TRAINING MANUAL ON MANAGEMENT OF POST PARTUM HAEMORRHAGE (PPH) 2016

NATIONAL TECHNICAL COMMITTEE
CONFIDENTIAL ENQUIRIES INTO MATERNAL DEATHS

Coordinated by:
Family Health Development Division
Ministry of Health Malaysia
2016
Maternal mortality has declined over the last five decades in Malaysia. Postpartum Haemorrhage (PPH) continues to haunt us as one of our leading causes of maternal deaths.

This revised training manual on PPH has brought to fore the latest evidence on the management options in PPH.

The quick reference guide has been introduced with this manual. This will serve to minimise the need to ‘flip the pages’ when the need arises to address PPH, in the clinical scenario.

The time, energy, effort and commitment of the committee to bring forth this manual is greatly appreciated. It must be acknowledged that excellent work has been done.

It is my fervent hope that this manual will be of benefit to both the public and the private sector in optimising the management of our PPH patients and hence reducing both the mortality and the morbidity of our patients.

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INTRODUCTION

Postpartum Haemorrhage is the leading cause of maternal death in many countries across the globe. In Malaysia, it remains the leading cause of death till date. Despite numerous efforts to curtail this debilitating death, many women who carry a pregnancy beyond 22 weeks of gestation still die at childbirth from bleeding.

Women who bleed of 500ml or more are included in this definition. There are numerous causes leading to this bleeding event. Many are preventable. It is prudent to intervene as early as possible as every minute matter in saving a life during this bleeding. The attending personnel must be familiar with the management of this condition. Prioritising the various steps in managing this condition is crucial.

This training module comes with a manual which is furnished with the A to Z in managing PPH which may occur at home, in a district hospital or in a facility with a specialist. This should be read together with the quick reference manual which has simplified flow charts and tables from the manual.

This is a revised edition of the previous manual as there has been new developments and evidence in managing Postpartum Haemorrhage such as drugs, manoeuvre and equipments.

OBJECTIVES

GENERAL OBJECTIVES

• To provide a comprehensive training guide on the management of PPH to all healthcare providers in Malaysia.
• To reduce maternal morbidities and mortalities from PPH.

SPECIFIC OBJECTIVES

• To serve as a reference material for the management of PPH in both public and private healthcare facilities.
• To educate trainee healthcare providers in colleges and universities on the current management of PPH.
• To provide a simplified and standardized training guide on PPH management at the hospital, health, home and alternative birthing centres.
• To empower the healthcare workers with appropriate knowledge and essential skills with regards to PPH management.
• To guide healthcare providers on effective referral system and pathways.
THIRD STAGE OF LABOUR

DEFINITION
The third stage of labour is the time from the birth of the baby to the expulsion of the placenta and membranes.

PHYSIOLOGY
Placental separation occurs at the time or soon after delivery.

Contraction and retraction of the uterus reduces uterine volume and the area of placental attachment, which aids in placental separation. Inevitably, the bleeding uterine sinuses form a retroplacental clot which aids in detachment and subsequent expulsion of the placenta.

A delayed third stage of labour is diagnosed if:
- It is not completed within 30 minutes with modified active management.
- It is not completed within 60 minutes from physiological management. However, the healthcare giver should be cautious as the risk of haemorrhage increases after 30 minutes.

MANAGEMENT
Options in management of third stage of labour include:
- Modified active management of third stage of labour.
- Physiological management.
- Combination of active and physiological management.

Table 1: Components of active and physiological management of third stage

<table>
<thead>
<tr>
<th>ACTIVE MANAGEMENT (CURRENT PRACTICE)</th>
<th>MODIFIED ACTIVE MANAGEMENT</th>
<th>PHYSIOLOGICAL MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylactic IM 1 ampoule Syntometrine or IM 10IU Oxytocin</td>
<td>Prophylactic IM 10IU Oxytocin</td>
<td>No routine uterotonic agents</td>
</tr>
<tr>
<td>Early cord clamping</td>
<td>Deferred clamping and cutting of the cord (after 1 min but before 5 minutes from fetal delivery)</td>
<td>No cord clamping until cessation of cord pulsation</td>
</tr>
<tr>
<td>Controlled cord traction after signs of placental separation</td>
<td>Controlled cord traction after signs of placental separation</td>
<td>Spontaneous delivery of placenta</td>
</tr>
</tbody>
</table>
Table 2: Advantages of active management of labour

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortens third stage of labour</td>
</tr>
<tr>
<td>Reduced incidence of haemorrhage, anaemia and blood transfusion</td>
</tr>
</tbody>
</table>

All patients should be advised on modified active management of third stage of labour. Physiological management may be desirable in low risk women who are not keen for active intervention. The increased risk of haemorrhage should be discussed. However, such patients will require active management in the event of:

- Haemorrhage.
- Failure to deliver the placenta after 60 minutes.
- The woman’s desire to artificially shorten the third stage.

TIMING OF ADMINISTRATION OF OXYTOCIC DRUGS

- Following delivery of anterior fetal shoulder or soon after birth, before the cord is clamped and cut.
- Multiple pregnancies should be ruled out prior to administration.

Table 3: Advantages of early and delayed cord clamping

<table>
<thead>
<tr>
<th>DELAYED CORD CLAMPING</th>
<th>EARLY CORD CLAMPING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase infant haemoglobin and serum ferritin</td>
<td>Reduce infant haemoglobin and serum ferritin</td>
</tr>
<tr>
<td>Increase in incidence of neonatal jaundice, polycythaemia</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Options of uterotonic agents

<table>
<thead>
<tr>
<th>SYNTOCINON</th>
<th>SYNTOMETRINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 10IU, IV 5IU</td>
<td>IM 1 ampoule (1ml)</td>
</tr>
<tr>
<td>Associated with less side effects of nausea &amp; vomiting</td>
<td>Contraindicated in patients with cardiac disease or hypertension</td>
</tr>
<tr>
<td>No difference in blood loss beyond 1,000mls</td>
<td>Reduces blood loss below 500mls</td>
</tr>
</tbody>
</table>

MODIFIED ACTIVE MANAGEMENT OF THIRD STAGE OF LABOUR

1. Intramuscular injection of 10IU oxytocin after delivery of anterior fetal shoulder, before the cord is clamped and cut.
2. Delayed cord clamping, not earlier than 1 minute but before 5 minutes from fetal delivery.
3. Monitor mother’s general condition, blood pressure, pulse rate and vaginal blood loss.
4. Palpate the uterus and ensure it is well contracted.
5. Deliver the placenta via controlled cord traction (CCT).
7. Examine the placenta and membranes for completeness.
8. Estimate and document the blood loss.
OBSERVATIONS AFTER COMPLETION OF THIRD STAGE OF LABOUR

1. General appearance.
2. Blood pressure.
3. Pulse rate.
4. Respiratory rate.
5. Uterine contractility.

IDENTIFY COMPLICATIONS EARLY!
COMMUNICATION IS IMPORTANT!
POSTPARTUM HAEMORRHAGE (PPH)

DEFINITION

PPH can be divided into primary or secondary:

- Primary PPH occurs within the first 24 hours after delivery.
- Secondary PPH occurs after 24 hours till 6 weeks post-delivery.

Traditionally, PPH is defined as blood loss above 500ml following vaginal delivery and above 1,000ml after abdominal delivery. A more clinical definition of PPH is any blood loss sufficient enough to cause haemodynamic instability.

Blood loss is often underestimated and that remains a major challenge in management.

Patients who are anaemic or who are volume depleted (e.g. dehydration, pre-eclampsia) may not be able to cope with excessive blood loss and are more prone to haemodynamic instability early.

Massive PPH is defined as PPH with blood loss in excess of 1,500ml. The rate of blood loss is also an essential factor to consider apart from the amount of loss.

AETIOLOGY OF PPH

Table 5: Causes of PPH

<table>
<thead>
<tr>
<th>“FOUR T’s”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone (70%)</td>
</tr>
<tr>
<td>Atonic uterus, distended bladder</td>
</tr>
<tr>
<td>Trauma (20%)</td>
</tr>
<tr>
<td>Uterine, cervical or vaginal injuries</td>
</tr>
<tr>
<td>Tissue (10%)</td>
</tr>
<tr>
<td>Retained products of conception</td>
</tr>
<tr>
<td>Thrombin (&lt;1%)</td>
</tr>
<tr>
<td>Pre-existing or acquired coagulopathy</td>
</tr>
</tbody>
</table>

Table 6: Risk factors for PPH

<table>
<thead>
<tr>
<th>AETIOLOGY</th>
<th>PROCESS</th>
<th>CLINICAL RISK FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormalities of uterine contraction (Tone) 70%</td>
<td>• Over distended uterus</td>
<td>• Polyhydramnios</td>
</tr>
<tr>
<td></td>
<td>• Uterine muscle exhaustion</td>
<td>• Multiple pregnancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Macrosomia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Precipitated labour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prolonged labour (1st or 2nd stage)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiparity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prolonged 3rd stage (&gt;30 mins)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Labour augmented with oxytocin</td>
</tr>
<tr>
<td>AETIOLOGY</td>
<td>PROCESS</td>
<td>CLINICAL RISK FACTORS</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Abnormalities of uterine contraction (Tone) 70%</td>
<td>• Intra-amniotic infection</td>
<td>• Endometritis, chorioamnionitis</td>
</tr>
</tbody>
</table>
| | • Drug-induced hypotonia | • Magnesium sulphate, nifedipine, salbutamol  
| | | • ‘Oxytocin desensitization’  
| | | • General anaesthesia  
| | • Functional or anatomic distortion of the uterus | • Fibroid uterus  
| | | • Uterine anomalies  
| | | • Placenta praevia  
| | | • Placental abruption |
| | • Bladder distension, may prevent uterine contraction | • Urinary retention  
| | • Idiopathic | • Previous PPH |
| Genital tract trauma (Trauma) 20% | • Episiotomy or lacerations (cervix, vagina or perineum) | • Instrumental delivery  
| | | • Precipitous labour  
| | | • Difficult vaginal deliveries  
| | • Extensions/lacerations at caesarean section | • Second stage caesarean section  
| | | • Fetal Malposition  
| | | • Deeply engaged fetal head/failed instrumental delivery  
| | • Uterine rupture | • Previous uterine surgery  
| | • Uterine inversion | • Mismanagement of third stage of labour  
| | | • Multiparity  
| | | • Fundal placenta  
| | | • Excessive cord traction  
| | | • Short umbilical cord |
| Retained products of conception (Tissue) 10% | • Retained cotyledon or succenturiate lobe  
| | • Morbidly adherent placenta | • Incomplete placenta at delivery  
| | | • Previous uterine surgery |
| Abnormalities of coagulation (Thrombin) <1% | • Pre-existing states:  
| | | • Hemophilia A  
| | | • Von Willebrand’s disease  
<p>| | | • Idiopathic Thrombocytopenic Purpura (ITP) | • History of hereditary coagulopathies |</p>
<table>
<thead>
<tr>
<th>AETIOLOGY</th>
<th>PROCESS</th>
<th>CLINICAL RISK FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormalities of coagulation (Thrombin) &lt;1%</td>
<td>• Acquired in pregnancy:</td>
<td>• Gestational thrombocytopenia</td>
</tr>
<tr>
<td></td>
<td>• Therapeutic anticoagulation</td>
<td>• HEllP syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Disseminated intravascular coagulation (DIC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Underlying thrombotic disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thromboprophylaxis</td>
</tr>
</tbody>
</table>
Table 7: Antenatal (booking and admission) risk reduction measures

<table>
<thead>
<tr>
<th>CLINICAL ASPECTS</th>
<th>RISK REDUCTION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Pregnant Women</td>
<td>Documented risk assessment at booking, admission and in labour with appropriate risk stratification (based on risk factors for PPH)</td>
</tr>
<tr>
<td>Routine Care</td>
<td>Optimise pre-delivery haemoglobin</td>
</tr>
<tr>
<td></td>
<td>i. Screen for anemia at booking:</td>
</tr>
<tr>
<td></td>
<td>Investigate and treat appropriately</td>
</tr>
<tr>
<td></td>
<td>ii. Ensure anemia corrected by 36 weeks</td>
</tr>
<tr>
<td></td>
<td>iii. Pre-delivery haemoglobin ≥11g/dl for high risk group of patient</td>
</tr>
<tr>
<td></td>
<td>iv. Documented plan of delivery</td>
</tr>
<tr>
<td>Maternal Blood Disorders</td>
<td>Involve haematologist/physicians combined clinic</td>
</tr>
<tr>
<td></td>
<td>i. Optimise blood disorders</td>
</tr>
<tr>
<td></td>
<td>ii. Documented plan of care</td>
</tr>
<tr>
<td>Previous Caesarean Section</td>
<td>Ultrasound scan for placental localization</td>
</tr>
<tr>
<td></td>
<td>If placenta praevia – do colour Doppler ultrasound scan to look for morbidly adherent placenta</td>
</tr>
<tr>
<td>Elective Caesarean Section &amp; Induction of Labour (IOL)</td>
<td>• Ensure procedure is indicated</td>
</tr>
<tr>
<td></td>
<td>• Check FBC (Full Blood Count)</td>
</tr>
<tr>
<td></td>
<td>• Do group, screen &amp; hold (GSH)</td>
</tr>
</tbody>
</table>

Table 8: Intra-partum risk reduction measures

<table>
<thead>
<tr>
<th>CLINICAL ASPECTS</th>
<th>RISK REDUCTION MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Episiotomy</td>
<td>• Selective use of episiotomy</td>
</tr>
<tr>
<td></td>
<td>• Caution in patients with prominent vulval varicosities</td>
</tr>
<tr>
<td>3rd Stage of Labour</td>
<td>• Modified active management</td>
</tr>
</tbody>
</table>
### CLINICAL ASPECTS RISK REDUCTION MEASURES

| More than one Identified Risk Factors for PPH | • Deliver in hospital with specialist  
• IV access in active labour  
• FBC and GSH  
• Modified active management of the 3rd stage |
| Chorioamnionitis | • Broad spectrum antibiotics  
• Close BP, PR, RR, temperature monitoring |
| Emergency Caesarean Section | • Ensure IV access  
• Do group and cross-match (GXM) |
| Ensure registrar/specialist present if: | • Increased risk of extended uterine tears  
• Deeply engaged fetal head (e.g. prolonged second stage, failed instrumental delivery)  
• Transverse lie  
• Placenta praevia/abruptio  
• Evidence of abnormal coagulation |
| Instrumental Delivery | • Ensure valid indication  
• Ensure prerequisites are fulfilled  
• Performed by a trained personnel |
| Trial of Vaginal Birth after Caesarean Section (VBAC) | • Close monitoring for any early signs of uterine scar dehiscence/rupture |

**Table 9: Post-partum risk reduction measures**

| More than one risk factors for PPH – observation following vaginal delivery and caesarean section | • Monitor in HDU/labour room (at least for first 2 hours) using the MOMS Chart  
• Oxytocin infusion  
• Consider carbetocin in selected patients if available  
• Actively encourage/assist women to void soon after birth  
• Facilitate skin-to-skin contact with baby, under supervision  
• Promote endogenous release of oxytocin by:  
  – Keeping the woman warm and calm  
  – Assisting early breast feeding |
CLINICAL ASPECTS | RISK REDUCTION MEASURES
--- | ---
Early recognition of perineal haematoma | Look for perineal haematoma if:

- Hypovolaemic shock disproportionate to the revealed blood loss
- Feelings of pelvic pressure
- Urinary retention
- Excessive or persistent perineal pain

Table 10: Components in PPH management

**All FOUR components of management MUST be done SIMULTANEOUSLY**

1. **COMMUNICATION**
   - Activate Red Alert.
   - Alert senior obstetrician.
   - Alert anaesthetic team for support in resuscitation and intensive monitoring in the intensive care.
   - Alert blood bank.
   - Alert porters for collection of blood samples, results and products.
   - Check blood availability – Emergency ‘O’ blood.
   - Allocate roles to team members.
   - Alert one member of the team to record events, fluids, drugs and vital signs.
   - Keep patient and immediate next-of-kin informed.

2. **RESUSCITATION**
   The two main objectives of initial resuscitation are restoration of blood volume and oxygen-carrying capacity.
   - ABC (Airway, Breathing, Circulation), give oxygen (15l/min via face mask).
   - Assess consciousness level, if impaired – ensure airway is protected.
• 2 large bore cannula & blood for cross-match, ensure good peripheral lines.
• Fluid resuscitation; WARMED fluid via rapid infuser or pressure bags.
• Insert CBD – monitor urine output.
• Crystalloids (Ringer’s Lactate) up to 2 litres (ratio of volume loss: crystalloids 1:3).
• Crystalloids preferred first as compared to colloids.
• Colloids (Gelofusine) up to 1-2 litres until blood arrives (ratio of volume loss: colloids 1:1).
• Blood (Emergency ‘O’ blood) – consider “Massive Transfusion Protocol” activation.

Table 11: Poor prognostic values in resuscitation

<table>
<thead>
<tr>
<th>POOR PROGNOSTIC VALUES IN RESUSCITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temperature &lt;34ºC</td>
</tr>
<tr>
<td>• Base deficit &gt;-6</td>
</tr>
<tr>
<td>• pH &lt;7.1</td>
</tr>
<tr>
<td>• Lactate &gt;4mmol/l</td>
</tr>
<tr>
<td>• Ionized calcium &lt;1.1mmol/l</td>
</tr>
</tbody>
</table>

MONITORING AND INVESTIGATIONS

• BP, PR.
• RR, SpO2.
• Temperature: Avoid hypothermia.
• Pain score.
• Fluid balance: Monitor urine output.
• Invasive monitoring (early) – arterial line, beat to beat blood pressure as a guide to response, for frequent blood sampling and to guide transfusion therapy.
• Prompt resuscitation remains the principle goal.
  – Central venous line is not imperative and can wait until the situation is under control. It may be necessary for infusion of inotropes and vasopressors or to help with rapid fluid transfusion rather than to measure numbers e.g. CVP.

• Take blood samples for FBC, coagulation profile, ABG (bedside testing of haemoglobin may be of useful). However, this should not replace clinical judgement.
• Vasopressor or inotropic drugs may be required.

Ensure all investigations taken are REVIEWED and MANAGEMENT IMPLEMENTED accordingly.

ARRESTING THE BLEED

• Uterine massage.
• Ensure placenta and membranes are complete.
• Administer uterotronics and review management of PPH below.
RESTORATION OF CIRCULATORY BLOOD VOLUME TO MAINTAIN ADEQUATE TISSUE PERFUSION AND OXYGENATION IS THE ESSENCE OF PPH MANAGEMENT.

Thus, **early recognition and timely intervention** to prevent shock and its consequences are extremely important.

**Table 12: Clinical correlation of blood loss in a 50kg patient**

<table>
<thead>
<tr>
<th>BLOOD LOSS (% BLOOD VOLUME)</th>
<th>MEAN ARTERIAL BLOOD PRESSURE (MMHG)</th>
<th>SYMPTOMS/SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–15% (500ml)</td>
<td>Normal</td>
<td>Postural hypotension Mild tachycardia (90–100bpm)</td>
</tr>
<tr>
<td>15–30% (1,000–1,500ml)</td>
<td>Slight fall</td>
<td>Tachycardia (110–120bpm) Thirst Weakness</td>
</tr>
<tr>
<td>30–40% (1,500–2,000ml)</td>
<td>50–70</td>
<td>Tachycardia (120–140bpm) Pallor Oliguria (&lt;30ml/hr) Confusion Restlessness</td>
</tr>
<tr>
<td>&gt;40% (&gt;2,000 ml)</td>
<td>&lt;50</td>
<td>Tachycardia (&gt;140bpm) Anuria Air hunger Coma Death</td>
</tr>
</tbody>
</table>

Blood loss is always underestimated. Therefore, please look for clinical signs of:
- Tachycardia.
- Hypotension.
- Reduced pulse pressure.
- Delayed capillary refilling time.
- Oliguria.

**Shock index may be used as an adjunct to diagnose occult shock (if >1)**

**SHOCK INDEX – HR/SBP (normal 0.7–0.9)**
Table 13: Signs of shock

<table>
<thead>
<tr>
<th>EARLY SHOCK</th>
<th>LATE SHOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awake, aware, anxious</td>
<td>Confused or unconscious</td>
</tr>
<tr>
<td>Slightly fast pulse (110 per minute or greater)</td>
<td>Very fast and weak pulse</td>
</tr>
<tr>
<td>Slightly fast breathing (30 respirations per min)</td>
<td>Extremely fast and shallow breathing</td>
</tr>
<tr>
<td>Pale</td>
<td>Pale and cold</td>
</tr>
<tr>
<td>Mild low blood pressure (systolic less than 90mmHg)</td>
<td>Very low blood pressure</td>
</tr>
<tr>
<td>Urine output of 30ml per hour or greater</td>
<td>Urine output less than 30ml per hour</td>
</tr>
</tbody>
</table>

Total blood volume increases about 40-45% in pregnancy, which is roughly 70mls/kg at term.

Calculation of blood volume for a 60kg patient; (total blood volume: 60 x 70ml = 4,200ml).

BP & PR are relatively insensitive during pregnancy. Tachycardia does not develop until blood loss ≥15% of total blood volume.

BP only drops after blood loss exceeds 30-40% of total blood volume. Therefore, presence of hypotension indicates massive blood loss. Inadequate and delayed intervention may result in rapid deterioration.

The patient’s clinical condition, response to initial fluid resuscitation and pre-morbid status are essential considerations prior for decision on blood transfusion. The threshold should be lower if:
1. The patient has anemia.
2. Rapid or ongoing blood loss.

ANAESTHETIC MANAGEMENT

- General anaesthesia is usually indicated for surgical intervention in a haemodynamically compromised patient.
- Haemodynamic compromise and coagulopathy should be addressed prior to surgery whenever possible, although surgical control may at times be required to enable effective resuscitation.
- In addition, surgery may be lengthy with the potential for further deterioration of patient. Rapid sequence induction is indicated, following antacid prophylaxis (e.g. Sodium Citrate and Ranitidine).
- Regional anaesthesia may be contraindicated due to maternal coagulopathy and risk of neuraxial haematoma as well as haemodynamic compromise.
- Induction of general anaesthesia in severely hypovolemic patient may cause a catastrophic fall in cardiac output. Therefore, ketamine is a suitable induction agent (0.7-1.5mg/kg IV).
- Aim for optimal mean arterial pressure during surgical haemostasis and once it is secured surgically the BP can be pushed up to patient’s normal baseline BP.
Fluid management is the most important aspect as the massive blood loss has to be replaced rapidly to prevent multi-organ impairment and failure. Blood loss of 1ml can be replaced by infusing 3ml of crystalloid or 1.5ml of colloid.

- E.g. 500ml of blood loss requires 1,500ml of Ringer’s Lactate or 750ml of Gelofusine.

- If blood loss is more than 30% of blood volume, blood transfusion must be started.

- While waiting for blood, 2l of crystalloid and 1–2l of colloid solution can be infused. Ringer’s Lactate is the preferred crystalloid and Gelofusine is the colloid of choice.

- Estimation of blood loss is difficult and often underestimated.

- Be cautious on fluid balance as over transfusion and dilution before achieving surgical haemorrhage control is associated with poorer outcomes.

- It is important to avoid the vicious cycle of hypothermia, acidosis and coagulopathy in the massively transfused patient. Warm fluids must be given and care directed to achieving normothermia by the use of devices such as forced air warming blanket.

- Correction of electrolyte imbalance may be necessary; this may include hyperkalemia (secondary to high concentrations of potassium in transfused blood) and hypocalcaemia.

- If a patient has loss a significant amount of blood leading to massive fluid shift, it is safer not to reverse the patient and to continue postoperative management in ICU.
UTERINE ATONY

MOST COMMON CAUSE OF PPH

First line drugs

1. Oxytocin

IV Oxytocin 5IU slow bolus over 1-2 minutes
   • May repeat dose after 5 minutes – up to a total dose of 10IU.
   • Start IV infusion of Oxytocin 40IU/1l in 500mls HM at a rate of 125mls/hour.

2. Syntometrine

IM syntometrine 1 ampoule (5IU Oxytoin & 0.5mg Syntometrine/ml)
   (should not be repeated within 2 hours, maximum 3 ampoules in 24 hours).

3. Methyl prostaglandin F2 alpha (Carboprost: 250 micrograms in 1ml)

IM Carboprost 250 micrograms
   • Repeated as required every 15 minutes to a maximum of 2mg (8 doses) INFORM consultant by the third dose.

4. Misoprostol/Gemeprost

   • Rectal Misoprostol 800–1,000 micrograms.
   • Rectal Gemeprost 1mg.

OTHER MEASURES WHILE OPTIMISING MEDICATIONS

• Consider bimanual compression and/or aortic compression during transfer or while resuscitating the patient.
• Consider anti-shock garment during transfer of patient to tertiary hospital if available.
• If intractable bleeding despite uterotonics – consider surgical management SOONER than later.

SURGICAL PROCEDURES

• If bimanual compression has been effective (tamponade test) consider use of intrauterine balloon tamponade – e.g. Bakri balloon, Sengstaken-Blackmoore, Rusch catheter.
• Uterine packing is not recommended as it may conceal the bleeding.
• Reassess on-going blood loss and look out and treat coagulopathy if present.
• If the above measures are ineffective in controlling bleeding – consider laparotomy EARLY with:
  1. Uterine compression sutures.
RETAINED PLACENTA

DEFINITION
The placenta is retained if it is not expelled within 30 minutes after delivery of the baby. It can be due to an “entrapped placenta” or a morbidly adherent placenta.

MANAGEMENT OF A RETAINED PLACENTA
- Ideally, manual removal of placenta (MRP) should be performed in OT.
- Monitor vital signs and blood loss every 15 minutes.
- Ensure two large IV access (16/18G).
- Blood grouped and cross-matched.
- Institute resuscitative measures if patient is haemodynamically unstable.
- Insert CBD and monitor I/O chart.
- Intravenous oxytocin infusion of 40 units in 500mls normal saline or Hartmann’s, to infuse at 125mls/hour while awaiting for operation theatre.
- Uterine massage and ensure uterus is well contracted.
- Avoid excessive cord traction as this may cause uterine inversion or the cord to be snapped.
- Obtain consent from patient and inform partner/next-of-kin.
- Administer single dose of broad spectrum antibiotic before procedure.

If the level of shock is disproportionate to blood loss, think of CONCEALED bleeding

PROCEDURE
- Clamp the umbilical cord.
- Wearing the MRP gloves, insert a hand into the vagina and up into the uterus along the cord.

(Source: healthphone.org)
• If the cord has been detached previously, insert a hand into the uterine cavity.
• The non-dominant hand should be placed at the abdomen to support the uterus and to provide counter traction during the removal process. (Figure 2).
• Move the fingers of the hand laterally until the edge of the placenta is located.

**Figure 2:**
Supporting the fundus while detaching the placenta.
(Source: healthphone.org)

• Explore the entire cavity until a line of cleavage is identified between the placenta and the uterine wall.
• Detach the placenta from the implantation site by keeping the fingers tightly together and using the edge of the hand to gradually create a space between the placenta and the uterine wall.
• If the placenta does not separate from the uterine surface by gentle lateral movement of the fingertips at the line of cleavage, suspect a morbidly adherent placenta and do not attempt further separation. The placenta can be left in situ if not actively bleeding. If bleeding, proceed to laparotomy and hysterectomy.
• With the other hand, continue to provide counter-traction to the fundus by pushing it in the opposite direction.
• Ensure the uterine cavity is empty.

**Figure 3:**
Proceed slowly all around the placental bed until the whole placenta is detached from the uterine wall.
(Source: brooksidepress.org)
• Administer oxytocin 40 units in 500ml IV fluids (normal saline or Ringer’s Lactate) at 125mls per hour.
• Have an assistant massage the fundus of the uterus to encourage uterine contraction.
• Examine the uterine surface of the placenta to ensure that it is complete. If any placental lobe or tissue is missing, explore the uterine cavity to remove it.
• Note: Intra-umbilical vein injection with oxytocin is not recommended.

CARE AFTER MANUAL REMOVAL OF PLACENTA

• Monitor pulse rate, blood pressure, respiratory rate and check the amount of vaginal bleeding hourly.
• If necessary, correct dehydration or shock by giving intravenous fluids. If the woman is in shock, start a blood transfusion.
• Ensure adequate analgesia.

COMPLICATIONS

The three major complications following manual removal of the placenta are:
• Haemorrhage and shock.
• Infection.
• Genital tract injury.

MANAGEMENT OF RETAINED PRODUCTS OF CONCEPTION

• General measures as mentioned above.
• Perform an immediate digital evacuation of retained tissue, preferably in OT.
• Administer broad-spectrum antibiotics.
• Prophylactic oxytocin infusion.
GENITAL TRACT TRAUMA

UTERUS

UTERINE INVERSION:

Figure 5:
Total uterine inversion.
(Source: google image search)

- Acute uterine inversion may present with sudden collapse during the third stage of labour due to neurogenic shock.
- Common presentation as a mass at the vagina or introitus. The uterine fundus may be indented or not palpable per abdomen.
- Appropriate resuscitation, analgesia and replacement of the uterus should be organized concurrently. Judicious use of fluid resuscitation – risk of fluid overload.
- If delayed, replacement will be more difficult due to the constricting ring around the uterus.
- The placenta should not be removed until replacement of the uterus.
- Options of management are manual replacement, hydrostatic replacement and surgical correction.

a. Manual replacement:

Figure 6: Manual replacement of inverted uterus.
(Source: emtutorials.com)
• The hand is placed inside the vagina. Gentle manoeuvre of the fingers around the cervical ring and simultaneous upward pressure with the palm of the uterine fundus.

• During replacement, remember “last thing out, first thing in” – i.e. the portion of the uterus that came down last should go in first (lower segment first, then fundus).

• Sustained pressure for several minutes is usually required.

• Tocolysis is helpful to relax the cervical ring and aid repositioning.

b. Hydrostatic replacement (O’Sullivan’s method):

• The vaginal orifice is occluded with a silicone ventouse cup inserted into the vagina or by opposing together both the labial. This gives a good seal.

• Then infuse at least 1l of warm saline into the vagina, through the ventouse cup, via a rubber tube held as high as possible above the patient (about 1-2 metres) – to ensure rapid flow.

• The saline distends the vagina and subsequently pushes the fundus back to its original position.

c. Surgical correction:

• The last resort when conservative methods above have failed.

• During laparotomy in Huntington procedure, identify the dimple of the inverted uterus and apply gentle upward traction with Allis forceps to reduce the inversion until the procedure is completed.

• If the above technique fails, Haultain’s technique is applied.

• This involves incising the cervical ring posteriorly with a longitudinal incision to facilitate uterine replacement by the Huntington’s method.

• After replacement is complete, the incision is repaired in 2 or 3 layers.

• After the uterus has been replaced, IV 40 units oxytocin infusion is commenced and infused for 4-6 hours, to prevent recurrence and uterine atony.

• Commence antibiotics to prevent infection.

UTERINE RUPTURE:

Increased risk in patients with:

• Previous uterine surgeries – e.g. myomectomy, caesarean section, previous cornual ectopic resection.

• Poorly-spaced pregnancy.

• Induction of labour with prostaglandin/oxytocin.

• Augmentation of labour.

It may present with:

• Fetal heart rate abnormality.

• Uterine scar tenderness.

• Persistent pain in between contractions.
• Cessation of contraction.
• Fresh vaginal bleeding/haematuria.
• Maternal tachycardia.
• Sudden maternal collapse.
• Sudden intrauterine death.
• Higher presenting part from previous findings.

The management of uterine rupture involves resuscitation and laparotomy with uterine repair, KIV hysterectomy.

Figure 7: Uterine tears. (Source: doctorstock.photoshelter.com)

TRAUMA DURING CAESAREAN SECTION

Trauma refers to uterine tears and lacerations, either laterally with or without broad ligament extensions or vertical tears downwards.

Exteriorize the uterus if extended tears are suspected

RISK FACTORS
• Difficult delivery of fetal head.
• Failed instrumentation.
• Deeply engaged head – e.g. Caesarian Section during second stage of labour.
• Obstructed labour.
• Fetal malposition.
• Transverse lie requiring surgical extensions.
POSSIBLE COMPLICATIONS

- PPH.
- Bladder/ureteric injuries.
- Broad ligament haematoma.
- Infection.
- Adhesions in future pregnancy.
- Uterine rupture in future pregnancies.
- Need for caesarean delivery in future pregnancies.

PREVENTION

Pre delivery

1. Ensure caesarean section is indicated.
2. The caesarean section must be performed by an experienced and trained doctor (credentialed and privileged).
3. May need an assistant to disengage the fetal head from below.
4. Re-examine vaginally prior to anaesthesia to exclude impending vaginal delivery.
5. Perform caesarean section in modified lithotomy position (to aid in manoeuvres to deliver fetal head).

Figure 8:
Modified lithotomy position.
(Source: openi.nlm.nih.gov)

Intra-operatively

1. Adequate exposure and incision size.
2. Enter the peritoneal cavity as high as possible as the bladder may distended.
3. Identify the lower segment. It may be very thin. Palpate the uterus and feel for the presenting part. Make a slightly higher incision but ensure it is still at the lower segment.
4. Use a scissor to extend the uterine incisions laterally. Avoid blunt lateral extension as this may cause extended tears. Curve the incisions laterally and upwards to avoid injury to uterine artery complex.
5. Deliver the head in between contractions.
6. Use the left hand/non dominant hand to assist dis-impaction of the fetal head while the assistant assist in dislodging it from below. Ensure the surgeon’s hand is kept straight and avoid flexing the wrist.
7. The fetal head should be dislodged till the uterine incision before delivery. Flexing the fetal head from below will also aid the surgeon in delivering the head.

8. If still unsuccessful, consider S/C Salbutamol 0.25mg.

9. If this fails, then try to push the fetal shoulders upwards with the right hand until the fetal head can be accessed via the left hand.

10. Another option is to grab the fetal legs and deliver as breech. This may require an inverted “T” (J, U) incision on the uterus.

**Post delivery**

1. Administer prophylactic uterotonic agents (IV 5 units oxytocin).
2. After delivery of the placenta, exteriorize the uterus and examine for extended tears.

**MANAGEMENT OF EXTENDED TEARS**

- Exteriorize the uterus.
- Inform the specialist.
- Do not suture blindly without identifying the extend of the tear.
- Ensure adequate exposure by appropriate retractors and use the suction to clear the surgical field.
- Ensure the bladder has been pushed down by dissecting the UV fold downwards.
- Examine for posterior uterine tears and cervical tears.
- Clamp the bleeders.
- Identify the apex of the tear.
- Place an Allis forceps at the apex of the tear to aid in repairing.
- Suture continuously using synthetic polyglycolic absorbable sutures (2/0) from the apex to the uterine incision.
- If the apex cannot be identified and extends beyond the cervix, a combined abdominal and vaginal approach is needed for repair.
- If the tear extends laterally into the broad ligament, open the round ligament and the anterior leaf of the broad ligament to identify the apex and bleeders before securing it.
- Ensure the ureters are identified and preserved.
- Suture the tear in two layers before uterine closure.
- Insert drain.
- Consider uterotonics.
- Broad spectrum antibiotics.
- Documentation:

  In INTRACTABLE bleeding due to tears assess the need for uterine artery ligation (include Internal Iliac Artery ligation, hysterectomy depending on extent of tear).
MANAGEMENT OF BLEEDERS FROM PLACENTAL BED

This is common following caesarean section for placenta praevia, especially posterior praevia.

Management

- Exteriorize the uterus.
- Administer uterotonic agents.
- Place the non-dominant hand posterior to the uterus and apply multiple figure of eight sutures at the placental bed using synthetic polyglycolic absorbable sutures size 2/0.
- Consider insertion of Bakri Balloon via the abdominal approach.
- Vertical compression sutures at the lower segment or bilateral uterine artery ligation has also been reported to be beneficial.

CERVIX

Perform a EUA if cervical or deep vaginal tears are suspected

Vaginal/cervical lacerations are common and the bleeding may be profuse due to the increase in vascularity. These lacerations are suspected if bleeding continues despite a well contracted uterus.

Examination for genital tract trauma:

- Ideally should be done in OT.
- One would need good lighting and at least 2 assistants.
- The cervix is examined first. 2 Sim’s speculum and 2 sponge forceps are used to visualise all the 4 quadrants of the cervix for any laceration.
- Next the vaginal fornices are examined, followed by the lateral vaginal wall and finally the perineum is examined.
- A careful examination of the vaginal fornices must be made. If the laceration extends upwards into the uterus, extensive bleeding can occur into the broad ligament. This is suspected when a pelvic mass is felt beside the uterus.

Repair of cervical tear

- Clean the perineum, vulva, vagina with antiseptic solution.
- Catheterize the bladder.
- Use the Sim’s speculum to visualise the cervix and identify the tear.
• Place a sponge forceps on one side of the tear and a second sponge forceps on the other side of the tear.
• Place the handles from both forceps in one hand and pull toward you. The forceps will hold the cervix steady while you repair it.
• Start suturing from the apex (top) of the tear. If you find difficulty in reaching the apex, apply the suture below it and pull on the suture. The apex of the tear will now come under your reach.
• Apply interrupted sutures along the length of the wound about 1 centimetre apart, taking the whole thickness of each lip of the cervix.
• Observe for a few minutes after suturing to ensure adequate hemostasis.

Figure 9:
Holding the cervix steady with forceps for laceration repair.

Figure 10:
Repair of cervical tear.

VAGINAL/VULVA

Multiple vaginal lacerations
• Arterial bleeding will have to be secured.
• If the apex of the tear is very high, a stay suture is first placed as high as possible. By applying downward traction on the stay suture, the apex above the stay suture would be more accessible to secure.
• If the apex is extending upwards and cannot be identified, may need to resort to combined laparotomy and vaginal approach.
• Suture the vaginal mucosa continuously. If multiple tears/bleeders, apply figure of ‘8’ sutures.
• During repair of high vaginal tear involving the posterior fornix, beware of inadvertent ureteric injuries.
• If the vagina is too friable, sutures might cut through. This can cause difficulty during repair. In such case, vaginal packing can be done to control the bleeding, and is removed after 12-24 hours.
• The roller gauze which is used to pack the vagina should be soaked with flavin or povidone iodine in order to lubricate it. This would prevent friction and trauma during removal.
• Administer prophylactic antibiotics.
• Insert CBD to prevent acute urinary retention due to pain and possible pressure on the urethra by the vaginal pack.

**Vulvo-vaginal haematomas**

**Figure 11:**
Vaginal blood supply.
(Source: Google Image search)

**Figure 12:** Classification of vaginal haematomas.
(Source: Google Image search)
1. **Infra-levator haematomas:**
   - Can be minor and self-limiting.
   - Haematomas <5cm in diameter – manage conservatively with analgesia and antibiotics.
   - Haematomas >5cm in diameter or expanding haematomas requires surgical intervention under anaesthesia.
   - This comprises of incision and drainage, identifying and ligating bleeding vessels and prevention of re-filling.
   - The surgical incision should be made through the vaginal mucosa to prevent visible scarring on the perineal skin.
   - After evacuation of blood clots, the cavity should be examined for any bleeding points.
   - Multiple figure of ‘8’ sutures can be applied to achieve haemostasis, using absorbable sutures.
   - If there is persistent oozing with no demonstrable bleeding point, again a vaginal pack can be inserted as a tamponade. These are removed after 12-24 hours.

2. **Supra-levator haematomas:**
   - Collection of blood occurs above the levator ani muscles.
   - These are likely to be missed as there may not be any visible signs of bleeding or haematoma.
   - They should be suspected in the presence of upper vaginal tears with uterus that is not centrally located.
   - Clinically, the patient’s condition is disproportionate to the visible blood loss.
   - They will present with lower abdominal pain with signs and symptoms of shock.
   - The presentation could be immediately after delivery or even after the first 24 hours.
   - CT scan/MRI are helpful to determine the size and site of the haematoma.
CONSERVATIVE MANAGEMENT

- Recommended if the patient is stable and the haematoma is not increasing in size.
- Blood transfusion may be required.
- Patients should be put on antibiotics to prevent to infection, which could lead to an abscess.
- If facilities available – for internal iliac artery embolization.

SURGICAL MANAGEMENT

- Indicated if the haematoma is increasing in size or if the patient is haemodynamically unstable.
- Perform exploratory laparotomy to evacuate the haematoma and ligate the bleeding vessels.
- However, in broad ligament haematomas, this might not be always possible. In such cases, we would have to resort to internal iliac artery ligation.
- Patients should be on broad spectrum antibiotics.

ADHERENT PLACENTA

RISK FACTORS

- Placenta praevia.
- Previous caesarean section.
- Advanced maternal age.
- Grandmultiparity.
- Previous curettage.
- Myomectomy.
- Submucous myoma.
- Asherman’s syndrome.
- A short caesarean to conception interval (<18 months).

DIAGNOSIS

Ultrasonography can be used to diagnose an adherent placenta.

Table 14: Ultrasound feature of a morbidly adherent placenta

<table>
<thead>
<tr>
<th>ULTRASOUND FEATURES OF A MORBIDLY ADHERENT PLACENTA</th>
<th>GREY SCALE</th>
<th>COLOUR DOPPLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of retroplacental hypoechoic zone</td>
<td></td>
<td>Dilated vascular channels with diffuse lacunar flow</td>
</tr>
<tr>
<td>Progressive thinning of the retroplacental hypoechoic zone (myometrium) &lt;2mm</td>
<td></td>
<td>Irregular vascular lakes with focal lacunar flow</td>
</tr>
</tbody>
</table>
**ULTRASOUND FEATURES OF A MORbidLY ADHERENT PLACENTA**

<table>
<thead>
<tr>
<th>GREY SCALE</th>
<th>COLOUR DOPPLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple placental lakes</td>
<td>Hypervascularity linking placenta to bladder</td>
</tr>
<tr>
<td>Thinning of the uterine serosa-bladder wall complex</td>
<td>Dilated vascular channels with pulsatile venous flow over cervix</td>
</tr>
<tr>
<td>Elevation of the tissue beyond the uterine serosa-extension of the placenta beyond the myometrium</td>
<td>Poor vascularity at sites of loss hypoechoic zone</td>
</tr>
</tbody>
</table>

![Figure 13: Placenta preavia without features or a morbidly adherent placenta.](image1)

![Figure 14: Features or a morbidly adherent placenta.](image2)

Magnetic resonance imaging may be informative to assess involving of surrounding viscus, especially if placenta percreta is suspected. It may also be beneficial in patients who are obese or with a posterior praevia.

Diagnostic features include abnormal uterine bulging, heterogenicity of placental signal intensity and the presence of abnormal dark intra placental bands.
**ANTENATAL CARE**

- All patients with previous caesarean section should have an ultrasound for placental localization.
- Anterior praevia major with previous uterine scar should have further ultrasound examination to exclude a morbidly adherent placenta.
- Documented plan of care and patient counselling must be done.

**INTRA-PARTUM CARE**

1. **Multidisciplinary management**
   - Consultant obstetrician.
   - Consultant anaesthetist and ICU care post operatively.
   - Surgeons, urologist, paediatricians and blood bank.
   - Blood and blood products in OT.
   - Intervention radiologist if facilities available.

2. **Plan of management**
   - Midline skin incision, and a classical caesarean section with placental non separation and a total hysterectomy is the ideal procedure in confirmed adherent placenta cases.
   - The placenta may be left in situ and managed expectantly if there is no evidence of placental separation and the patient is not bleeding. This may be beneficial if it is completely adhered or if it is a percreta where the surgical intervention may be associated with significant morbidity.
   - The triple P procedure which involves resection and reconstruction of the uterus has been reported with good success rates.
   - Intra-operative cell savage has been reported to be beneficial. Internal iliac artery balloon occlusions are recommended if facilities are available to reduce blood loss.

**Suspect a morbidly adherent placenta in patients with risk factors**

**Do not attempt to remove the placenta if a morbidly adherent placenta is suspected**

Methotrexate is not recommended for expectant management of morbidly adherent placenta. Prophylactic antibiotics and ultrasound surveillance is recommended.
COMPLICATIONS

Maternal:
1. Hysterectomy: 0.7% to 9.0% with one previous caesarean delivery.
2. Injury to other organs:
   a. Ureteral injury: 0.03% to 1.1%.
   b. Cystotomy: 0.1% to 4.5%.
   c. Bowel Injury: 0.1% to 1.1%.
3. Blood transfusion: 4.0 to 15.7%.
4. Disseminated intravascular coagulation.
5. Infection.
6. Maternal death: 1-7%.

Perinatal:
1. Fetal growth restriction.
2. Prematurity.
SECONDARY PPH

DEFINITION
Abnormal or excessive bleeding from the genital tract after 24 hours to 6 weeks post-natally.

Common clinical presentations are sudden episodes of fresh vaginal bleeding, abdominal pain, fever and passing out products of conception.

CAUSES OF SECONDARY POSTPARTUM HAEMORRHAGE
- Retained products of conception.
- Lower genital tract trauma.
- Infection (endometritis) or dehiscence of uterine scar.
- Bleeding disorders, coagulopathy and use of anticoagulants.
- Trophoblastic disease (uncommon).
- Chronic sub-involution of the uterus (uncommon).
- Uterine AV malformation (rare).

TREATMENT OF SECONDARY POSTPARTUM HAEMORRHAGE
- General resuscitation.
- Start broad spectrum antibiotic after taking blood cultures and high vaginal swab.
- Transfer patient to hospital with specialist.
- Investigations of secondary PPH should include high vaginal swab, full blood count, coagulation profile and electrolytes.
- A pelvic ultrasound may help to identify the presence of retained products of conception.
- It is generally accepted that secondary PPH is often associated with infection (endometritis) and conventional treatment involves antibiotics and uterotonics.
- In massive haemorrhage and if the cavity is confirmed empty, insertion of balloon catheter may be an option.
- Surgical measures should be undertaken if there is excessive or continuing bleeding.
- Perform surgical evacuation after adequate resuscitation and commencement of antibiotic therapy (perform evacuation within 12 hours of diagnosis and initiation of antibiotics, last dose to be given within an hour from the procedure).
- There is a significant risk of uterine perforation in such cases and the evacuation of the uterus should be carried out by trained person (to consider suction & evacuation under ultrasound guidance).
- The decision of surgical evacuation should be in consultation with obstetrician.
DOMICILIARY DELIVERIES
(HOME/HEALTH CLINIC AND
ALTERNATIVE BIRTH CENTERS)

The attending staff should carry the delivery bag with the “PPH pack”.

PPH PACK FOR HOME/ABC DELIVERY

Table 15: Components of the “PPH Pack”

<table>
<thead>
<tr>
<th>NO</th>
<th>ITEM</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fluids</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Drugs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lines</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Support Item</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Drainage</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Documentation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hartmann’s Solution</th>
<th>2 pint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gelofusine</td>
<td>1 pint</td>
</tr>
<tr>
<td></td>
<td>Syntometrine</td>
<td>2 ampoules (IM)</td>
</tr>
<tr>
<td></td>
<td>Syntocinon</td>
<td>4 ampoules (IV)</td>
</tr>
<tr>
<td></td>
<td>Misoprostol*</td>
<td>2 suppositories</td>
</tr>
<tr>
<td></td>
<td>I/V infusion set</td>
<td>3 sets</td>
</tr>
<tr>
<td></td>
<td>16 and 18 G cannula</td>
<td>2 each</td>
</tr>
<tr>
<td></td>
<td>Roller Gauze 2 inches</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CBD set</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Referral Checklist</td>
<td>2</td>
</tr>
</tbody>
</table>

*Misoprostol – to be made available once approved by MOH Pharmacy committee.

If resources available, consider to include:
- ‘Non-pneumatic anti-shock garments’.
- Bakri balloon.

IMMEDIATE MEASURES

Call for medical assistance/Obstetric Retrieval Team and give clear instructions for help. Inform that this is a PPH case together with the severity of PPH.
- Keep patient flat with leg elevated.
- Remember resuscitation (‘ABC’).
- Set up 2 intravenous lines using large bore cannula (size 18G or larger).
- Run Hartmann’s/Gelofusine solution fast (refer to fluid resuscitation on PPH management).
- Give IM syntometrine/IV syntocinon and repeat if necessary (refer drug appendix; consider per rectal misoprostol if available).
• Massage the uterus gently.
• Consider anti-shock garment during transfer of patient to hospital if available.

**ASSESS THE CONDITION OF PATIENT AND RESUSCITATE AT THE SAME TIME**

• Monitor the vital signs every 15 minutes and DOCUMENT (BP, PR, RR).
• General condition – alert, drowsy, unresponsive.
• Assess blood loss – use pictograph (see Appendix).
• Keep patient warm with blankets.
• Palpate for the uterus e.g. size, consistency and contractility.
• Check the bladder and catheterise – I/O chart.
• If placenta is delivered, examine carefully the placental membranes and its cotyledons to ensure its completeness.

**SUSPECT ATONY IF THE PLACENTA HAS BEEN DELIVERED AND THE UTERUS IS NOT CONTRACTED**

**Management**

• Repeat IM syntometrine/IV syntocinon (after 15 minutes).
• Administer IV oxytocin infusion (40 units in 1 pint Hartmann’s and infuse at 125mls/hour.
• If bleeding continues, perform:
  – Continue massaging the uterus.
  – Bimanual uterine compression.
  – Aortic compression.

**SUSPECT A GENITAL TRACT TRAUMA IF THE BLEEDING PERSIST DESPITE A CONTRACTED UTERUS**

**Management**

• Examine the vulva, perineum and lower vagina for tears.
• If there is any perineal tear, suture or clamp with artery forceps if it is feasible to secure haemostasis.
• If suturing/clamping is not feasible, pack the vagina with 2 roller gauze (preferably soaked with flavin emulsion).
RETAINED PLACENTA

Do not attempt to remove the placenta if it is retained unless there is evidence of complete separation.

- If the placenta is separated and retained within the vagina, it can be safely removed manually.
  - Check for its completeness.
  - May need to repeat intramuscular syntometrine/syntocinon if the uterus is soft (not contracted).

- If the placenta is retained and the bleeding is profuse; resuscitate the patient with fluids and uterotonics agents as mentioned above.

MANAGEMENT OF SECONDARY PPH AT HOME/ABC

Identifying Secondary PPH (also refer to secondary PPH).

The Nurse should monitor the following:

- Temperature.
- Blood pressure.
- Pulse rate.
- Respiratory rate.
- Check for involution of uterus.
- Examination of perineum and vagina for tears.

Management of Secondary PPH at Home or ABC.

- Assess the patient’s general condition.
- Set up IV infusion using large bore cannula size 18G or larger.
- Transfer the patient immediately after stabilisation to hospital.
- Continue to monitor the patient’s vital signs while in transit to hospital.
MANAGEMENT OF COAGULATION DISORDERS

BLEEDING DISORDERS IN PREGNANCY

Table 16: Bleeding disorders in pregnancy

<table>
<thead>
<tr>
<th>BLEEDING DISORDERS IN PREGNANCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Coagulation</td>
</tr>
<tr>
<td>INHERITED</td>
</tr>
<tr>
<td>Von Willebrand’s disease</td>
</tr>
<tr>
<td>a. HELLP Syndrome</td>
</tr>
<tr>
<td>b. Placental abruption</td>
</tr>
<tr>
<td>c. Amniotic fluid embolism</td>
</tr>
<tr>
<td>d. Sepsis/chorioamnionitis</td>
</tr>
<tr>
<td>e. Intra-uterine death</td>
</tr>
<tr>
<td>Haemophilia</td>
</tr>
<tr>
<td>Prothrombin/fibrinogen deficiency</td>
</tr>
<tr>
<td>B) Thrombocytopenia/Platelet dysfunction – e.g. ITP, dengue</td>
</tr>
<tr>
<td>C) Vessel wall e.g. connective tissue, drugs, hereditary defects, vasculitis</td>
</tr>
</tbody>
</table>

• Consumptive coagulopathy or “wash out phenomenon” occurs when almost 80% of total blood volume has been lost. It is the leading cause of Disseminated Intravascular Coagulopathy (DIC) in Obstetrics and it associated with significant maternal morbidity and mortality.

• Inherited bleeding disorders are rare, but should be considered in patients with atypical presentations. Such patients may give a history of abnormal bleeding prior to pregnancy or may have hereditary causes of bleeding disorders. A good history is essential to clinch the diagnosis.

• Pregnancy is a pro-thrombotic state. Most inherited bleeding disorders tend to improve during pregnancy but may worsen immediately post-delivery. However, platelets disorders may worsen during pregnancy.

• The management of such patients should ideally be in a multidisciplinary team involving a consultant obstetrician, haematologist and anaesthetist.
DISSEMINATED INTRAVASCULAR COAGULOPATHY (DIC)

“DEATH IS COMING (DIC)"

Clinical judgement of DIC is essential.
Do not delay intervention until laboratory conformation!

DIC is characterized by systemic activation of blood coagulation system. This results in deposition of fibrin, leading to microvascular thrombi in various organs, causing multi-organ dysfunction. Consumption and severe exhaustion of clotting factors may induce severe bleeding.

- The principles of management are:
  - Identify the coagulopathy.
  - Correct the coagulopathy/replace blood and blood products.
- Treat the underlying cause/remove trigger factors (e.g. if sepsis, remove to source, if abruption – deliver).
- Manage complications.

<table>
<thead>
<tr>
<th>BLOOD PRODUCTS</th>
<th>VOLUME (MLS) PER UNIT</th>
<th>CONTENTS</th>
<th>EFFECTS</th>
<th>COMPATIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packed red cells</td>
<td>280±50</td>
<td>Red blood cells, White blood cells &amp; plasma</td>
<td>Increase haematocrit by 3% Increase Haemoglobin by 1gm/dl</td>
<td>ABO and Rhesus</td>
</tr>
<tr>
<td>Platelets</td>
<td>50±10</td>
<td>Platelets, Red blood cells, White blood cells &amp; plasma</td>
<td>Increase platelets counts between 5-10 x 10^9/l</td>
<td>ABO and Rhesus</td>
</tr>
<tr>
<td>Fresh frozen plasma (FFP)</td>
<td>200-250</td>
<td>Fibrinogen, antithrombin III, factor V and VIII</td>
<td>Increase fibrinogen by 10mg/dl</td>
<td>ABO No need Rhesus compatibility</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>40±10</td>
<td>Fibrinogen, factors III and XIII, Von Willebrand factor</td>
<td>Increase fibrinogen by 10mg/dl</td>
<td>ABO No need Rhesus compatibility</td>
</tr>
<tr>
<td>Components</td>
<td>Levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>&gt;8g/dl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelet count</td>
<td>&gt;75 x 10⁹/l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prothrombin count</td>
<td>&lt;1.5 x mean control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activated prothrombin time</td>
<td>&lt;1.5 x mean control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibrinogen levels</td>
<td>&gt;1.0g/l</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**a. Blood**

The decision for transfusion of packed red cells should be based on clinical; as laboratory confirmation may not be immediately available, especially in an emergency setting. Haemodynamic instability and rapid, on-going blood loss are essential factors of consideration, rather than the estimated blood loss.

It takes approximately 30-45 minutes for cross match. Consider whole blood transfusion while awaiting DIC regime in an emergency setting.

Other available options are O negative blood, low-antibody titre O positive blood or unmatched blood, depending on the rate and severity of bleeding.

**b. Fresh Frozen Plasma (FFP)**

FFP is used to correct PT or APTT. The target PT and APTT should be <1.5 x mean control. The dosage is 12–15mls/kg. A rough guide is to use 1l of FFP. It takes 30 minutes to thaw.

**c. Cryoprecipitate**

Contains more fibrinogen and is beneficial in correcting hypofibrinogenemia; which is common in patients with massive haemorrhage.
- Dosage 1–2units/10kg. Fibrinogen concentrates 4gm. It takes 30 minutes to thaw.

**d. Platelets**

Consider platelet transfusion if the levels are below 50 x 10⁹/l. One unit of platelets will increase the count by 5 to 10 x 10⁹/l. Six units of platelets will increase the total platelets by 30–60 x 10⁹/l. The desired target for vaginal delivery is above 50 x 10⁹/l and 80 x 10⁹/l for epidural and caesarean delivery.
### Table 19: Various DIC regimes

<table>
<thead>
<tr>
<th>REGIME</th>
<th>COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard regime</td>
<td><strong>REGIME COMPONENTS</strong></td>
</tr>
<tr>
<td>(60kg patient)</td>
<td>12-15mls/kg FFP = 4 units</td>
</tr>
<tr>
<td></td>
<td>1-2 units/10kg of cryoprecipitate = 6 units</td>
</tr>
<tr>
<td></td>
<td>2 units of platelets = increase by 10-20 x 10⁹/l platelets</td>
</tr>
<tr>
<td></td>
<td>(recommended 4 unit)</td>
</tr>
<tr>
<td>Regime ratio</td>
<td>RBC:plasma:platelets = 4:2:2</td>
</tr>
<tr>
<td></td>
<td>For every 4 units of RBC = 2 unit of FFP + 2 unit of platelets</td>
</tr>
<tr>
<td>Alternative regime</td>
<td><strong>REGIME COMPONENTS</strong></td>
</tr>
<tr>
<td>(massive or refractory DIC)</td>
<td>RBC:plasma:platelets = 1:1:1</td>
</tr>
<tr>
<td></td>
<td>For every unit of red cell = 1 unit of FFP + 1 unit of platelets</td>
</tr>
</tbody>
</table>

DIC is not a fixed regime of 6:4:2. It should be based on the patient’s weight, severity and ongoing blood loss. It can be repeated every 15–30 minutes for ongoing blood loss. Check FBC, PT/APTT and Fibrin Degradation Products.

e. Recombinant factor VIIa (rFVIIa)

This is an off licensed use in PPH. Case studies has proven to be beneficial. It may be used in refractory DIC or used as an adjuvant with other standard pharmacological or surgical treatment. The pre-requisites are:

- Hct >24%.
- Fibrinogen >0.5-1.0g/l (where available).
- Platelets >50 x 10⁹/l.
- pH ≥7.2.

The recommended dose is 90mcg/kg rounded up to a whole vial. It may be repeated in 15-30 minutes in the absence of response.

Recombinant factor VIIa is available as NOVO 7. It is available in two preparations:

- 1,000mcg vial.
- 2,000mcg vial.

Based on the average maternal weight of 70kg and a dose of 90mcg/kg:

- Using the 1,000mcg/vial: approximately 6 vials would be required.
- Using the 2,000mcg/vial: approximately 3 vials would be required.
DELIVERY OF PATIENTS IN DIC

Vaginal delivery is not a contraindication but PPH must be anticipated.

Transfuse blood and blood products to achieve desired range for vaginal delivery (platelets >50 x 10^9/l & INR <1.5 x mean control). Delivery should be conducted by the senior personnel. Avoid intramuscular injections, internal scalp electrodes, fetal blood sampling, episiotomies and instrumental deliveries.

Caesarean sections should be performed for obstetric indications, must be by specialist. Transfuse platelets or FFP/Cryoprecipitate to achieve the desired range of safe surgery (Platelet >80 x 10^9/l & INR <1.5 x mean control). This should be just prior to skin incision.

The skin should be a midline incision. Consider use of intraperitoneal and subrectus drains. The skin closure should be interrupted sutures.

MANAGEMENT OF PATIENTS ON ANTICOAGULANT TREATMENT

Management of such patients should ideally be in a multidisciplinary team involving a consultant obstetrician, haematologist and anaesthetist. Patients on anticoagulation treatment should deliver in tertiary hospitals.

a. Aspirin

Aspirin does not increase the risk of haemorrhage. The benefits of continuing aspirin till delivery outweighs the risk of haemorrhage and thus, aspirin should not be routinely stopped at 36 weeks due to concern of haemorrhage.

b. Low Molecular Weight Heparin (LMWH)

Patients on LMWH should be advised to stop their injections if there have signs or symptoms of labour. They should present to the nearest hospital as soon as possible for a review.

If elective delivery is planned, LMWH should be withheld at least 12 hours for prophylactic treatment and 24 hours for therapeutic treatment.

If patients on LMWH presents in labour, ensure the patients have 2 large bore branula and blood grouped and saved. Avoid intramuscular injections, routine episiotomies, internal fetal scalp monitoring, fetal blood sampling or instrumental deliveries.

If caesarean sections are required, it should be performed by a specialist and consider the use of intraperitoneal and subrectus drains. The skin should be closed with interrupted sutures.

LMWH should be initiated 4 hours after the delivery while the epidural catheter should not be removed within 12 hours of administration. The LMWH can be reinitiated 6 hours after removal of epidural.
c. Unfractionated heparin

Intravenous heparin should be withheld 6 hours prior to surgery while s/c heparin should be withheld 12 hours prior to caesarean section. The antidote for heparin is protamine sulphate, and 1mg of protamine sulphate is used per 100 units of heparin and is only used if the patient had massive bleeding.

d. Warfarin

Patients on warfarin should ideally be reverted to LWMH/unfractionated heparin by 36 weeks and should be planned for an elective delivery. Therapeutic doses of LMWH/unfractionated heparin should be started once the INR has normalised and LMWH should be stopped 24 hours before induction/surgery. Similarly, IV heparin should be stopped 6 hours before induction/surgery.

Caesarean section is limited to obstetric indications.

Patients on warfarin with a high INR who presents in labour should be managed based on their symptoms. Those without bleeding tendencies despite a high INR can be managed with intravenous Vitamin K of 1mg OD. Those with high INR with bleeding tendencies will benefit from higher dosages of Vitamin K (5mg), 15mls/kg of FFP and also prothrombin complex.

The warfarin can be initiated on day three post-delivery; once the patient has no more substantial risk of bleeding. LMWH should be initiated 4 hours post-delivery and overlapped with warfarin (day 3) until the desired INR is achieved. Breastfeeding is not a contraindication.

Table 20: Antidote for heparin and warfarin

<table>
<thead>
<tr>
<th>OVERDOSE</th>
<th>ANTIDOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin</td>
<td>Protamine sulphate (1mg for 100 units of heparin)</td>
</tr>
<tr>
<td>Warfarin</td>
<td>IV Vitamin K 1-5 mg</td>
</tr>
<tr>
<td></td>
<td>Consider FFP 15mls/kg</td>
</tr>
<tr>
<td></td>
<td>Prothrombin complex 30-50units/kg</td>
</tr>
</tbody>
</table>

Avoid NSAIDs in patients who are on anticoagulant treatment
COMPLICATIONS OF BLOOD TRANSFUSION

ADVERSE EFFECTS OF TRANSFUSION

- Blood transfusion can be associated with acute or delayed adverse effect. It ranges from brief episodes of fever to life threatening haemolysis.
- All personnel involved in ordering and administering transfusions must be able to recognize the symptoms and signs of transfusion reactions and to manage them.
- Blood transfusion checklist and consent form must be completed before any transfusion.

Table 21: Adverse effects of transfusion

<table>
<thead>
<tr>
<th>Acute Adverse Effects (≤24 hours of transfusion)</th>
<th>Delayed Adverse Effects (&gt;24 hours of transfusion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune</td>
<td>Immune</td>
</tr>
<tr>
<td>Acute Hemolytic Transfusion Reaction</td>
<td>Delayed Hemolytic Transfusion Reaction</td>
</tr>
<tr>
<td>Transfusion Related Acute Lung Injury</td>
<td>Transfusion Associated Graft Versus Host Disease (TaGVHD)</td>
</tr>
<tr>
<td>Anaphylaxis/Anaphylactoid Reactions</td>
<td>Post Transfusion Purpura (PTP)</td>
</tr>
<tr>
<td>Febrile Non Hemolytic Transfusion Reaction</td>
<td>Immunomodulation/suppression</td>
</tr>
<tr>
<td>Allergic Reaction</td>
<td>Alloimmunization</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-immune</td>
<td>Non-immune</td>
</tr>
<tr>
<td>Bacterial Contamination</td>
<td>Transfusion Transmitted Infection</td>
</tr>
<tr>
<td>Transfusion Associated Circulatory Overload (TACO)</td>
<td>Iron Overload</td>
</tr>
</tbody>
</table>

SIGNS AND SYMPTOMS

Signs and symptoms that may be indicators of a transfusion reaction include:
- Feeling of apprehension/restlessness.
- Fever, chills, rigor.
- Pain at infusion site, abdomen or flanks.
- Hypotension or hypertension.
- Respiratory distress (wheezing, dyspnoea and cyanosis).
- Skin manifestations (urticaria, rash, flushing, pruritus, and localized edema).
- Nausea/vomiting.
- Acute onset of sepsis.
- Anaphylaxis.
- Renal shutdown.
- Abnormal bleeding.
**Standard investigations:**

- 8-10ml venous blood in EDTA tube for repeat blood grouping, compatibility testing, antibody screening and Direct Coomb’s test.
- Full blood count/Full blood picture.
- Renal function test and liver function tests (including bilirubin).
- Urine for haemoglobin.

**SPECIFIC TRANSFUSION REACTIONS**

*Table 22: Specific transfusion reactions*

<table>
<thead>
<tr>
<th>TRANSFUSION REACTION</th>
<th>SIGNS &amp; SYMPTOMS</th>
<th>MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune Haemolytic Transfusion Reaction</td>
<td>As above</td>
<td>Stop transfusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABC, I/O charting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administer adrenaline 0.01mg/kg over 1-2 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manage DIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recross-match blood if needs transfusion (no increase risk)</td>
</tr>
<tr>
<td>Delayed Haemolytic Transfusion Reaction (DHTR)</td>
<td>As above</td>
<td>Manage haemolysis with steroids or intravenous immunoglobulin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future transfusions with antigen negative red cells</td>
</tr>
<tr>
<td>Febrile Non-Haemolytic Transfusion Reactions (FNHTR)</td>
<td>Temperature rise</td>
<td>Antipyretic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transfuse slowly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leucocyte-depleted blood/components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trial of washed blood component</td>
</tr>
<tr>
<td>Allergic Transfusion Reactions/Anaphylaxis</td>
<td>Urticarial reaction</td>
<td>Antihistamines, O2, hydrocortisone</td>
</tr>
<tr>
<td>Transfusion Related Acute Lung Injury (TRALI)</td>
<td>SOB, cyanosis,</td>
<td>Critical care unit</td>
</tr>
<tr>
<td></td>
<td>fever, cough,</td>
<td>Oxygen therapy</td>
</tr>
<tr>
<td></td>
<td>hypotension and</td>
<td>Assisted ventilation</td>
</tr>
<tr>
<td></td>
<td>hypoxaemia</td>
<td>Treat hypotension</td>
</tr>
<tr>
<td></td>
<td>Bilateral diffuse</td>
<td>The blood bank must be informed to defer the donor</td>
</tr>
<tr>
<td></td>
<td>pulmonary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>infiltrates on CXR</td>
<td></td>
</tr>
</tbody>
</table>
### Transfusion Reaction and Signs & Symptoms Management

<table>
<thead>
<tr>
<th>Transfusion Reaction</th>
<th>Signs &amp; Symptoms</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Transfusion Purpura (PTP)</td>
<td>Precipitous fall in platelet generalized purpura, (5-9 days after transfusion)</td>
<td>High-dose intravenous immunoglobulin (IVIG 1g/kg/day for 2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administer compatible antibody platelets</td>
</tr>
<tr>
<td>Transfusion Associated Graft Versus Host Disease (TA-GVHD)</td>
<td>Fever, skin rash, diarrhoea, elevated liver enzymes and pancytopaenia 1-6 weeks after transfusion</td>
<td>Skin biopsy or cytogenetic/HLA analysis to establish the presence of third party lymphocytes</td>
</tr>
<tr>
<td>Transfusion Associated Circulatory Overload (TACO)</td>
<td>Dyspnoea, cough, chest pain, cyanosis, hypertension, headache</td>
<td>Upright position, maintain airway; provide oxygen and ventilator support if necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diuretics (IV frusemide)</td>
</tr>
</tbody>
</table>
POSTPARTUM CARE

“TREAT THE PATIENT, NOT THE DISEASE”

COMPLICATIONS FOLLOWING PPH

Table 23: Complications following PPH

<table>
<thead>
<tr>
<th>IMMEDIATE</th>
<th>LONG TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute pulmonary oedema</td>
<td>Future fertility</td>
</tr>
<tr>
<td></td>
<td>Sheehan’s Syndrome</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>Psychological sequelae</td>
</tr>
<tr>
<td></td>
<td>Post-traumatic stress</td>
</tr>
<tr>
<td>Risk of peripartum hysterectomy and associated complications</td>
<td>Delayed bonding</td>
</tr>
<tr>
<td>Coagulopathy</td>
<td>Neurological sequelae secondary to prolonged hypoxia</td>
</tr>
<tr>
<td>ICU care-related complications</td>
<td></td>
</tr>
<tr>
<td>Blood transfusion and associated complications e.g. infections/acute lung injury</td>
<td></td>
</tr>
<tr>
<td>Death</td>
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</tbody>
</table>

a. Immediate

The immediate period following PPH is just as essential as the acute phase.

A multidisciplinary team involving consultants, especially Obstetricians and Anaesthetist are essential. Such patients should ideally be managed in the intensive care or high dependency unit depending on the severity of the clinical condition.

Close monitoring for further bleeding and effect of treatment is essential. Such high risk patients should be monitored using the Malaysia Obstetrics Monitoring System (MOMS). This will aid in early identification and intervention. (Review appendix).

- Overzealous fluid resuscitation may predispose to acute pulmonary oedema. High or prolonged use of oxytocin may cause water intoxication. Strict input output chart and weight appropriate urine output measurements are essential. Central venous pressure monitoring may be beneficial.

- Profound hypotension may cause acute renal failure and such patients may require short term supportive care. Sufficient mean arterial pressure should be maintained throughout resuscitation.

- The coagulopathy should be corrected but it should be based on clinical grounds as laboratory confirmation may not be readily available.

- There should be a documented plan of care regarding timing of removal of abdominal
packs, balloon tamponades or intra-abdominal drains. These should ideally be removed once the coagulopathy has been corrected. Such patients should ideally be initiated on broad spectrum antibiotics.

- Adequate analgesia is essential. However, NSAIDs should be avoided as this increases the risk of bleeding.
- Prophylactic proton pump inhibitors may prevent stress induced upper gastrointestinal bleeding.

b. Thromboprophylaxis

Massive PPH is an additional risk factor for thromboembolism. Intermittent calf compressor should be used while the coagulopathy is being corrected.

- Pharmacological thromboprophylaxis should be initiated once the coagulopathy has normalized and the patient has no substantial risk of further bleeding. The need for longer duration depends on the on-going risk of developing thromboembolism. In such circumstances, liaising with the physician/haematologist may be beneficial.

c. Risk management

Documentation should be complete and legible. The diagnosis, sequence of events, the personnel involved, adverse events and management plans should be appropriately documented in the medical notes. Operative notes and the consent forms should be clear and complete.

On-going and timely communication between the healthcare team, patient and immediate next-of-kin are vital and should be documented. This includes a formal debriefing of patients and immediate next-of-kin by the managing specialist/consultant on the sequence of events and progress. The counselling of patients who underwent a caesarean hysterectomy should ideally be substantiated with diagrams and written information leaflets.

Auditing such cases and identifying “root cause analysis” is an effective way of identifying preventive measures. This will aid in improving the quality of patient care.

d. Long term

The psychological consequences can be dramatic and often goes unnoticed. Arrangements should be made for bonding as soon as possible. Child and mother should not be separated unnecessarily. Midwifery support should be arranged to support in breastfeeding.

The implications of Sheehan’s Syndrome should be addressed and arrangements should be made to follow up and investigate such patients. It is good clinical practice to counsel and screen patients who required massive blood transfusion for retro viral disease, hepatitis and other blood borne diseases.

e. Follow up

Personalised follow up plans and home visits should be arranged for these patients. The discharge summary should be concise yet informative and should state the follow up plans
and implications in future pregnancies.

The primary healthcare team and district nurses should be informed for appropriate home visits to ensure the patient and her family are coping well.

**f. Contraception**

Certain causes of PPH may be recurrent in subsequent pregnancies. Although it may be inappropriate to discuss such issues following an adverse event, specific time should be allocated to discuss on contraception and this should be documented in the patient’s health record.
REFERRAL, TRANSFER AND DOCUMENTATION

Logistics and accessibility to healthcare remains an important challenge in the practice of medicine, especially during a life threatening situation.

The process of transfer itself may cause an additional risk to the patient. A systematic approach and communication is extremely vital.

Communication is vital, do not delay referral!

Hasty transfer of an unstable patient may cause more harm

DECISION TO TRANSFER

- Refer early and appropriately!
- There should not be barriers in communication.
- Speak directly to the senior most personnel (Specialist/Medical Officer/Matron/Sister).

PPH referrals may be divided into two broad categories:
- Referral from home, health clinic or private clinic to the nearest hospital.
- Referral from a hospital without specialist to a hospital with specialist.

THE SYSTEM OF REFERRAL

a. Initiate via phone call

- Health Clinic: Call FMS or MO or Sister in charge.
- Hospital without specialist: Call the On-call MO.
- Hospital with specialist: Call the MO/O&G specialist on call.

Contact the Call Centre (Emergency Department) and/or Labour Ward, of the nearest hospital.

b. Followed by a formal referral/monitoring form

The main purpose of the referral by phone is:

i. To inform the hospital about an obstetric emergency to allow appropriate preparations.
ii. Early involvement of senior staff who may advise on:
   - Optimal resuscitation before and during transfer.
   - Measures to reduce further blood loss.
   - The need to dispatch the Obstetric Retrieval Team.
OBSTETRIC RETRIEVAL TEAM (ORT)

The Obstetric Emergency Retrieval services are currently available in some hospitals.

Depending on the severity of the case, resources and available facilities, it is a multidisciplinary team consisting of:

- O&G specialist/registrar.
- Medical officers.
- Midwifes/Staff nurses.
- Porters.

The decision to activate ORT is made by the receiving specialist from the nearby tertiary hospital. The A&E ambulance can be mobilised with the additional team members and equipment (PPH Pack).

The main function of the team is to assist in stabilizing the patient prior or during transfer as the team is better equipped with essential basic emergency adjuncts. In certain district settings, if needed, the team could also perform surgery or stabilize the patient prior to transfer.

The main objective is to provide optimal care during an emergency situation and various clinical factors needs to be considered before a decision is made on the best course of action. The additional time duration taken to prepare and send the retrieval team should be taken into account.

ADDITIONAL MEDICAL EQUIPMENT

It is dependent on the nature of the cases being retrieved. A complete set of medical equipment should be brought in the ambulance:

1. Adult ventilator.
2. Defibrillator.
3. High range mobile vital sign monitors including pulse oximetry.
4. Portable ultrasound machine.
6. Transport incubator with neopuf.
7. Infusion pumps.
8. IV fluids/volume expanders.
9. Matched or unmatched blood and blood products.
CLINICAL INDICATIONS

- Patient is unstable for transfer or is critically ill.
- Lack of appropriate equipment in the primary emergency setting which can be effectively reversed by the Obstetric Team.
- Complications during surgery at a district hospital and the patient needs to be stabilized before transfer.
- Other clinical indications decided by the O&G specialist/consultant.

BENEFITS

- Patient can be optimized before transfer.
- More trained personnel and better equipment to resuscitate patient.
- Additional blood products.
- Life saving procedures or interventions may be performed at the primary setting itself.

Disadvantages:
- Not available or feasible in all centres.
- A longer time taken to transfer patients.
- Need additional cost and resources.

TRANSPORTATION

- Choose the most appropriate transport based on resources and location. (A Medivac may be used occasionally in rural Sarawak or some centres may only be assessable via boat).
- The patient should be escorted by a medical personnel.
- Inform husband/family members regarding patient’s condition and need for transfer.
- Continue monitoring and DOCUMENTATION (using the monitoring/referral checklist) while waiting and during the transportation.

PRACTICAL POINTS DURING TRANSFER

A systematic approach is essential during transfer. Use a checklist to ensure completeness.

a. Pre-transfer

- Directly communicate via phone with the senior most personnel at the receiving hospital.
- Call for ambulance/porters/blood products.
- Do not delay transfer.
- Convey essential information.
- Optimise the patient.
- Assess feasibility of using the Obstetric Retrieval Team.
- Follow SOP/guidelines and do not panic.
- Inform family members.
A team leader to take charge.
The experienced and trained personnel should escort the patient.
Ensure the ambulance or transport is well equipped and functioning (check before transfer).
Prepare medication in prefilled syringes and label to prevent delay.
Nasogastric tube if the patient is intubated.

b. Resuscitate and stabilise the patient before and during transfer

- The principle is to resuscitate and stabilise the patient as far as possible, before transportation.
- This includes fluid resuscitation, achieving haemodynamic stability, airway control and maintaining ventilator support.
- Measures must also be taken to reduce further blood loss.
- All lines, drains, endotracheal tubes must be well secured to prevent accidental dislodgement.

c. Coordinate equipment

- Have a check list of equipment to be taken.
- Refer to appendix on PPH Kit and equipment under Retrieval Team.

d. During transfer

- Monitor and manage the patient appropriately.
- Document vital signs.
- If an acute problem arises, stop the vehicle to carry out resuscitative measures or divert to the nearest health facility.

e. On arrival

- Ensure safe disembarkation.
- Hand over to appropriate person.

Table 24: Care during transfer of patient with PPH

<table>
<thead>
<tr>
<th>CARE</th>
<th>ACTION</th>
</tr>
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</table>
| Contraction of uterus         | Massage the uterus
<p>|                               | Bimanual compression of the uterus                             |
|                               | Commence oxytocin infusion                                    |
|                               | Repeat uterotonics if necessary                               |
| To reduce further blood loss  | Balloon tamponade                                             |
|                               | Vaginal packing for genital tract trauma                       |
|                               | Manual compression of the aorta                               |
|                               | Anti-shock garment when available                             |</p>
<table>
<thead>
<tr>
<th>CARE</th>
<th>ACTION</th>
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<tbody>
<tr>
<td>Maintaining haemodynamic stability</td>
<td>Administer O2</td>
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<td></td>
<td>Ensure patent IV access</td>
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<tr>
<td></td>
<td>IV fluid, plasma expanders</td>
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<tr>
<td></td>
<td>Blood transfusion when available</td>
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<tr>
<td>Observation</td>
<td>Check level of consciousness, pallor, pulse, BP, RR, blood loss</td>
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<tr>
<td></td>
<td>CBD – I/O chart</td>
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<tr>
<td>Hypothermia prevention</td>
<td>Thermal blankets</td>
</tr>
<tr>
<td>Accurate documentation</td>
<td>Use monitoring/referral form</td>
</tr>
<tr>
<td>Communication</td>
<td>Receiving hospital</td>
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<tr>
<td></td>
<td>Next-of-kin</td>
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</tbody>
</table>
BIMANUAL UTERINE COMPRESSION

- Inform the patient prior to procedure and provide analgesia.
- Wash and scrub hands, wear sterile glove. Insert the lubricated gloved hand into the vagina, form a fist in the anterior vagina fornix.
- Apply pressure against the anterior wall of the uterus.
- The other hand, identify the fundus of the uterus. Then pushed it deeply into the abdomen, behind the fundus of the uterus. Apply pressure to the posterior uterine wall.
- Maintain until bleeding is controlled and uterus is contracted.

AORTIC COMPRESSION

Figure 16: Aortic compression. (Source: rescuescience.org)
• It is downward pressure thorough the abdominal wall with a closed fist over the abdominal aorta. Point of pressure is just above the umbilicus, slightly to the patient’s left.

• The other hand palpate the femoral pulse to ensure the femoral pulse is not palpable. If the femoral pulse is still palpable, it indicate the compression is not effective. Check the position of the fist and exert more pressure till the femoral pulse is no longer palpable. It can be performed until help arises.

VENOUS CUT-DOWN

**Indications**

When venous access is urgently needed but no other intravenous sites are available for the insertion of percutaneous cannulae and the operator is not experienced in central vein cannulation.

**Equipment**

- Curved/mosquito artery forceps.
- Dissecting forceps.
- Needle holder.
- Scalpel and blades.
- Scissors.
- Vicryl 2/0 or Chromic 2/0.
- Local anaesthetic.

**Sites**

- Ankle: Long saphenous vein (2cm anterior and 2cm superior to the medial malleolus).
- Antecubital fossa: Median cubital vein or cephalic vein.
- Wrist: Cephalic vein (as it crosses the radio-carpal joint in anatomical snuff box).
Technique

- Apply a venous tourniquet proximal to the intended cannulation site.
- Shave the area and cleanse the skin with an antiseptic solution.
- Infiltrate the area with local anaesthetic.
- Make a 2 to 3cm transverse incision through the skin over the expected site of vein.
- By blunt dissection, identify and dissect the vein clear from surrounding tissue.
- Elevate a 2cm length vein and ligate the distal end, leaving the suture in place for traction.
• Loosely tie the proximal end and hold with forceps to control bleeding.
• Make a small transverse venotomy with sharp-pointed scissors/blade.
• Introduce the plastic cannula (without trocar) through the venotomy and secure it in place by tying the proximal ligature.
• Connect the cannula to the giving set and commence infusion.
• Close the skin incision with 3/0 silk and cover with a sterile dressing.

Complications
• Haemorrhage or haematoma.
• Perforation of the posterior wall of the vein.
• Phlebitis/Venous thrombosis.
• Nerve damage.

UTERINE TAMPONADE – BAKRI BALLOON

Figure 18: Bakri Balloon Insertion.
(Source: youtube.com)

a. Insertion following vaginal delivery – transvaginal placement

• Ensure uterus is clear of any retained placental fragments, blood clots, arterial bleeding or laceration before inflating balloon.
• Insert vaginal speculum, use sponge forceps to insert balloon catheter transvaginally into the uterine cavity. If possible, perform this under ultrasound guidance. Avoid excessive force during insertion.
• Once in place, inflate balloon with warm normal saline in increments of 50-100ml, until no further vaginal bleeding is seen in the Bakri drainage catheter tubing or vagina. Do not inflate >500ml. Connect catheter drainage tubing to a urine bag for monitoring.
• If tamponade fails (i.e. bleeding continues even after inserting the tamponade balloon), the patient will require surgical intervention.
• Document amount of fluid in balloon.
• Pack the vagina to ensure the balloon stays in place.
• Place a Foley catheter for bladder drainage if not already indwelling.
b. Insertion following caesarean section – transabdominal placement

- The tamponade catheter is passed from above with the inflation port/tubing end inserted through the uterine incision.
- The shaft of the balloon will then be pushed through the cervix, to be pulled out by the assistance via the vagina. This will allow the balloon to be positioned within the uterine cavity. Inflate just enough to retain the balloon within the uterus.
- Close the uterine incision as per normal procedure, taking care to avoid puncturing the balloon during suturing.
- After closure of the uterus and before closing the abdomen, the assistant will then inflate the balloon from below until a positive tamponade test is achieved (reaching the desired volume to create tamponade and stop further bleeding per vagina).
- Document amount of fluid in balloon.
- Close abdomen as per normal procedure.
- Pack the vagina to ensure the balloon stays in place.

c. Post-insertion care

- Monitoring has to be in the high dependency or intensive care unit.
- Close monitoring of vital signs, fundal height, blood loss from Bakri drainage catheter, vaginal blood loss and urine output.
- Patient has to be kept nil by mouth until removal of Bakri balloon in case of need to return to theatre.
- Start antibiotics IV Cefuroxime 750mg tds & IV Metronidazole 500mg tds.
- Continue oxytocin infusion for 4-6 hours after insertion.

d. Removal

- Leave the Bakri balloon in place for 8-24 hours (not >24 hours) to allow time for blood transfusion and coagulopathy correction.
- Once coagulopathy is corrected, deflate the balloon in 2 stages – withdraw half the normal saline in the first stage. If there is no significant bleeding after 30 minutes, withdraw the remaining volume to deflate and remove the balloon.
- Continue to observe for any active per vaginal bleeding.

Note:
- Tamponade balloon must be available in Labour Room at all times and the staff must be aware of its location.
- Tamponade balloon is NOT first line therapy – MEDICAL TREATMENT remains the first option for treating PPH.

UTERINE COMPRESSION SUTURES

- Used in cases of postpartum haemorrhage caused by uterine atony.
- Aims to exert continuous compression on the uterine vascular system.
Materials

- Vicryl 1.0/Liver sutures.
- Local preference.

1. B-LYNCH COMPRESSION SUTURE

Figure 19: B-Lynch Compression Suture.
(Source: medertainer.blogspot.com)

Figure 20: Technique to perform B-Lynch Compression Suture.
(Source: obmanagement.com)
**Technique**

- A lower segment transverse incision is made on the uterus or the recent LSCS suture removed to check the cavity for retained placental fragments.
- The first stitch is placed 3cm below the right lower edge of the uterine incision and 3cm from the right lateral border (point A).
- The suture is rethreaded through the uterine cavity to emerge at the upper incision margin, 3cm above and 4cm from the lateral border (point B).
- The suture is then passed over to compress the uterine fundus approximately 3-4cm from the right cornual border, and fed posteriorly and vertically to enter the posterior wall of the uterine cavity (point C) at the same level as the upper anterior entry point (point B).
- Rethreaded through the uterine cavity horizontally to emerge on the left side (point D) through the same surface marking as on the right.
- The suture is passed over to compress the uterine fundus approximately 3-4cm from the left cornual border and fed anteriorly on the left (point E and F) through the same surface marking as on the right.
- The two lengths of suture are pulled taut, assisted by bimanual compression to aid the compression.
- The two ends are then knotted and the uterine incision is closed.

2. HAYMAN COMPRESSION SUTURE

*Figure 21: Hayman Compression Suture.*
(Source: glowm.com)
**Technique**

- May be placed without opening the lower uterine segment or uterine cavity.
- Ensure downward bladder retraction.
- The suture is passed directly from the anterior uterine wall through the posterior uterine wall, just above the reflection of the bladder.
- The suture is then tied at the fundus of the uterus using a three-knot technique.
- This can be done as one suture on each side of the uterus or more than one suture if uterus is particularly broad.
- Two to four longitudinal/vertical sutures can be placed.
- A transverse cervicoisthmic suture also can be placed, if needed, to control bleeding from the lower uterine segment.

*Note: There are other compression sutures that had been described, e.g. Cho multiple square, U sutures with varying success/complications rate.*

**UTERINE ARTERY LIGATION**

- Exteriorize the uterus.
- Feel for pulsations of the uterine artery near the junction of the uterus and cervix.
- Using 0 chromic catgut suture on a large needle, pass the needle around the artery and through 2–3cm of myometrium (uterine muscle) at the level where a transverse lower uterine segment incision would be made. Tie the suture securely.
- Place the sutures as close to the uterus as possible, as the ureter is generally only 1cm lateral to the uterine artery.
- Repeat on the other side.
- If the artery has been torn, clamp and tie the bleeding ends.
- Ligate the utero-ovarian artery just below the point where the ovarian suspensory ligament joins the uterus (Fig 1.).
• Repeat on the other side.
• Observe for continued bleeding or formation of haematoma.

INTERNAL ILIAC ARTERY LIGATION

NOTE: Internal iliac artery ligation should be performed by trained gynaecologist or under supervision.

• Exteriorise the uterus.
• Identify the ‘right adnexal triangle’

Borders of the ‘right adnexal triangle’
• The round ligament, the infundibulopelvic (IP) ligament and the psoas muscle.

• Use 2 long artery forceps to hold the peritoneum around 1cm from the round ligament and make a superficial incision on the peritoneum, parallel to the IP ligament. Dissect the loose areola tissue and identify the common iliac artery.
• Use a small Dever retractor to retract along the common iliac artery, till the bifurcation of the common iliac artery is visualised.
After identifying the ureter, it is retracted away from the vessels. Dissect the fascia around the internal iliac artery to free the artery from its adjacent structures and to identify the anatomical relationship of the internal iliac artery with the iliac veins.

A right-angled clamp is passed beneath the internal iliac artery from lateral to medial side about 4cm distal to its origin.

**Note:** On the left side, it is sometimes necessary to incise the sigmoid mesocolon and mobilise the sigmoid colon medially in order to expose the area overlying the iliac vessels adequately.
Using absorbable suture 1-0, the internal iliac artery is ligated. Check and ensure the femoral and dorsalis pedis artery pulsations are present.

**Figure 27:**
Internal Iliac Artery Ligation.

**PICTOGRAPH OF ESTIMATED BLOOD LOSS**

**SANITARY PAD**

1/4 SOAKED 20 ml  
1/2 SOAKED 50 ml  
FULLY SOAKED 100 ml  

**KIDNEY DISH**

1/4 FILLED 100 ml  
1/2 FILLED 250 ml  
COMpletely FILLED 500 ml
# MALAYSIAN OBSTETRICS MONITORING SYSTEM (MOOS)

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</table>

Inform doctor if a patient has a single red score
Inform doctor if a patient has two yellow scores

Name:
IC:
RN:
Age:
Date:
Diagnosis:
Weight:
**DRUG REGIMENS FOR PREVENTION AND TREATMENT FOR PPH**

**PPH Prevention**

**Prophylaxis Options**

- **Oxytocin**: 1st line prophylaxis, 10IU/ml IM or 5IU slow IV push within the first minute after delivery
- **Syntometrine**: (combination of oxytocin 5IU and ergometrine 0.5mg): 1 ampoule IM within the first minute after delivery
- **Misoprostol**: If oxytocin is not available or cannot be safely used, 600µg rectally within the first minute after delivery
- **Carbetocin**: 100µg IM or IV over 1 minute

**PPH Treatment**

**Treatment Options**

- **Oxytocin**: 10IU IM or 5IU slow IV push, or 20-40IU/l IV fluid infusion
- **Misoprostol**: 800µg rectally (4 x 200-µg tablets)
- **Syntometrine**: (combination of oxytocin 5IU and ergometrine 0.5mg): Give 1 ampoule IM
- **Carboprost**: 0.25mg IM q15 minutes (maximum 2mg)

---

*Warning: Ergot alkaloids are contraindicated for women with high blood pressure, cardiac disease, pre-eclampsia, or eclampsia because they increase blood pressure.*

**See PPH Drug Table for its limited indication.**

**NB If one of the listed treatment options is not effective, another can be administered depending on the severity of the haemorrhage and consider non-pharmaceutical interventions.***
## PPH Drug Table

<table>
<thead>
<tr>
<th>ORDER OF ADMINISTRATION</th>
<th>DOSE</th>
<th>ROUTE</th>
<th>MECHANISM OF ACTION</th>
<th>SIDE EFFECTS</th>
<th>CONTRAINDICATIONS/CAUTIONS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Oxytocin</strong> (Pitocin®, Syntocinon®)</td>
<td>5IU</td>
<td>IV slowly over 1-2 mins</td>
<td>Stimulates the upper segment of the myometrium to contract rhythmically, constricting spiral arteries decreasing blood flow through the uterus.</td>
<td>Rare</td>
<td>Hypersensitivity to Oxytocin. Overdose or prolonged use can cause water intoxication. IV push dosing may cause hypotension.</td>
<td>In place of Syntometrine if BP elevated. Ensure placenta is expelled.</td>
</tr>
<tr>
<td></td>
<td>After 5 mins repeat as required to maximum total dose of 10IU</td>
<td>IM, onset 2.5 mins; effect marked 15 mins; lasts for 30 mins</td>
<td></td>
<td>Painful contraction, nausea and vomiting, water intoxication, transient vasodilatation and hypotension.</td>
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<td></td>
<td>5-10IU/hour (125-250ml/hour)</td>
<td>IV infusion (40IU in 500ml – 1L crystalloid/0.9% NaCl)</td>
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<tr>
<td><strong>2. Syntometrine</strong> (Oxytocin combined with Ergometrine)</td>
<td>1 ampoule (1ml) (Combination of Oxytocin 5IU and Ergometrine 0.5mg)</td>
<td>IM (Warning: IV could cause hypotension)</td>
<td>Combines rapid uterine action of Oxytocin and the sustained uterotonic effects of Ergometrine.</td>
<td>Tonic uterine contraction and abdominal pain; nausea, vomiting; headache, dizziness; skin rashes; hypertension; bradycardia; cardiac arrhythmia; anaphylactoid reaction.</td>
<td>Retained placenta; severe hypertension; hepatic, renal or cardiac disease; sepsis; hypersensitivity to Ergometrine.</td>
<td>Administer with anti-emetic (e.g. Metoclopramide 10mg IV) Avoid use if placenta not expelled.</td>
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<td></td>
<td>Repeat dose of 1ml after no less than 2 hours if necessary</td>
<td>Total dose given in 24 hours should not exceed 3ml</td>
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<td></td>
<td>0.5mg of Ergometrine* (for information only – see comments)</td>
<td>IV, onset 40 sec IM, onset 7 mins; effect marked at 45 mins; lasts for 2-4 hours</td>
<td>Vasoconstriction and contracts smooth muscles upper and lower segments of the uterus tetanically.</td>
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<tr>
<td>3. Carbetocin</td>
<td>100µg</td>
<td>IV bolus over 1 minute</td>
<td>As per Oxytocin</td>
<td>As per Oxytocin</td>
<td>Hypersensitivity to Oxytocin/Carbetocin; serious cardiovascular disease, especially coronary heart disease.</td>
<td>Currently only licensed in elective caesarean section under epidural or spinal anaesthesia for the prevention of PPH and to decrease the need for therapeutic uterotonics.</td>
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<tr>
<td>(Duratocin®)</td>
<td>If inadequate contraction with single dose, DO NOT REPEAT dose – consider other uterotonics</td>
<td>rapid onset; firm contraction within 2 mins; lasts about 1 hour</td>
<td></td>
<td>As per Oxytocin</td>
<td>Because of its long duration of action, uterine contractions produced by Carbetocin cannot be stopped simply by discontinuation – DO NOT GIVE prior to delivery of fetus.</td>
<td>Trials are underway for its use in vaginal delivery, till consensus reached – decision to use in other setting rest with prescribing clinician.</td>
</tr>
<tr>
<td>Long-acting synthetic analogue of oxytocin</td>
<td>100µg</td>
<td>IV bolus over 1 minute</td>
<td>As per Oxytocin</td>
<td>As per Oxytocin</td>
<td>Hypersensitivity to Oxytocin/Carbetocin; serious cardiovascular disease, especially coronary heart disease.</td>
<td>Currently only licensed in elective caesarean section under epidural or spinal anaesthesia for the prevention of PPH and to decrease the need for therapeutic uterotonics.</td>
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<td>As per Oxytocin</td>
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<td>Trials are underway for its use in vaginal delivery, till consensus reached – decision to use in other setting rest with prescribing clinician.</td>
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<tr>
<td>4. Carboprost (Hemabate®) Prostaglandin F-2a analogue</td>
<td>250µg Repeat as required every 15-90 mins (Max total dose: 2mg or 8 doses)</td>
<td>IM Intra-myometrial**</td>
<td>Improves uterine contractility by increasing the number of oxytocin receptors and causes vasoconstriction.</td>
<td>Fever with chills, headache, paraesthesia, diarrhoea, nausea and vomiting, breast tenderness, extremely high BP, dystonia, pulmonary oedema.</td>
<td>Cardiac, pulmonary, renal, or hepatic disease, hypersensitivity to prostaglandin Caution: Asthma, anaemia, diabetes, epilepsy, hyper/ hypotension, jaundice, uterine surgery.</td>
<td>**Intrammyometrial use – responsibility rests with administering clinicians as it is not recommended, act faster but carries risk of IV injection which may lead to severe CVS side effects including cardiac arrest.</td>
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<tr>
<td>5. Misoprostol (Cytotec®) Prostaglandin E1 analogue</td>
<td>800 to 1,000µg (4 to 5 tablets)</td>
<td>Rectal Slow onset of action – consider early administration</td>
<td>Generalised smooth muscle contraction.</td>
<td>Nausea, vomiting, diarrhoea, headache, abdominal pain, pyrexia.</td>
<td>Hypersensitivity to misoprostol, cardiovascular disease.</td>
<td>Use when oxytocin and ergometrine are not successful or not readily available. Off-label use.</td>
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<td>ORDER OF ADMINISTRATION</td>
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<td>6. Tranexamic Acid (TA)</td>
<td>Loading dose infusion of 1g, then infusion of 1g 30 mins later if required</td>
<td>Loading: Infusion over 10 min (1g in 100ml 0.9% NaCl) Maintenance: Infusion over 8 hours (1g in 100ml 0.9% NaCl)</td>
<td>Inhibit clot breakdown by blocking the lysine binding sites on plasminogen molecules.</td>
<td>Gastrointestinal disturbances (nausea, vomiting, diarrhoea) may occur.</td>
<td>Active thromboembolism including DVT, pulmonary embolism, cerebral thrombosis; thrombosis risk. Precaution in renal impairment and DIVC.</td>
<td>WHO recommendation: Suggests TA use when 1st and 2nd line drugs are ineffective at controlling PPH or when bleeding is thought to be due to trauma. A large WOMAN Trial is on-going on TA use in PPH.</td>
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<tr>
<td>7. Recombinant Activated Factor VII (rFVIIa)</td>
<td>Consult haematologist: 90µg/kg (rounded to the nearest vial) 2nd dose after 20 – 30 mins and after checking exclusion criteria (optimise) Max: 2 doses</td>
<td>IV, over 3-5 mins; when effective improvement in bleeding seen within 10-15 mins. Timing of use in relation to peripartum hysterectomy still debated</td>
<td>Directly activates coagulation via tissue factor independent of FVIII or FIX to generate a thrombin burst and stabilize the clots.</td>
<td>Exclusion Criteria: Inadequate platelets (&lt;20,000-50,000) and fibrinogen (&lt;1g/l), pH &lt;7.2 and a body temperature of &lt;34°C; to be optimised before administration.</td>
<td>Increases the already higher risk of VTE in obstetric women – risk of life threatening VTE. In life threatening situations – ‘off licence’ consent may be problematic; decision to use rest with the clinician prescribing.</td>
<td>In the face of life-threatening PPH, and in consultation with haematologist, rFVIIa may be used as an adjuvant to standard pharmacological and surgical treatments. Expensive.</td>
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<td><strong>8. Gemeprost</strong></td>
<td>1-2mg intrauterine; 1mg per rectal</td>
<td>(From studies): Intra-uterine Per vaginal Per rectal</td>
<td>Resembles PGF2a.</td>
<td>See Carboprost &amp; Misoprostol for side-effects, contraindications and cautions.</td>
<td>Case reports from a decade ago or more suggested it may be efficacious in the management of PPH, but no RCTs to demonstrate its safety or effectiveness.</td>
<td>Its use should be restricted to those situations when there is not ready access to routine oxytocic drugs or PG F2a.</td>
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<td>(Cervagem®) Prostaglandin E Analogue</td>
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HEAVY BLEEDING AFTER BIRTH

(POSTPARTUM HAEMORRHAGE, PPH)

Who is this information for?

This information is for you if you wish to know about heavy bleeding after birth. It may be helpful if your delivery was complicated with heavy bleeding.

Is it normal to bleed after delivery?

Yes it is, especially just after birth. The bleeding comes from the womb where the placenta was attached. Cuts and tears from the birth passage may also cause bleeding.

This bleeding is not heavy and becomes less over the next few hours. The colour will change from fresh red to brown over the next few weeks and should stop by 6 weeks after delivery.

If the bleeding is heavier than normal, it is called postpartum haemorrhage.

What is postpartum haemorrhage, PPH?

1. Primary PPH – When you lose more than 500mls of blood within the first 24 hours after birth.
   It is common, affecting 1 in 20 pregnant women.
   Severe PPH is less common, affecting 6 in 1,000 women and can be life threatening.
2. Secondary PPH – When you have abnormal or heavy bleeding between 24 hours to 6 weeks of delivery. It is less common, affects 1 in 50 women.

How can PPH affect me?

A major haemorrhage can be life threatening.

PRIMARY PPH

A. Who is at risk?

1. Before delivery
   a. Obesity (BMI >30kg/m²).
   b. Previous PPH.
   c. Had four or more deliveries.
   d. Twins or triplets.
   e. Having a low lying placenta (praevia).
   f. Placental separation before delivery (abruption).
7. During labour
   a. Caesarean delivery.
   b. Forceps or ventouse delivery.
   c. Retained placenta.
   d. Having a big baby.
   e. Prolonged labour beyond 12 hours.

It may also occur in patients without identifiable risk factors.

**B. What can you do to reduce the risk?**

If you are anemic, taking iron supplementations may reduce the need for blood transfusions.

If you had a previous caesarean section, it is important to have an ultrasound to ensure you do not have a low lying placenta or a placenta which is attached to the previous operation site.

If you are at high risk, it is best you deliver in a specialist hospital. You may require blood transfusions if you have major haemorrhage.

**C. What is done to reduce the chance of you having PPH?**

If you had a vaginal birth, you will be given an injection in your thigh (syntometrine/oxytocin) to reduce blood loss.

After delivery, you will be examined for tears and if it bleeds heavily, it will be repaired to reduce blood loss. You may also be given oxytocin into a drip in your vein.

If you had a caesarean delivery, oxytocin will be given via injections and in the drip in your vein.

**What happens if you had PPH?**

This is an emergency and it can happen quickly.

The midwife or doctor may:
   a) Massage your womb through the abdomen to help it contract.
   b) Give you further injections.
   c) Put a drip in your arm and take some blood for testing.
   d) Put a tube in your bladder to help the womb contract.
   e) Check to ensure the placenta is complete, if it is still inside your womb, you may have it removed in the operation theatre under anaesthesia.
   f) Examine to look for further tears and if may require stitches.

Your blood pressure and pulse will be monitored closely and you will stay in the labour ward until the bleeding has settled.
What happens if you continue to bleed?

You may feel unwell, dizzy; light headed, faint or nauseous. You will be given oxygen and drips.

Senior medical staffs will be involved in your care. You will be given more medication, either injections or through the drips.

You may be taken to the operating theatre to look for the cause and to stop the bleeding. Your partner will stay in the waiting area and will be informed about your condition. Your baby will be taken care by the nurse.

What procedures might be done to stop the bleeding?

a) A “balloon” may be inserted in your womb to put pressure on the bleeding.

b) You may require an operation and stitches will be placed on your womb to help it contract.

c) In dire circumstances, if other measures have failed, your womb may be removed (hysterectomy) to arrest the bleeding.

d) You may have drains or packs in your tummy which will be removed once the bleeding has stopped.

You will be observed in the intensive care or high dependency unit. You will be monitored closely.

How will you feel afterwards?

You may require longer hospital stay. You may be given some medications to treat your anemia and antibiotics.

Your doctor will discuss what has happened before you leave the hospital and you will be given appropriate follow up.

You should recover over the following weeks.

If you feel unwell, upset or if you develop anxiety or depression, return to the hospital immediately to see your doctor.

Secondary PPH

Heavy or prolonged bleeding after delivery is not normal. If you do experience it, seek medical attention as soon as possible. An ultrasound scan will be performed or you may be given some antibiotics. It usually resolves with simple measures.

Future pregnancies after a PPH?

There is a small risk of recurrence in your next pregnancy if you had PPH. The doctor will discuss this with you and will advise you accordingly.
REFERENCES & FURTHER INFORMATION

RCOG patient information leaflet.

If you have further questions, kindly ask your doctor or Obstetrician.

This information leaflet is prepared by the Malaysian PPH training Module Committee.
TRAINING PROGRAMME

DAY 1

0800  Registration
0815  Pre-test
0830  Introduction
0845  Third Stage of Labour & Manual Removal of Placenta
0930  Definition and causes of PPH
1015  Tea
1030  Management of PPH in Hospitals
1115  Resuscitation & Anaesthetic Management in PPH
1200  Breakout Session: Scenarios & Workshops (15 minutes/group)
   Group A  Resuscitation & Volume Replacement
   Group B  Retained Placenta & MRP
   Group C  Uterine Atony
   Group D  Genital Tract Trauma
1300  Lunch
1400  Management of Secondary PPH
1445  Management of Adherent Placenta
1530  Breakout Session: Skills (15 minutes/group)
   Group A  Aortic Compression
   Group B  Balloon Tamponade
   Group C  Uterine Compression
   Group D  Uterine Inversion
1630  Tea

DAY 2

0800  Registration
0815  Managing PPH in Domiciliary Deliveries
0900  Referral Procedures & Documentation
0945  Managing PPH during CS
1030  Tea
1045  Management of Coagulation Disorders
1130  Transfusion for PPH cases
1215  Postpartum Care for PPH cases
1300  Lunch
1400  Breakout Session: Role play (15 minutes/group)
   Group A  PPH at Home
   Group B  Referral and Retrieval
<table>
<thead>
<tr>
<th>Group C</th>
<th>Massive PPH</th>
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<tr>
<td>Group D</td>
<td>Postpartum Care</td>
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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<td>1500</td>
<td>Post-test</td>
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<td>1515</td>
<td>Case scenario</td>
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<td>1645</td>
<td>Certificate Presentation and closing ceremony</td>
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<td>1700</td>
<td>Tea</td>
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</tbody>
</table>

Number of participants: 42 (7× 6 groups)
1. Define PPH
2. Classify PPH
3. List the causes of primary PPH
4. List the causes of secondary PPH
5. Give the risk factors for adherent placenta
6. What are the 4 criteria during resuscitation?
7. What are the common drugs and their doses used in managing uterine atony?
8. Describe some manoeuvres in managing uterine atony.
9. What is the ratio of blood and blood products transfused during massive bleeding?
10. Components of modified active management of 3rd stage of labour
11. List (number) risk factors for PPH
12. What are the signs of early and late shock?
13. What are the long term complications of PPH?
14. What are the components of products transfused for DIVC?
CASE SCENARIOS

GENITAL TRACT TRAUMA:
24 years old G1 P0 at term, came to the labour room with the complaint of lower abdominal pain. Her antenatal follow up was uneventful. On admission, vital signs were stable. Per abdomen, uterus was term size, singleton fetus in longitudinal lie with cephalic presentation. Fetal head was engaged and estimated fetal weight was 3.4 to 3.6kg. Contraction was 5 in 10 minutes.

On vaginal examination, cervix was fully effaced with os dilated to 4cm. Station was 0 and membrane was bulging. 30 minutes later, the patient had spontaneous rupture of membrane. After another 30 minutes, patient felt like bearing down and fetal head was noted at perineum. Second stage was only 5 minutes and the patient delivered a baby girl with good Apgar Score, weighing 4kg.

Placenta was delivered uneventfully via control cord traction. After delivery of the placenta, it was noted that the patient had profuse per vaginal bleeding, soaking the draw sheet. The uterus was noted to be contracted at 18 weeks size.

1. What is your diagnosis?
2. What is the estimated blood loss?
3. How would you manage this patient?

UTERINE INVERSION:
Patient’s husband, a foreigner from a nearby estate, came to your clinic requesting for your help. Informs you that his wife, a P4 with no antenatal follow up, has just delivered at home, conducted by a friend.

You followed the husband to his house and examined the patient. The patient complaints of severe lower abdominal pain. You noticed that the placenta has not been delivered.

On examination, the patient was pale, pulse rate was 120 bpm with good volume and BP was 60/40mmHg. Abdomen was soft but you were not able to palpate the uterine fundus. On vaginal examination, there was minimal bleeding per vagina and you felt a mass in the vagina.

1. What is your diagnosis?
2. How would you manage this patient?
3. How would you refer this case?

UTERINE RUPTURE:
45 years old G10P9 at term came to your labour room with the complaint of lower abdominal pain. Antenatally, she has GDM on insulin. She also has 1 previous scar for breech presentation, with 2 successful vaginal deliveries after the caesarean section.
On admission, contraction was 3 in 10 minutes. Vital signs were stable. On abdominal examination, uterus was term size; singleton fetus in longitudinal lie with cephalic presentation with head 3/5 palpable. Fetus was noted to be big with estimated fetal weight of 3.8kg. On vaginal examination, cervix was fully effaced with os 8cm dilated. Review after 2 hours showed os still 8cm. Contraction was still 3 in 10 minutes and pitocin infusion was started.

30 minutes later, the patient was noted to be pale and irritable. Pulse rate was 100 bpm thready and BP was 60/40 mmHg. The patient’s abdomen was noted to be distended. You were unable to detect the fetal heart beat. On vaginal examination, station was noted to be very high.

1. What is your diagnosis?
2. What are her risk factors for this condition?
3. How would you manage this patient?

**UTERINE ATONY:**

41 years old G7 P6 at 38 weeks was admitted to Labour room at 0700 hours in active phase of labour, with os was 4cm. She was diagnosed to have GDM on Insulin, with BSP not well controlled. Clinically she has polyhydramnions and estimated fetal weight was 3.8 to 4.0kg

1. List her risk factors for PPH.
2. Outline antenatal PPH risk reduction measures for her.

Her labour progress well, she delivered a 4.0kg baby at 11.30 am. Post completed of third stage, she started to have heavy pre vaginal bleeding, estimated around 1,000 cc. Examination revealed she is pale and uterus was lax, not well contracted.

3. What is the diagnosis?
4. What causes PPH in her?
5. Outline her PPH management.
   a. General measures.
   b. What drugs could be used?
   c. What are the contraindications for these drugs?

She responded to the drugs, the uterus contracted. How should she be monitored then.

**RETAINED PLACENTA:**

28 years old G2P1 at 40 weeks, History of retained placenta during her first delivery was admitted in latent phase of labour. Antenatally was uneventful. She was transferred to labour room 12 hours later in active phase of labour. Per abdomen, uterus was term size, HPA was 3/5 palpable, estimated fetal weight 3.6-3.8kg with os was 4 cm dilated, station -2.

1. What is her high risk of PPH?
   She was in labour room for 8 hours, examination showed that she looked dehydrated, in
pain, contraction was strong 4 in 10 on oxytocin infusion. Her Blood pressure was 120/70, pulse 88/minute. She delivered and her placenta was retained.

2. How would you manage her?

SECONDARY PPH:

She was discharged well. On D7 postpartum she experienced fever for one day and had per vaginal bleeding of 500 cc at home.

1. What is your diagnosis?
2. How would you manage her?

ABRUPTION PLACENTA:

31 years old G3 P2 at 34 weeks POA, presented with abdominal pain and pervaginal bleeding. The pain was persistent for the past 1 hour. Antenatally, she had Preeclampsia on alpha methyldopa 500mg tds. She looks pale, the blood pressure was 140/90, urine albumin was 1+ and her pulse rate was 120 beats per minute. The uterus was term size, tense and tender. Fetal heart rate was 120 beats and CTG showed baseline 120 beats per minute with poor beat to beat variability.

1. What is the provisional diagnosis? What investigations needed to assess and confirm the diagnosis?
2. Do risk assessment for PPH. Outline the management.
3. She continued to bleed, BP drop to 80/60. She was in pain and bearing down.
4. How would you clinically estimate blood loss?
5. How would you manage her?

She delivered a FSB baby girl with 500 cc retroplacental clots. She developed uterine atony, not responding to uterotonic.

1. What is the cause of PPH?
2. Outline the management. What other modalities of PPH management are you going to use?
3. How do you monitor her?
4. How do you know that she is responding to the tamponade?
5. If she did not respond, outline the care plan.
6. How do you counsel the husband and family members?
MORBIDLY ADHERENT PLACENTA:

Mrs. MA is a 38 years old Gravida 5 Para 4 booked at KK at 10 weeks. She is a known case a previous cesarean section for placenta praevia type 4 in her fourth pregnancy.

1. What are the risk factors in this lady?
   • Mature mother.
   • Grand multip.
   • Previous cesarean section.

2. What investigation would you recommend?
   i. Ultrasound.
   ii. Hemoglobin level.

3. At 20 weeks an ultrasound revealed a low lying placenta. Would you order any investigation after and when?
   • Yes. At an ultrasound at 28 weeks.

4. Further investigation revealed a type 3 anterior placenta praevia. What else would you like to know in this investigation?
   • Perform a Doppler ultrasound to exclude an adherent placenta.
   • Look for the placental plane.

5. She is diagnosed to have placenta accreta. How would you manage her?
   • Managed at a tertiary centre as an in patient till delivery.
   • Couple should be counseled regarding the option available in the management ie: Leave placenta in situ, hysterectomy, interventional radiology management.
   • Multidisplinary team must be involved.
   • Include senior obstetrician and anesthetist. If percreta is suspected need to include the urologist/surgeon.
   • Blood must be available.

6. She is bleeding profusely at 36 week while in the ward. She has loss 800ml of blood. How would you manage her?
   • Initial management as per primary PPH. Resuscitation ABC.
   • Definitive management to inform the multidisplinary team and proceed with decided management as planned.

During cesarean section a hysterectomy was performed.
REFERENCES & SUGGESTED READING


• World Health Organization. WHO guidelines for the management of postpartum haemorrhage and retained placenta. 2009.


• Royal College of Obstetricians and Gynaecologists. Green–top Guideline No.7: Antenatal corticosteroids to reduce neonatal morbidity and mortality. London: RCOG; 2010


NOTES: