

## **POSTPARTUM HAEMORRHAGE (PPH) – PREVENTION AND MANAGEMENT**

*This LOP is developed to guide clinical practice at the Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this LOP.*

### **1. AIM**

- Early recognition and prompt appropriate intervention to minimise the impact of postpartum haemorrhage (PPH)

### **2. PATIENT**

- A woman whose blood loss at or after childbirth is measured or estimated at  $\geq 500$  mLs, or who experiences hemodynamic compromise from postpartum bleeding

### **3. STAFF**

- Medical, nursing and midwifery staff

### **4. EQUIPMENT**

- Two large bore intravenous (IV) cannulae (14–16 gauge)
- Blood tubes (pink, purple +/- blue topped)
- IV Starter Kit
- Sphygmomanometer
- Personal protective equipment (PPE)
- Measuring equipment e.g. scales, jug, kidney dish
- Indwelling urinary catheter (IDC)
- PPH Box

### **5. CLINICAL PRACTICE**

#### **Prevention of PPH**

- Discuss with woman in antenatal setting, standard recommendation for active management of third stage of labour
- Consider risk factors for primary PPH (see appendix 1)
- Ensure additional prophylaxis for prevention of PPH for woman at higher risk is discussed antenatally, during labour (see educational notes) and documented clearly in medical record
- Insert IVC and collect full blood count (FBC), group and hold for all those at high risk for PPH
- Consider crossmatch  $\geq$  two units packed cells for woman with placenta praevia, suspected placenta accreta, severe anaemia, thrombocytopenia, or known coagulopathy

#### **Treatment of PPH immediate management**

- Call for help
- Activate Rapid Response - call 2222 according to criteria
- Perform stepwise management of PPH as outlined in quick reference guide chart (appendices 2a and b)
- Identify underlying cause of PPH and check if placenta and membranes are complete/incomplete
- Replace volume by infusing warm crystalloid solution at least three times the measured volume of blood lost. Consult the anaesthetic team if more than two litres of crystalloid solution are required

## POSTPARTUM HAEMORRHAGE (PPH) – PREVENTION AND MANAGEMENT cont'd

- Consider treatment with uterotonic medications and/or IV tranexamic acid (see appendix 3) after ascertaining if there are any contraindications to specific therapies e.g. hypertension, asthma, active venous thromboembolism (VTE)
- Keep the woman warm and administer high flow oxygen via facial mask
- Notify consultant obstetrician and consultant anaesthetist to attend if EBL > 1.5L with ongoing bleeding
- Ensure early notification of major blood loss or likely major blood loss to Blood Bank, as there will be a delay between activation of Critical Bleeding Protocol (CBP) and delivery of fresh frozen plasma (FFP) of approximately 30 minutes

### Management of ongoing bleeding

- Escalate further as required e.g. Rapid Response Tier 2, Code Blue, consultant obstetrician and consultant anaesthetist attendance
- Communicate early with other colleagues when surgical assistance is anticipated, particularly where hysterectomy or internal iliac artery ligation is likely
- Transfer to theatre
- Activate CBP (see appendix 4) if either of the following criteria met:
  - woman likely to need replacement of her entire blood volume in 24 hours
  - woman is receiving or has received transfusion of four units packed cells within four hours, in addition to haemodynamic instability and/or ongoing blood loss
- Ensure this is led by the anaesthetic team and used with or without rotational thromboelastometry (ROTEM) (see appendix 5)
- Communicate directly with the Blood Bank technician (extension 29145) and state if ROTEM guided or non-ROTEM guided. See CBP: [http://seslhdweb.seslhd.health.nsw.gov.au/powh/documents/cpm/Section04/Critical\\_Bleeding\\_Protocol\\_POWH\\_CLIN072\\_updated\\_24thAug20.pdf](http://seslhdweb.seslhd.health.nsw.gov.au/powh/documents/cpm/Section04/Critical_Bleeding_Protocol_POWH_CLIN072_updated_24thAug20.pdf)
- Notify the Access and Demand Manager (ADM)/After Hours Nursing Manager (AHNM) on pager 44020. If the porter (extension 26784 Mon-Fri, or After-Hours pager 44000) is unavailable for immediate transport of blood products, the ADM/AHNM must make alternative arrangements for delivery
- Ensure staff send an 'Authority to Issue Blood Products' form (pink form) for all products requested, with the staff member collecting the products. This is important to ensure the correct products are delivered to the right patient, as there may be more than one CBP in progress on the Randwick Campus

### Postnatally

- Consider need for transfer to High Dependency Unit/Intensive Care Unit
- Document estimated blood loss and treatments used for PPH
- Debrief woman and her family members/support people
- Debrief staff
- Monitor urine output
- Check haemoglobin (Hb) after six hours and again within 24 hours of the birth.
- Consider need for oral iron vs IV iron vs packed cells transfusion depending on Hb and presence of symptoms of anaemia

## 6. DOCUMENTATION

- Medical Record

## POSTPARTUM HAEMORRHAGE (PPH) – PREVENTION AND MANAGEMENT cont'd

### 7. EDUCATIONAL NOTES

- Primary PPH is within 24 hours of birth<sup>1,2</sup>
- Secondary PPH is 24 hours to six weeks postpartum<sup>1,2</sup>
- Severe PPH is defined as blood loss of 1000 ml or more after childbirth<sup>2</sup>
- Blood loss of  $\geq 2000$  mL carries a significant risk for coagulopathy, and additional escalation is recommended when blood loss is more than this or if there is hemodynamic compromise<sup>1,2</sup>
- Primary prophylaxis is active management of third stage. Routine prophylactic oxytocin administered after delivery of the anterior shoulder reduces the risk of PPH by more than 40% and is the most effective means of preventing PPH from uterine atony and is not associated with an increased risk of retained placenta.
- Active management of third stage involves<sup>1,2</sup>:
  - oxytocin - 10 units intramuscular (IM)
  - controlled cord traction (CCT)
- Aetiology of PPH is described in appendix 1
- Some women need to be considered for added PPH prophylaxis due to single major risk factor or cumulative minor risk factors. Either ergometrine (if no contraindications) 250mcg IM/IV and/or oxytocin infusion (40 units oxytocin in 1000mLs sodium chloride 0.9% @ 250mLs/hr) should be used.
- **Major risk factors include:**
  - suspected or proven placental abruption
  - multiple pregnancy
  - pre-eclampsia/gestational hypertension
  - previous PPH
  - Von Willebrand's disease
  - anaemia (Hb <9g/L)
  - grand multiparity
  - instrumental birth and/or shoulder dystocia
  - prolonged first or second stage of labour
  - retained placenta > 30 minutes
- **Minor risk factors include:**
  - Asian Ethnicity
  - obesity/body mass index (BMI) >30
  - advanced maternal age
  - multiple or large fibroids
  - polyhydramnios
  - precipitate labour
  - induction of labour (IOL)/augmentation of labour
  - estimated fetal weight > 4kgs
  - febrile in labour (>38°C)
  - use of magnesium sulphate in labour
- When blood loss continues, or woman is haemodynamically unstable, other less common causes need to be considered:
  - uterine inversion
  - uterine rupture
  - broad ligature haematoma
- Secondary PPH accounts for 1-2% of PPH, and the causes include uterine subinvolution, retained products, endometritis, uterine vascular disorders (e.g. Arterial Venous Malformations), and coagulopathies<sup>7</sup>

## POSTPARTUM HAEMORRHAGE (PPH) – PREVENTION AND MANAGEMENT cont'd

- PPH boxes/trolley are located in Birth Unit, Birth Centre, Operating Theatre, Antenatal ward and both Postnatal wards
- ROTEM is a point of care whole blood haemostasis testing method<sup>2</sup>
- Uterine/vaginal tamponade may be undertaken with rolled raytec gauze or intrauterine cavity balloon
- Misoprostol, a prostaglandin E1 analogue, is not currently recommended for routine prevention and control of PPH. Its use is unlicensed, however, it may be used as an adjunct to other medications in cases of severe PPH
- Tranexamic acid has been used to treat PPH. In a meta-analysis (two trials (20,412 women) it was found that IV tranexamic acid reduces the risk of maternal death due to bleeding (risk ratio (RR) 0.81, 95% confidence interval (CI) 0.65 to 1.00; quality of evidence: moderate). The effect was more evident in women given treatment between one and three hours after giving birth with no apparent reduction when given after three hours<sup>5,6</sup>. There was no increased risk of thromboembolic events

### 8. RELATED POLICIES / PROCEDURES / CLINICAL PRACTICE LOP

- Third Stage Management Following Vaginal Birth
- Blood Products - Management of Pregnant Woman Unable to Use Blood Products
- Balloon Placement for Uterine Tamponade
- Perineal/Genital Tract Repair
- Labelling of Injectable Medicines, Fluids, and Lines
- Maternal Collapse
- Escalation for Birthing Services
- Critical Bleeding Protocol POWH CLIN072 (Business Rule)
- Management of the Deteriorating MATERNITY woman SESLHDPR/705
- NSW Health Guideline - Postpartum Haemorrhage (PPH) GL2021\_009
- NSW Health Policy Directive PD2014\_028 Open Disclosure Policy
- NSW Health Policy Directive PD2020\_047 Incident Management

### 9. RISK RATING

- High

### 10. NATIONAL STANDARD

- Standard 4 Medication Safety
- Standard 6 Communicating for Safety
- Standard 7 Blood Management
- Standard 8 Recognising and Responding to Acute Deterioration

### 11. REFERENCES

1. RCOG 2016. Postpartum Haemorrhage Prevention and Management. Green-Top Guideline No. 52
2. RANZCOG 2017. Management of Postpartum Haemorrhage (PPH). C-Obs 43
3. Queensland Maternity and Neonatal Clinical Guidelines Program. 2018 Primary postpartum haemorrhage MN18.1-V7-R23
4. Mousa HA, Blum J, Abou El Senoun G, Shakur H, Alfirevic Z. Treatment for primary postpartum haemorrhage. Cochrane Database Systemic Reviews. 2014 Issue 2 Feb 13;(2):CD003249.

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5. Shakur H, Beaumont D, Pavord S, Gayet-Ageron A, Ker K, Mousa HA. Antifibrinolytic drugs for treating primary postpartum haemorrhage. Cochrane Database Systemic Reviews 2018 Feb 20;2:CD012964.
6. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Shakur, Haleema et al. The Lancet, Volume 389, Issue 10084, 2105-- 2116 May 2017
7. Bienstock JK, Eje AC, Hueppchen NA. Postpartum Hemorrhage. N Engl J Med 2021; 384:1635-1645.

### **REVISION & APPROVAL HISTORY**

Reviewed and endorsed Maternity Services LOPs group 5/10/21  
Reviewed to incorporate Critical Bleeding Protocol and replace PACE terminology with Rapid Response August 2019  
Approved Quality & Patient Safety Committee 20/6/19  
Reviewed and endorsed Maternity Services LOPs group 18/6/19 – replaced *Massive Transfusion in Obstetrics & Gynaecology (Code Pink)*  
Reviewed and endorsed Maternity Services LOPs 19/6/18  
Approved Quality & Patient Care Committee 4/2/16  
Reviewed and endorsed Maternity Services LOPs group December 2015  
Approved Quality & Patient Safety Committee December 2012  
Amendment to dosages in appendix May 2014  
Reviewed and endorsed Maternity Services LOPs group December 2012  
Reviewed Obstetric Clinical Guidelines Group Sept 2010 – Approved Quality & Patient Safety Committee 21/10/10  
Reviewed July 2007 – Approved Clinical Performance & Quality Committee August 2007  
Endorsed Maternity Services Clinical Committee 10/12/02 – Approved Quality Council 16/12/02

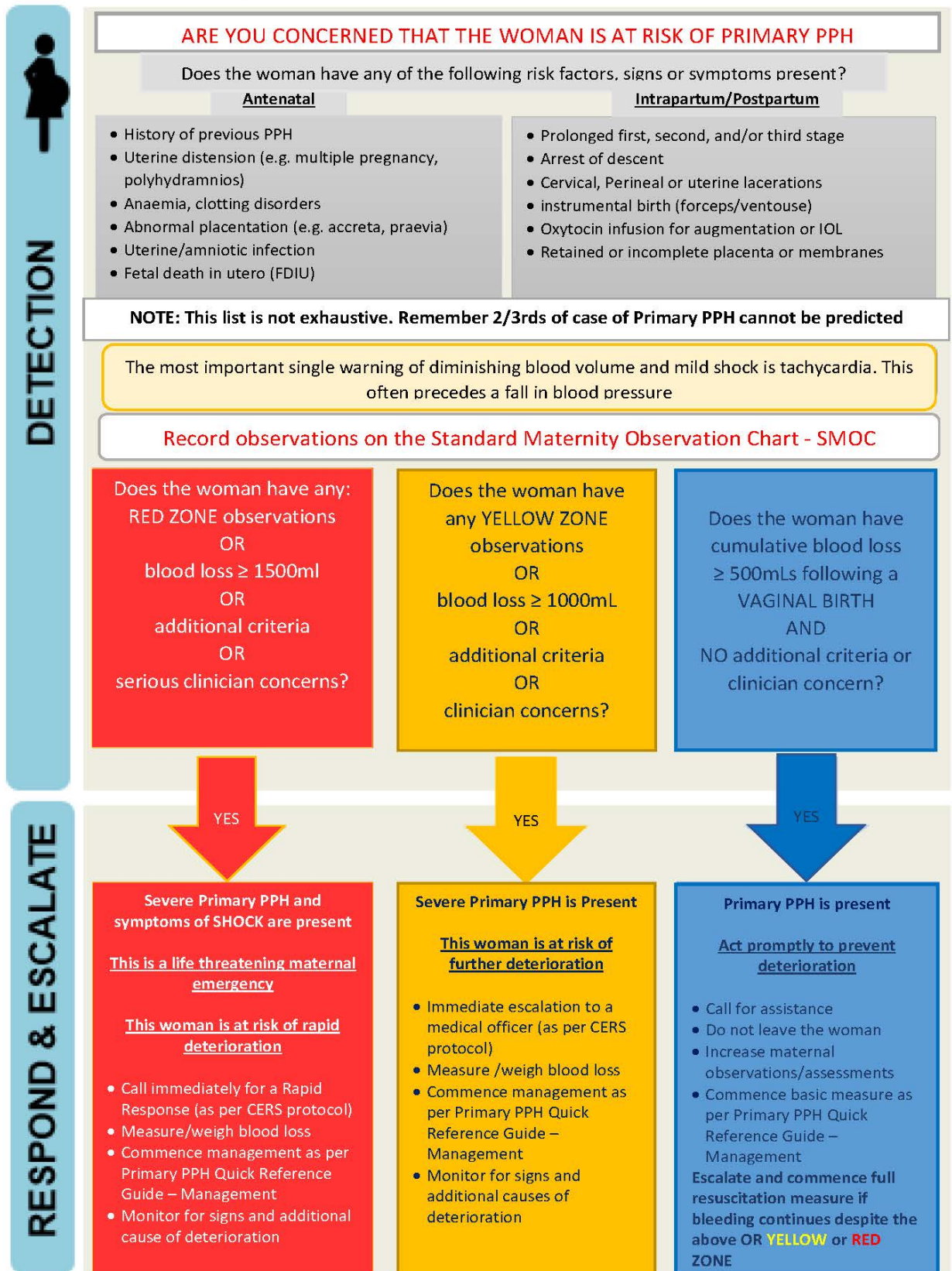
**FOR REVIEW: AUGUST 2023**

Appendix 1:

**Risk Factors for PPH**

Antepartum	Intrapartum	Postpartum	Cause
<ul style="list-style-type: none"> <li>Maternal age <math>\geq</math> 35 years</li> <li>BMI <math>\geq</math> 35 kg/m<sup>2</sup></li> <li>Grand multiparity</li> <li>Uterine anomalies (e.g. fibroids)</li> <li>History of previous primary or secondary PPH</li> <li>History of APH in the current pregnancy</li> <li>Over distension of the uterus:               <ul style="list-style-type: none"> <li>Multiple pregnancy</li> <li>Polyhydramnios</li> <li>Fetal macrosomia (&gt; 4kg)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Precipitate labour</li> <li>Prolonged labour (first, second, or third stage)</li> <li>Arrest of descent</li> <li>Uterine infection (e.g. pyrexia &gt; 38 °C in labour)</li> <li>Oxytocic use for augmentation or induction of labour</li> <li>Instrumental birth (forceps or vacuum)</li> <li>Intrapartum haemorrhage</li> </ul>	<ul style="list-style-type: none"> <li>Drug induced hypotonia (e.g. magnesium sulphate, anaesthetic agent)</li> <li>Bladder distension</li> </ul>	<p><b>Tone</b> <b>70%</b></p>
	<ul style="list-style-type: none"> <li>Precipitate labour</li> <li>Instrumental birth (forceps or vacuum)</li> </ul>	<ul style="list-style-type: none"> <li>Cervical, uterine, or perineal lacerations</li> <li>Caesarean section</li> </ul>	<p><b>Trauma</b> <b>20%</b></p>
<ul style="list-style-type: none"> <li>History of retained placenta</li> <li>Abnormal placentation (i.e. Placenta praevia, accreta, percreta, or increta).</li> </ul>		<ul style="list-style-type: none"> <li>Retained placenta manual removal or products (e.g. cotyledon, membranes, blood clots)</li> <li>Manual Removal</li> <li>Uterine inversion</li> </ul>	<p><b>Tissue</b> <b>10%</b></p>
<ul style="list-style-type: none"> <li>Intrauterine fetal death</li> <li>Therapeutic anticoagulation</li> <li>Maternal bleeding disorders:               <ul style="list-style-type: none"> <li>Von Willebrand Disease</li> <li>Idiopathic Thrombocytopenia Purpura</li> <li>Thrombocytopenia (from hypertensive disorders of pregnancy)</li> <li>Disseminating Intravascular Coagulation (DIC)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Amniotic Fluid Embolism (AFE)</li> <li>Disseminated Intravascular Coagulation (DIC)</li> </ul>	<ul style="list-style-type: none"> <li>AFE</li> <li>DIC</li> </ul>	<p><b>Thrombin</b> <b>1%</b></p>
<p>NOTE: Most cases of PPH occur in women with no identifiable risk factors.</p>			

## PRIMARY PPH QUICK REFERENCE GUIDE – DETECT AND RESPOND



# PRIMARY PPH QUICK REFERENCE GUIDE - MANAGEMENT

RESUSCITATE, TREAT THE CAUSE & REASSESS

Initial assessment & resuscitation	<p><b>Basic measures – for all women when a PPH is detected</b></p> <ul style="list-style-type: none"> <li>• <b>Call for assistance</b></li> <li>• Lie woman flat</li> <li>• Repeat or give oxytocic</li> <li>• Keep woman warm</li> <li>• Ensure woman's bladder is empty</li> <li>• Repair genital tract trauma if indicated</li> </ul> <p>If placenta is delivered evaluate uterine tone, expel clots, fundal massage</p> <ul style="list-style-type: none"> <li>• Inspect placenta &amp; membranes for completeness</li> <li>• Monitor BP, P, RR &amp; SpO2 every 5 mins &amp; temp every 15mins</li> </ul> <p><b>Gain IV access &amp; send urgent</b></p> <ul style="list-style-type: none"> <li>○ Group and hold</li> <li>○ FBC</li> <li>○ Coagulation screen</li> </ul> <p><b>Consider:</b></p> <ul style="list-style-type: none"> <li>○ Cross match (4 units)</li> <li>○ LFT, UECs</li> </ul> <p><b>If Bleeding continues or signs of shock despite basic measures – commence full resuscitation &amp; treat cause</b></p> <ul style="list-style-type: none"> <li>• Escalate as per local CERS</li> <li>• O2 via mask (10-15L/min)</li> <li>• Insert IDC – monitor output (i.e. &gt;30mL/hr)</li> <li>• Give maximum of 3.5 L warmed fluids</li> <li>• Consider blood transfusion early. Give O RhD neg blood (or group specific if available) if bleeding ongoing after 3.5 L of fluids infused</li> <li>• Re-test coags, FBC, Ca2+ and ABG's every 30-60mins whilst bleeding</li> </ul>																					
Identify the cause	<table style="width: 100%; text-align: center;"> <tr> <td style="background-color: #FFD700; padding: 5px;"><b>(TISSUE)</b></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">YES</td> <td style="background-color: #FFD700; padding: 5px;"><b>(TONE)</b></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">YES</td> <td style="background-color: #FFD700; padding: 5px;"><b>(TRAUMA)</b></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">YES</td> <td style="background-color: #FFD700; padding: 5px;"><b>(THROMBIN)</b></td> </tr> <tr> <td style="padding: 5px;">Placenta out &amp; complete?</td> <td></td> <td style="padding: 5px;">Fundus firm?</td> <td></td> <td style="padding: 5px;">Genital tract/uterus intact</td> <td></td> <td style="padding: 5px;">Blood Clotting?</td> </tr> <tr> <td style="color: red; font-weight: bold; font-size: 1.2em;">NO</td> <td></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">NO</td> <td></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">NO</td> <td></td> <td style="color: red; font-weight: bold; font-size: 1.2em;">NO</td> </tr> </table>	<b>(TISSUE)</b>	YES	<b>(TONE)</b>	YES	<b>(TRAUMA)</b>	YES	<b>(THROMBIN)</b>	Placenta out & complete?		Fundus firm?		Genital tract/uterus intact		Blood Clotting?	NO		NO		NO		NO
<b>(TISSUE)</b>	YES	<b>(TONE)</b>	YES	<b>(TRAUMA)</b>	YES	<b>(THROMBIN)</b>																
Placenta out & complete?		Fundus firm?		Genital tract/uterus intact		Blood Clotting?																
NO		NO		NO		NO																
Treat the cause Immediate management	<ul style="list-style-type: none"> <li>• Do not massage uterus</li> <li>• Ensure 3<sup>rd</sup> stage oxytocic given</li> <li>• Apply CCT &amp; attempt delivery of placenta                             <ul style="list-style-type: none"> <li>○ stop if undue traction required</li> <li>○ remove placenta if retained in vagina</li> </ul> </li> <li>• Post-delivery: check for completeness, massage fundus – assess tone</li> <li>• Transfer to OT for:                             <ul style="list-style-type: none"> <li>○ manual removal/EUA of retained placenta or products</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Uterine massage</li> <li>• Expel uterine clots</li> <li>• <b>Give 1<sup>st</sup> line drugs:</b> <ul style="list-style-type: none"> <li>• Oxytocin</li> <li>• Ergometrine</li> <li>• Syntometrine®</li> <li>• Carbectocin</li> </ul> </li> <li>• <b>Give 2<sup>nd</sup> line drugs early</b> <ul style="list-style-type: none"> <li>• Tranexamic acid</li> <li>• Carboprost tromethamine®</li> </ul> </li> <li>• Consider bi-manual compression</li> <li>• <b>In addition to immediate Management:</b> <ul style="list-style-type: none"> <li>• Oxytocin infusion</li> <li>• Misoprostol</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Inspect cervix, vagina, perineum, and repair trauma</li> <li>• Assess for uterine inversion and replace if found</li> <li>• Transfer to OT if:                             <ul style="list-style-type: none"> <li>○ uterine rupture suspected</li> <li>○ haematoma</li> <li>○ unable to see/access trauma site</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Review blood test results</li> <li>• <b>Activate Critical Bleeding Protocol (CBP) early – Give:</b> <ul style="list-style-type: none"> <li>○ RBC, FFP, Platelets</li> <li>○ Cryoprecipitate if fibrinogen &lt;2.5 grams/L</li> <li>○ Ca Gluconate if Ca2+ &lt;1.1 mmol/L</li> <li>○ Avoid hypothermia &amp; acidosis</li> </ul> </li> </ul>																		
Reassess. Treat ongoing bleeding	<b>MASSIVE PPH (i.e. blood loss ≥ 2,000mLs or signs of severe shock)</b>																					
	- Review criteria for activating Critical Bleeding Protocol (CBP)	- Transfer to OT - Maintain facial Oxygen	- Bimanual compression - Senior multidisciplinary team																			
	<p><b>Transfer:</b></p> <p>To OT for manual removal or EUA if not already undertaken</p>	<p><b>Consider:</b></p> <ul style="list-style-type: none"> <li>• Intrauterine balloon tamponade</li> <li>• Angiographic embolisation (if available)</li> <li>• Laparotomy:                             <ul style="list-style-type: none"> <li>○ Interim aortic compression</li> <li>○ B-Lynch compression suture</li> <li>○ bilateral uterine artery ligation</li> <li>○ Hysterectomy</li> </ul> </li> </ul>	<p><b>Consider:</b></p> <ul style="list-style-type: none"> <li>• Anaesthetic to optimise genital tract/cervix exposure &amp; repair</li> <li>• Assess for uterine rupture/trauma</li> <li>• Laparotomy/ Hysterectomy</li> </ul>	<p><b>Consider:</b></p> <ul style="list-style-type: none"> <li>• Angiographic embolisation</li> <li>• Bilateral uterine artery ligation</li> <li>• Hysterectomy (consider early)</li> </ul>																		

Adapted from NSW MoH GL2021\_010 Postpartum Haemorrhage (PPH)

- document clearly: actions, responses, and outcomes
- consider reporting requirements, debriefing with all staff and the woman (along with open disclosure)

**Severe PPH increases the risk of VTE. Review criteria or VTE prophylaxis**



### Appendix 3

Management	Medication	Dosage	Administration	Notes
<b>1<sup>st</sup> line Immediate</b>  <i>(Choice of medication is dependent on any prior 3<sup>rd</sup> stage prophylaxis given)</i>	Oxytocin (Syntocinon®) 5 units/mL or 10 units/mL	10 units	IM or slow IV	Short acting oxytocic
	Ergometrine 500 microgram/mL	500 micrograms  OR 250 micrograms + 250 micrograms	IM  IM or slow IV	Ergometrine may be added if carbetocin was used as prophylaxis
	Oxytocin 5 units with ergometrine (Syntometrine®) 500 micrograms/mL	Give as 1 mL Syntometrine®	IM	Oxytocic combined with ergot derivative - longer acting combination therapy
	Carbetocin <b>in Operating Theatre only</b> 100 microgram/mL	100 micrograms	IM OR IV	Single dose only - long-acting oxytocic
<b>2<sup>nd</sup> line Early</b>  <i>(Use both medications when bleeding not controlled)</i>	Tranexamic acid <sup>^</sup> 100 mg/mL	1 gram	Slow IV	If bleeding persists after 30 minutes a second dose may be administered
	Carboprost <sup>#</sup> tromethamine 250 microgram/mL	250 micrograms	IM	Can be repeated at not less than 15 minutely intervals - (maximum of 8 doses)
In addition to immediate management	Oxytocin (Syntocinon®) infusion	40 units in 1 litre crystalloid	IV (given over 4 hours)	
	Misoprostol <sup>^</sup> 200 micrograms	400 - 800 micrograms	Buccal / sublingual or rectal	Regardless of route of administration, misoprostol takes 1 to 2.5 hours to increase uterine tone

<sup>^</sup>Use of misoprostol and tranexamic acid for post-partum haemorrhage is considered off-label use. Ensure correct procedures are followed including the indication has been approved by the local Drug and Therapeutics Committee and informed patient (or delegate) consent is obtained (as per *Approval Process of Medicines for Use in NSW Public Hospitals*).

<sup>#</sup>Carboprost is only available for use in Australia under the Special Access Scheme (SAS). Hospitals will need to make arrangements through their individual pharmacy departments to ensure availability and access to this product for emergency use. The prescriber will be required to complete a Category A form and obtain informed patient (or delegate) consent for use.

# POWH Adult Critical Bleeding Protocol



Actual or anticipated 4 units RBC in < 4 hours, + haemodynamically unstable, +/- anticipated ongoing bleeding  
Severe thoracic, abdominal, pelvic or multiple long bone trauma, major gastrointestinal, surgical or obstetric bleeding

Senior clinician determines that patient meets criteria for **CRITICAL BLEEDING PROTOCOL** activation

## Baseline Bloods

Group and Screen / Cross Match	Full Blood Count	Coagulation Screen	Biochemistry	Blood gas	ROTEM if using ROTEM guidance
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## Notify Blood Bank Ext 29145

State: **'ACTIVATE CRITICAL BLEEDING PROTOCOL'** and stipulate **'NON-ROTEM'** or **'ROTEM'**

4 Units of PRBC immediately issued (not necessarily matched)

Send porter to Blood Bank with completed 'Authority to Issue Blood Products' pink form to collect products

### NON ROTEM

**PACK 1** 4 PRBC (initially provided) 4 units ELP  
3 units Apheresis Cryoprecipitate

**PACK 2** 4 PRBC 4 units ELP 1 bag platelets

Consider: IV Tranexamic Acid 1g loading over 10 minutes followed by 1g infusion over 8 hours

For Further advice on managing critical bleeding contact Haematologist on call

If bleeding continues: Alternate Pack 1 and Pack 2

### ROTEM

RBC requested as per blood loss or Hb (blood gas or FBC)

Refer to the following Algorithms for critical bleeding management

Cardiac / Vascular Algorithm  
General Surgical / Obstetric Haemorrhage Algorithm

Apheresis Cryoprecipitate Dosing & Multiplate Schedules

## Bleeding Continues

YES

NO

YES

### AIM FOR

- Temperature > 35°C
- pH > 7.2
- Base excess < - 6
- Lactate < 4 mmol/L
- Ca<sup>2+</sup> > 1.1 mmol/L
- Platelets > 50 x 10<sup>9</sup>/L
- PT/APTT < 1.5 normal
- INR ≤ 1.5
- Fibrinogen > 1.5 g/L

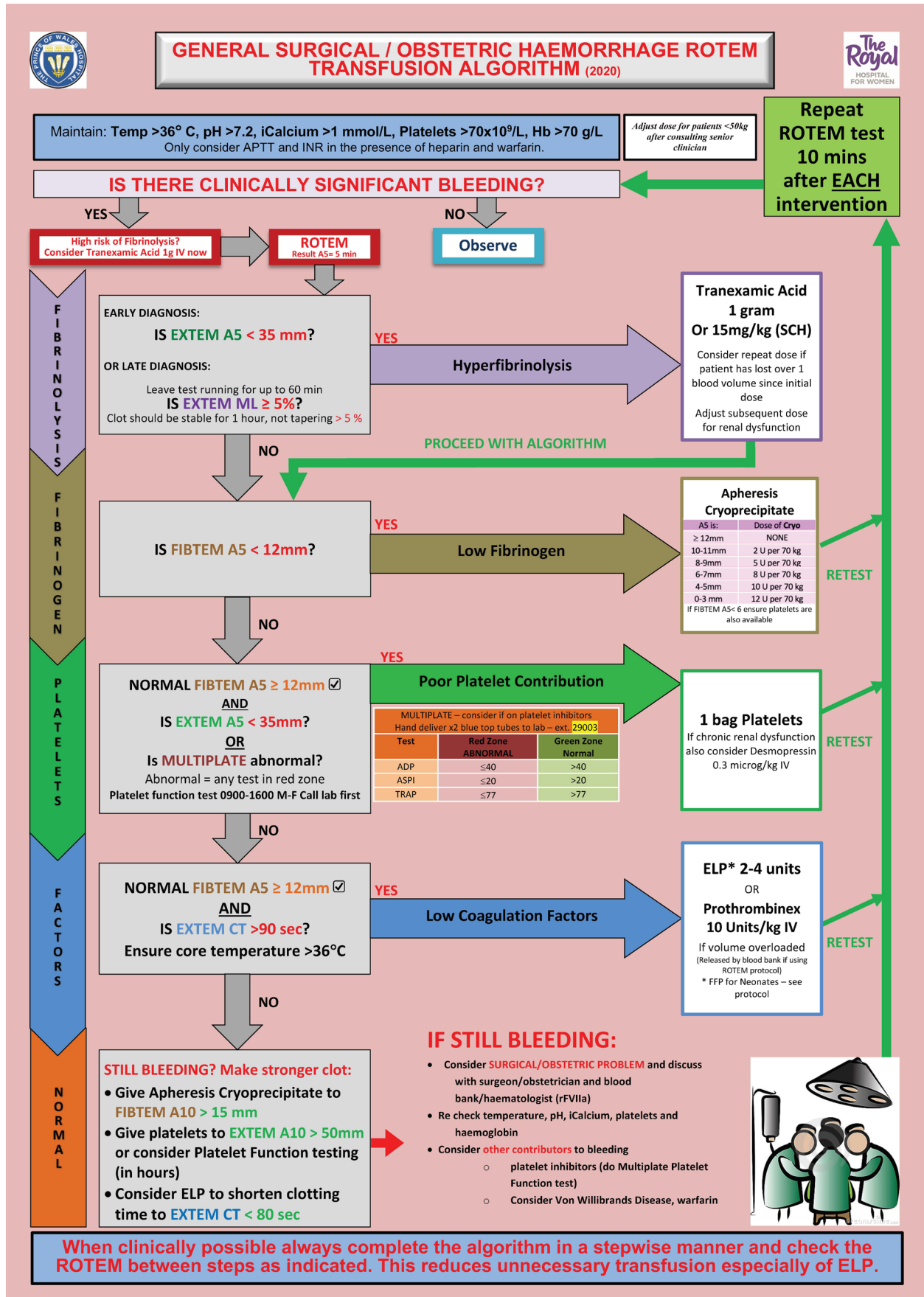
Notify Blood Bank to cease protocol  
Return unused products to Blood Bank immediately

### MONITOR Every 30-60 minutes

Full Blood Count  
Coagulation Profile  
Ionised Calcium  
Arterial Blood Gas

### Special Considerations

Vitamin K & Prothrombinex for warfarin reversal  
Protamine for heparin reversal  
Contact Haematologist on call for NOAC reversal



**RETEST**

**RETEST**

**RETEST**

**When clinically possible always complete the algorithm in a stepwise manner and check the ROTEM between steps as indicated. This reduces unnecessary transfusion especially of ELP.**