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 ≥500mLs, 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 ≥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/Code Blue - call 2222 according to criteria
- Involve anaesthetic team
- 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
- 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)

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

- Keep the woman warm and administer high flow oxygen via facial mask
- 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

Blood loss greater than 1.5L with ongoing bleeding

- Notify consultant obstetrician and consultant anesthetist to attend
- Administer IV tranexamic acid (see appendix 3) if not already given
- Transfer to theatre
- Ask anaesthetic team to perform rotational thromboelastometry (ROTEM) if appropriate
- Ensure blood product replacement is led by the anaesthetic team and used with or without ROTEM guidance (see appendix 5)
- 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
- 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
- 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
- Communicate early with other colleagues when surgical assistance is anticipated, particularly where hysterectomy or internal iliac artery ligation is likely

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

7. EDUCATIONAL NOTES

- Primary PPH is within 24 hours of birth[1,2]
- Secondary PPH is 24 hours to six weeks postpartum[1,2]
- Severe PPH is defined as blood loss of 1000 ml or more after childbirth[2]

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

- Blood loss of ≥2000mL carries a significant risk for coagulopathy, and additional escalation is recommended when blood loss is more than this or if there is hemodynamic compromise[1,2]
- 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[1,2]:
  - 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^{o}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 ligament 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[7]
- 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[2]

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

- 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[5,6]. 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.

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

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

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Appendix 1:

Risk Factors for PPH

Antepartum	Intrapartum	Postpartum	Cause

• Maternal age ≥ 35 years
• BMI ≥ 35 kg/m^2
• Grand multiparity
• Uterine anomalies (e.g.fibroids)
• History of previous primary or secondaryPPH
• History of APH in thecurrent pregnancy
• Over distension of theuterus:
  ○ Multiple pregnancy
  ○ Polyhydramnios
  ○ Fetal macrosomia (> 4kg)
	• Precipitate labour
	• Prolonged labour (first, second, or third stage)
	• Arrest of descent
	• Uterine infection (e.g. pyrexia > 38 °C in labour)
	• Oxytocic use for augmentation or induction of labour
	• Instrumental birth (forceps or vacuum)
	• Intrapartum haemorrhage
		• Drug induced hypotonia (e.g. magnesium sulphate, anaesthetic agent)
		• Bladder distension
			Tone
			70%

	• Precipitate labour • Instrumental birth (forceps or vacuum)	• Cervical, uterine, or perineal lacerations • Caesarean section	**Trauma** **20%**
• History of retainedplacenta • Abnormal placentation(i.e. Placenta praevia, accreta, percreta, or increta).		• Retained placenta manual removal or products (e.g. cotyledon, membranes, blood clots) • Manual Removal • Uterine inversion	**Tissue** **10%**

• Intrauterine fetal death
• Therapeutic anticoagulation
• Maternal bleeding disorders:
  ○ Von Willebrand Disease
  ○ Idiopathic Thrombocytopenia Purpura
  ○ Thrombocytopenia(from hypertensive disorders of pregnancy)
  ○ Disseminating Intravascular Coagulation (DIC)
	• Amniotic Fluid Embolism (AFE)
	• Disseminated Intravascular Coagulation (DIC)
		• AFE
		• DIC
			Thrombin
			1%

NOTE: Most cases of PPH occur in women with no identifiable risk factors.			

Adapted from NSW MoH GL2021_010 Postpartum Haemorrhage (PPH)

Appendix 2a

PRIMARY PPH QUICK REFERENCE GUIDE – DETECT AND RESPOND

DETECTION

ARE YOU CONCERNED THAT THE WOMAN IS AT RISK OF PRIMARY PPH

Does the woman have any of the following risk factors, signs or symptoms present?

Antenatal	Intrapartum/Postpartum
• History of previous PPH • Uterine distension (e.g. multiple pregnancy, polyhydramnios) • Anaemia, clotting disorders • Abnormal placentation (e.g. accreta, praevia) • Uterine/amniotic infection • Fetal death in utero (FDIU)	• Prolonged first, second, and/or third stage • Arrest of descent • Cervical, Perineal or uterine lacerations • instrumental birth (forceps/ventouse) • Oxytocin infusion for augmentation or IOL • Retained or incomplete placenta or membranes

NOTE: This list is not exhaustive. Remember 2/3rds of case of Primary PPH cannot be predicted

The most important single warning of diminishing blood volume and mild shock is tachycardia. This often precedes a fall in blood pressure

Record observations on the Standard Maternity Observation Chart - SMOC

Does the woman have any: RED ZONE observations OR blood loss ≥ 1500ml OR additional criteria OR serious clinician concerns?	Does the woman have any YELLOW ZONE observations OR blood loss ≥ 1000mL OR additional criteria OR clinician concerns?	Does the woman have cumulative blood loss ≥ 500mLs following a VAGINAL BIRTH AND NO additional criteria or clinician concern?
YES	YES	YES

RESPOND & ESCALATE

Severe Primary PPH and symptoms of SHOCK are present **This is a life threatening maternal emergency** **This woman is at risk of rapid deterioration**	Severe Primary PPH is Present **This woman is at risk of further deterioration**	Primary PPH is present **Act promptly to prevent deterioration**
• Call immediately for a Rapid Response (as per CERS protocol) • Measure/weigh blood loss • Commence management as per Primary PPH Quick Reference Guide – Management • Monitor for signs and additional cause of deterioration	• Immediate escalation to a medical officer (as per CERS protocol) • Measure /weigh blood loss • Commence management as per Primary PPH Quick Reference Guide – Management • Monitor for signs and additional causes of deterioration	• Call for assistance • Do not leave the woman • Increase maternal observations/assessments • Commence basic measure as per Primary PPH Quick Reference Guide – Management **Escalate and commence full resuscitation measure if bleeding continues despite the above OR YELLOW or RED ZONE**

Adapted from NSW MoH GL2021_010 Postpartum Haemorrhage (PPH)

Appendix 2b

PRIMARY PPH QUICK REFERENCE GUIDE - MANAGEMENT

RESUSCITATE, TREAT THE CAUSE & REASSESS

Initial assessment & resuscitation

Basic measures – for all women when a PPH is detected

- **Call for assistance**
- Lie woman flat
- Repeat or give oxytocic
- Keep woman warm
- Ensure woman's bladder is empty
- Repair genital tract trauma if indicated
- If placenta is delivered evaluate uterine tone, expel clots, fundal massage
- Inspect placenta & membranes for completeness
- Monitor BP, P, RR & SpO2 every 5 mins & temp every 15mins

Gain IV access & send urgent

- Group and hold
- FBC
- Coagulation screen

Consider:

- Cross match (4 units)
- LFT, UECs

If Bleeding continues or signs of shock despite basic measures – commence full resuscitation & treat cause

- Escalate as per local CERS
- O2 via mask (10-15L/min)
- Insert IDC – monitor output (i.e. >30mL/hr)
- Give maximum of 3.5 L warmed fluids
- Consider blood transfusion early. Give O RhD neg blood (or group specific if available) if bleeding ongoing after 3.5 L of fluids infused
- Re-test coags, FBC, Ca2+ and ABG's every 30-60mins whilst bleeding

Identify the cause

(TISSUE) Placenta out & complete? — YES → **(TONE)** Fundus firm? — YES → **(TRAUMA)** Genital tract/uterus intact — YES → **(THROMBIN)** Blood Clotting?

NO

Treat the cause Immediate management

- Do not massage uterus
- Ensure 3rd stage oxytocic given
- Apply CCT & attempt delivery of placenta
  - stop if undue traction required
  - remove placenta if retained in vagina
- Post-delivery: check for completeness, massage fundus – assess tone
- Transfer to OT for:
  - manual removal/EUA of retained placenta or products

- Uterine massage
- Expel uterine clots

Give 1st line drugs:

- Oxytocin
- Ergometrine
- Syntometrine ®
- Carbectocin

Give 2nd line drugs early

- Tranexamic acid
- Carboprost tromethamine®

Consider bi-manual compression

In addition to immediate Management:

- Oxytocin infusion
- Misoprostol

- Inspect cervix, vagina, perineum, and repair trauma
- Assess for uterine inversion and replace if found
- Transfer to OT if:
  - uterine rupture suspected
  - haematoma
  - unable to see/access trauma site

- Review blood test results
- **Activate Critical bleeding Protocol (CBP) early – Give:**
  - RBC, FFP, Platelets
  - Cryoprecipitate if fibrinogen <2.5 grams/L
  - Ca Gluconate if Ca2+ <1.1 mmol/L
  - Avoid hypothermia & acidosis

MASSIVE PPH (i.e. blood loss ≥ 2,000mLs or signs of *severe* shock)

- Review criteria for activating Critical Bleeding Protocol (CBP)
- -Transfer to OT
- Maintain facial Oxygen
- Bimanual compression
- Senior multidisciplinary team

Reassess. Treat ongoing bleeding

Transfer:
To OT for manual removal or EUA if not already undertaken

Consider:

- Intrauterine balloon tamponade
- Angiographic embolisation (if available)
- Laparotomy:
  - Interim aortic compression
  - B-Lynch compression suture
  - bilateral uterine artery ligation
  - Hysterectomy

Consider:

- Anaesthetic to optimise genital tract/cervix exposure & repair
- Assess for uterine rupture/trauma
- Laparotomy/ Hysterectomy

Consider:

- Angiographic embolisation
- Bilateral uterine artery ligation
- Hysterectomy (consider early)

After the emergency

- develop clear plan for ongoing and follow-up care
- 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

Adapted from NSW MoH GL2021_010 Postpartum Haemorrhage (PPH)

Appendix 3

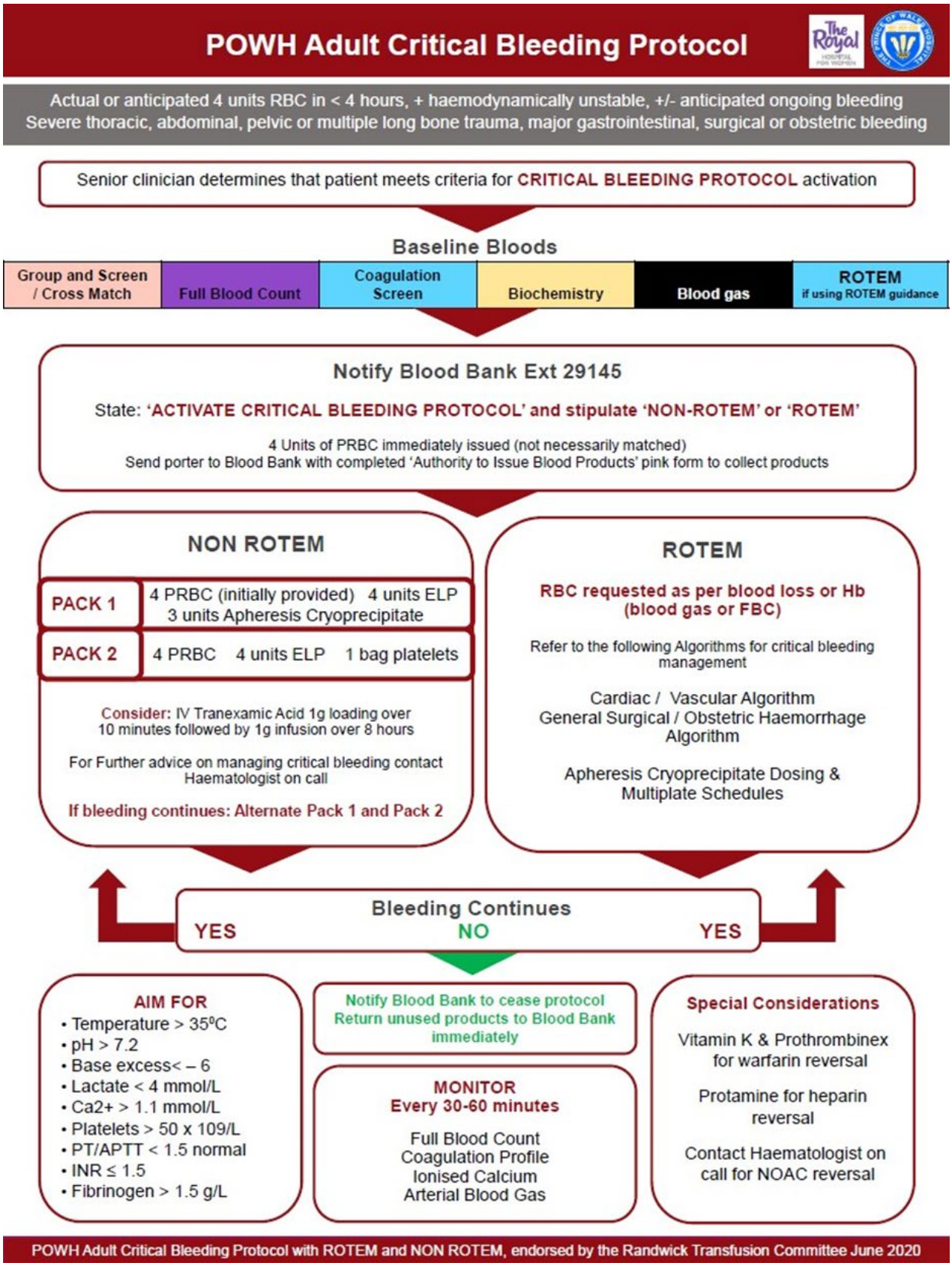
Management	Medication	Dosage	Administration	Notes
1st line **Immediate** *(Choice of medication is dependent on any prior 3rd stage prophylaxis given)*	Oxytocin (Syntocinon®) 5 units/mL or 10 units/mL	10 units	IM or slow IV	Short acting oxytocic
	Ergometrine 500 microgram/mL	500 micrograms OR 250 micrograms + 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 **in Operating Theatre only** 100 microgram/mL	100 micrograms	IM OR IV	Single dose only - long-acting oxytocic
2nd line **Early** *(Use both medications when bleeding not controlled)*	Tranexamic acid^ 100 mg/mL	1 gram	Slow IV	If bleeding persists after 30 minutes a second dose may be administered
	Carboprost# 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^ 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

^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*).

#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.

Adapted from NSW MoH GL2021_010 Postpartum Haemorrhage (PPH)

Appendix 4


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
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
• Ca2+ > 1.1 mmol/L
• Platelets > 50 x 109/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
POWH Adult Critical Bleeding Protocol with ROTEM and NON ROTEM, endorsed by the Randwick Transfusion Committee June 2020

Appendix 5

GENERAL SURGICAL / OBSTETRIC HAEMORRHAGE ROTEM TRANSFUSION ALGORITHM (2020)

Maintain: **Temp >36° C, pH >7.2, iCalcium >1 mmol/L, Platelets >70x10⁹/L, Hb >70 g/L**
Only consider APTT and INR in the presence of heparin and warfarin.

Adjust dose for patients <50kg after consulting senior clinician

Repeat ROTEM test 10 mins after EACH intervention

IS THERE CLINICALLY SIGNIFICANT BLEEDING?

YES

High risk of Fibrinolysis? Consider Tranexamic Acid 1g IV now

ROTEM Result A5= 5 min

NO

Observe

FIBRINOLYSIS

EARLY DIAGNOSIS:
IS EXTEM A5 < 35 mm?

OR LATE DIAGNOSIS:
Leave test running for up to 60 min
IS EXTEM ML ≥ 5%?
Clot should be stable for 1 hour, not tapering > 5 %

YES → Hyperfibrinolysis → **Tranexamic Acid 1 gram Or 15mg/kg (SCH)**
Consider repeat dose if patient has lost over 1 blood volume since initial dose
Adjust subsequent dose for renal dysfunction

NO → PROCEED WITH ALGORITHM

FIBRINOGEN

IS FIBTEM A5 < 12mm?

YES → Low Fibrinogen → **Apheresis Cryoprecipitate**

A5 is:	Dose of Cryo
≥ 12mm	NONE
10-11mm	2 U per 70 kg
8-9mm	5 U per 70 kg
6-7mm	8 U per 70 kg
4-5mm	10 U per 70 kg
0-3 mm	12 U per 70 kg

If FIBTEM A5< 6 ensure platelets are also available

RETEST

NO

PLATELETS

NORMAL FIBTEM A5 ≥ 12mm ☑
AND
IS EXTEM A5 < 35mm?
OR
Is MULTIPLATE abnormal?
Abnormal = any test in red zone
Platelet function test 0900-1600 M-F Call lab first

YES → Poor Platelet Contribution

MULTIPLATE – consider if on platelet inhibitors
Hand deliver x2 blue top tubes to lab – ext. 29003

Test	Red Zone ABNORMAL	Green Zone Normal
ADP	≤40	>40
ASPI	≤20	>20
TRAP	≤77	>77

→ **1 bag Platelets**
If chronic renal dysfunction also consider Desmopressin 0.3 microg/kg IV

RETEST

NO

FACTORS

NORMAL FIBTEM A5 ≥ 12mm ☑
AND
IS EXTEM CT >90 sec?
Ensure core temperature >36°C

YES → Low Coagulation Factors → **ELP* 2-4 units**
OR
Prothrombinex 10 Units/kg IV
If volume overloaded
(Released by blood bank if using ROTEM protocol)
* FFP for Neonates – see protocol

RETEST

NO

NORMAL

STILL BLEEDING? Make stronger clot:
- Give Apheresis Cryoprecipitate to FIBTEM A10 > 15 mm
- Give platelets to EXTEM A10 > 50mm or consider Platelet Function testing (in hours)
- Consider ELP to shorten clotting time to EXTEM CT < 80 sec

IF STILL BLEEDING:

- Consider SURGICAL/OBSTETRIC PROBLEM and discuss with surgeon/obstetrician and blood bank/haematologist (rFVIIa)
- Re check temperature, pH, iCalcium, platelets and haemoglobin
- Consider other contributors to bleeding
  - platelet inhibitors (do Multiplate Platelet Function test)
  - Consider Von Willibrands Disease, warfarin

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.