All Wales Maternity & Neonatal Network Guidelines

Prevention and Management of Postpartum Haemorrhage

Documents to read alongside/ support this guideline	NICE Guidance CG190. Intrapartum Care for Healthy women and babies (2014) NICE Guidance NG121. Intrapartum Care for women with existing medical conditions or obstetric complications and their babies (2019) RCOG Green-top Guideline no 27a Placenta Praevia and Placenta Accreta: Diagnosis and Management (2018) RCOG Green-top Guideline no 52 PPH. Prevention and Management of Postpartum Haemorrhage (2016)

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Summary of reviews/amendments	
Version	**Completed action**
2.9	Replaces Obs Cymru, Prevention and Management of Postpartum Haemorrhage 1.5
3.1a	Amendment to the ROTEM Algorithm following publication of the Obs Plus Study. Also minor additions to the checklist

Disclaimer: These guidelines have been ratified at the Maternity/Neonatal Guideline Meeting; however clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt, contact a senior colleague or expert. Caution is advised when using guidelines after the review date.

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Introduction and Background

Obstetric haemorrhage is the leading cause of maternal death worldwide, accounting for 27% of all deaths in the most recent World Health Organisation (WHO) review. In the UK, 12 women died from obstetric haemorrhage between 2016 and 2018. Obstetric haemorrhage is also a leading cause of serious maternal morbidity, and the incidence is increasing. The recommendations from 'Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries' (MBRRACE) report [(1)] focus on prompt recognition of the severity of a haemorrhage (whether this be visible, using measurement to quantify loss or concealed with altered maternal clinical signs), and emphasise communication, documentation, teamwork and leadership in the management of postpartum haemorrhage (PPH).

In Wales the OBS Cymru 4 stage PPH Management Checklist is used which prompts escalation to appropriate clinicians, reinforces PPH management and standardises documentation. Stage 0 is for risk assessment purposes and does not intend to determine place of birth, but aids holistic assessment and place of birth recommendation and should be used in all birth settings. (Appendix 1). In the event of a PPH, a senior clinician should take a helicopter view to avoid losing situational awareness

'The words woman and women have been used throughout this document as this is the way that the majority of those who are pregnant and having a baby will identify. For the purpose of this document, this term includes girls. It also includes people whose gender identity does not correspond with their birth sex or who may have a non-binary identity'.

1 Purpose and Scope

Primary postpartum haemorrhage (PPH) is the most common form of major obstetric haemorrhage. The traditional definition of primary PPH is the loss of $\geq$ 500 mL of blood after vaginal delivery or $\geq$ 1000 mL of blood after caesarean delivery within 24 hours of delivery. PPH can be broken down into stages:

- Stage 1: 500–999 mL
- Stage 2:1000-1499 mL
- Stage 3: $\geq$1500 mL (major obstetric haemorrhage)

In women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2), a lower level of blood loss may be clinically significant as highlighted in the 2020 MBRRACE report [(1).]

Clinicians are encouraged to amend the blood loss criteria for Stage 1, 2 and 3 of the OBS Cymru 4 stage PPH management checklist accordingly. This ensures that the response to obstetric haemorrhage is tailored to the proportionate blood loss as a percentage of circulating blood volume based on a woman's current body weight.

Secondary PPH is defined as abnormal bleeding from the birth canal between 24 hours and 12 weeks postnatal. This guideline includes recommendations for the management of secondary PPH.

Women with pre-existing bleeding disorders and women taking anticoagulants are at increased risk of PPH. This guideline does not include specific recommendations for the management of such situations or for managing haemorrhage in women who refuse blood transfusion and in these situations the input of a local haematologist should be sought. Clinicians should be aware that women taking SSRI may be at an increased risk of PPH [(2)].

This guideline aims to support health professional's practice in all settings but recognises that some of the recommendations specifically apply to management within hospital settings and may not be suitable for out of hospital births where facilities and resources may require different practices [(3).]

2 Pathophysiology

The total circulating blood volume in late pregnancy increases to 100mL/kg of ideal body weight (around 6 to 7L). This combined with increase in coagulation factors provides physiological protection against haemorrhage. Healthy pregnant women can compensate very well during haemorrhage, and therefore initial clinical observations may be falsely reassuring.

Table 1 ***Clinical features of shock related to volume of blood loss*** *(adapted from PROMPT Course Manual 3rd ed)*

Blood Loss	Clinical Features
10% blood loss	• Mild tachycardia

(700mL if 70kg actual body weight)	• Normal blood pressure
15% blood loss (1050mL if 70kg actual body weight)	• Tachycardia (>100bpm) • Hypotension (Systolic blood pressure 90-80 mmHg) • Tachypnoea (Respiratory rate> 20 breaths per minute) • Pallor, sweating • Weakness, faint, thirst
30% blood loss (2100mL if 70kg actual body weight)	• Rapid, weak pulse (>120bpm) • Moderate hypotension (Systolic blood pressure 80-70mmHg) • Tachypnoea (Respiratory rate> 20 breaths per minute) • Pallor, cold clammy skin • Poor urinary output (<0.5mL/kg/hr) • Restlessness, anxiety, confusion
40% blood loss (2800mL if 70kg actual body weight)	• Rapid, weak pulse (>140bpm) • Severe hypotension (Systolic blood pressure <70mmHg) • Pallor, cold clammy skin, peripheral cyanosis • Air hunger • Anuria • Confusion, unconsciousness, collapse

Blood loss as a proportion of a pregnant woman's circulating blood volume is illustrated in table 2. Clinicians are encouraged to amend the blood loss volume criteria for Stage 1,2 and 3 of the OBS Cymru 4 stage PPH management checklist accordingly in women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2).

Table 2 ***Blood loss proportionate to a pregnant women's circulating blood volume*** *(adapted from PROMPT Course Manual 3rd ed)* [(11)]

ML = millilitres

Maternal weight (kg)	Estimated total blood volume (mL)	7.5% blood loss (mL)	15% blood loss (mL)	30 % blood loss (mL)	40% blood loss (mL)
50kg	5000	375	750	1500	2000
60kg	6000	450	900	1800	2400
70kg	7000	525	1050	2100	2800
80kg	8000	600	1200	2400	3200

3 Prediction and Prevention of Primary PPH

3.1 Risk Assessment

Health Professionals should be aware of factors which may increase the incidence of PPH. These should be considered in line with other guiding documents. The All Wales Midwifery Led Care Guidelines should be used to guide place of birth planning. Women who meet the defined criteria for Midwifery Led Care [(4)] might still be identified in the stage 0 assessment (Hb 85-95 g/l, Multiparous, BMI 35-40). Any positive score in stage 0 should prompt the opportunity for a woman to make a fully informed choice about her preferred place of birth, considering her PPH risk assessment score. This should also include prophylactic uterotonics for the third stage of labour

Where the chance of PPH is known to be significant then women should be advised to plan to give birth in an obstetric unit with access to blood transfusion services. A standard risk assessment should be completed on all women who present in labour, regardless of environment. (Stage 0 of the OBS Cymru PPH Management Checklist, Appendix 1).

3.2 Risk Factors

Risk factors for primary PPH may present antenatally or intrapartum and may differ between parity; care plans must be modified as and when risk factors arise. **It is important to note that many cases of PPH may not have any identifiable risk factors.**

Table 3 Risk Factors for PPH [(5)]

The four 'T's	Risk factors/notes
Tone: **abnormalities of uterine contraction** Over-distension of uterus	Polyhydramnios, multiple gestation, macrosomia
Intra-amniotic infection	Suspected infection, prolonged rupture of membranes

Functional/anatomical distortion of uterus	Induction of labour with uterine stimulation, rapid labour, prolonged labour/Fibroids, placenta praevia and accreta, uterine anomalies
Uterine relaxants	Terbutaline, nifedipine, magnesium, volatile anaesthetic agents, GTN
Bladder distension	May prevent uterine contraction
Tissue: retained products of conception Retained cotyledon, succenturiate lobe or membranes	Previous uterine surgery
Morbid placental adhesion (Placenta accrete or percreta)	
Retained blood clots	
Trauma: genital tract injury Lacerations of the cervix, vagina or perineum	Precipitous delivery, operative delivery, Malposition, deep engagement, difficult fetal extraction
Extensions, lacerations at Caesarean section	Previous uterine surgery
Uterine rupture	
Uterine inversion	High parity with excessive cord traction, abnormally adherent placenta
Thrombin: abnormalities of coagulation **Acquired in pregnancy:** Gestational thrombocytopenia	
Pre-eclampsia with thrombocytopenia e.g. HELLP	Pre-eclampsia with abnormal blood profile
Severe infection	Fetal demise, maternal sepsis
Abruption	Antepartum haemorrhage, suspicion of concealed bleeding
Amniotic fluid embolus	Sudden collapse
Rare conditions including Thrombotic thrombocytopaenic purpura (TTP) and Idiopathic thrombocytopaenic purpura (ITP)	Variable effect on coagulation
Pre-existing states: Including inherited clotting disorders (eg Haemophilia A, Von Willebrand's disease).	History of hereditary coagulopathies or liver disease, bruising and excessive bleeding history including previous PPH
Therapeutic Antenatal anticoagulation	History of thromboembolic disease Cardiac valve replacement

	All women receiving antenatal anticoagulation plans should follow their individualised intrapartum plans

4 Minimising Risk

4.1 Treating antenatal anaemia

Antenatal anaemia should be investigated and treated appropriately as this may reduce the morbidity associated with primary PPH. NICE recommend that all pregnant women should be offered screening for anaemia. Haemoglobin (Hb) levels outside the normal range for pregnancy (110 g/l at first contact and 105 g/l at 28 weeks) should be investigated and iron supplementation considered. Parenteral iron therapy should be considered antenatally for women with iron deficiency anaemia who do not respond to oral iron, or who have unwanted gastrointestinal side-effects. Supplemental iron therapy should also be considered for women who are at high risk of PPH if their haemoglobin level is towards the lower end of normal range, example, women with multiple pregnancy, placenta praevia, and diagnosed cases of morbid placental adhesion.

4.2 Prophylactic measures to reduce blood loss at delivery

- Prophylactic uterotonics should be routinely offered in the management of the third stage of labour in all women as they reduce the risk of PPH. If a woman at low risk of postpartum haemorrhage requests physiological management of the third stage she should be supported with her choice [4,5]. Current practice varies across Wales regarding the use of prophylactic uterotonics. The RCOG and NICE recommends:

  - For women without risk factors for PPH having a spontaneous vaginal birth, oxytocin (10 units by intramuscular injection (IM) should be given as the baby's shoulders deliver, or as soon as possible after

- In women with a raised Body Mass Index (BMI) or lower limb oedema consider the appropriate length IM needle and or site of injection (deltoid muscle), or whether IV 5 units oxytocin bolus may be appropriate

- Ergometrine–oxytocin (Syntometrine 500 micrograms/5 units) IM may be used in the absence of hypertension in women at increased risk of haemorrhage as it reduces the risk of minor PPH (500-1000mls) [5]

- For women giving birth by caesarean section, oxytocin (5 units by slow IV injection) should be given as soon as the baby is delivered. In high risk cases, an oxytocin infusion should be commenced (40 units over 4 hours). Carbetocin may also be considered as an alternative to oxytocin although not currently recommended by either RCOG or NICE [5,6].

- Clinicians may consider the use of intravenous Tranexamic acid (0.5–1.0 grams), in addition to oxytocin, at caesarean section to reduce blood loss in women at increased risk of PPH.

For women who are unable to receive autologous blood transfusion, cell salvage should be available.

4.3 Women with placenta praevia and/or suspected morbid placental adhesion (placenta accrete, increta or percreta)

The diagnosis and management of placenta praevia and morbidly-adherent placenta in Wales is outlined by RCOG 27a [7] and local guidelines.

The following **six** elements reflects good clinical practice and should be considered [7]

- Consultant obstetrician planned and directly supervising delivery
- Consultant anaesthetist planned and directly supervising anaesthetic at delivery
- Arrangement for blood and blood products to be available

- Multidisciplinary involvement, communication and meeting as required, in pre-operative planning. This should include specialist pelvic surgeons and interventional radiology where available.
- Discussion with woman and consent should include possible interventions (such as hysterectomy, leaving placenta in place, cell salvage and interventional radiology)
- Ensure local availability of a level 2 critical care bed.

Women who decline blood products should be transferred to a centre where cell salvage and interventional radiology are available [7]. The placement of prophylactic vascular catheter placement for balloon occlusion or in readiness for embolization if bleeding ensues, requires further evaluation [7].

5 Management of PPH

5.1 Identifying the severity of haemorrhage

Visual estimation of blood loss is inaccurate. Measured blood loss and clinical signs and symptoms should be included in the assessment of PPH. **All** blood loss after birth (in all birth settings) should be measured by means of weighing all collection drapes, incontinence pads, sanitary pads, swabs and suction (Appendix 2).

There may be circumstances under which weighing blood loss is not possible, for instance in the case of pool births. In these cases, visual estimation will have to be relied upon, along with clinical findings.

5.2 Identify the cause of haemorrhage

Early identification and specific management initiated by appropriately trained members of the multidisciplinary team is essential. Primary PPH is usually caused by the 4 T's whilst secondary PPH is associated with retained products of conception and/or infection. Management should be directed by the cause of the bleeding.

5.3 Communication

5.3.1 The woman and partner

PPH often occurs unexpectedly and communication with the woman and her birthing partner is important; clear information of what is happening should be given throughout.

5.3.2 Staff

Relevant staff with an appropriate level of expertise should be alerted of PPH. As a minimum, the labour ward co-ordinator (Band 7 midwife) should be alerted when blood loss is 500–1000 mL (OBS Cymru PPH Management Checklist Stage 1). This blood loss may be lower if the OBS Cymru management checklist has been amended in women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2).

In midwifery led settings where total measured blood loss is 500-999mL at the end of a birth (including perineal inspection and suturing), individual assessment should guide care planning. Where there have been no concerns around uterine atony and the woman is well, haemodynamically stable and with normal postnatal observations, care can continue in a midwifery led setting. A plan should be made for an FBC at around 24 hours to identify women who may benefit from postnatal iron therapy.

If at any time bleeding is regarded as excessive or the woman is showing signs of hypovolaemia then emergency action as per OBS Cymru, including emergency transfer to the obstetric unit, should be initiated regardless of measured blood volume. Where blood loss measured is 500mL or more and bleeding is ongoing, emergency action and transfer should be initiated. Staff at the obstetric unit should be informed of the transfer. Resuscitation should be undertaken as time and equipment allows. All women who have bled 1000mL or more (even if this has stopped) or in whom there is clinical concern should be transferred to an obstetric unit for assessment. There should be early escalation in women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2).

At 1000mL blood loss with ongoing bleeding or clinical concern (OBS Cymru PPH Management Checklist Stage 2), a multidisciplinary team should attend at the woman's bedside. Caution should be taken in women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2).

As a minimum the following staff should attend:

- The labour ward co-ordinator
- Obstetric registrar

- Obstetric anaesthetist
- A healthcare support worker or maternity care assistant

One member of the team should be assigned the task of recording events on the OBS Cymru PPH Management Checklist (scribe).

At stage 3 of the OBS Cymru PPH Management Checklist the consultant obstetrician and anaesthetist should be informed. The use of the term 'ongoing major obstetric haemorrhage' should be used to communicate the urgency.

As per *Roles and responsibilities of the consultant providing acute care in obstetrics and gynaecology* [8] the consultant obstetrician should attend in person where bleeding continues if the most senior obstetrician present at that time is not signed off as competent for managing the case. The consultant must attend any case of PPH >2L with ongoing bleeding [8].

At Stage 3 of the OBS Cymru PPH Management Checklist, the Major Obstetric Haemorrhage Protocol should be initiated. Activation of the major obstetric haemorrhage protocol is specific to each hospital in Wales. Switch board, Blood bank, Laboratory services, porters, and theatre staff should be alerted. Haematology input may also be required.

5.4 Resuscitation and Management of PPH

Clinicians should be prepared to use a combination of pharmacological, mechanical and surgical methods to arrest PPH. These methods should be directed towards the causative factor. When uterine atony is thought to be a cause of the bleeding, then a sequence of mechanical and pharmacological measures should be instituted in turn until the bleeding stops. If pharmacological measures fail to control the haemorrhage, surgical interventions should be initiated sooner rather than later.

Resuscitation should be guided by the OBS Cymru 4 stage PPH Management Checklist (Appendix 1). The woman should be resuscitated in the left lateral position until delivery of placenta in order to avoid to the exacerbation of hypotension from aorto-caval compression

By Stage 2 of the OBS Cymru 4 stage PPH management checklist (>1000mL blood loss, clinical concern or abnormal vital signs) the following interventions should be undertaken;

- Pulse, BP, respiratory rate and oxygen saturations should be measured and recorded on a MEOWS chart at least every 10 minutes
- Oxygen should be administered if maternal oxygen concentration is < 96% on air, or maternal conscious level is reduced
- Insertion of two intravenous cannula (at least 16 gauge or larger)
- Immediate venepuncture for:
    - Appropriate blood bank samples (either electronic issue or cross match)
    - Full blood count
    - Coagulation screen, including fibrinogen
    - Renal and liver function for baseline
    - Point of care tests, venous blood gas and ROTEM
- Lactate >2mmol/L may indicate significant hypovolaemia and point of care testing may be falsely reassuring. Repeat testing and ongoing clinical assessment is important
- If clinically required, warmed isotonic fluids should be infused. This should be titrated to maintain a palpable peripheral pulse. Rapid infusion devices should be used when appropriate
- Foley catheter to monitor urine output which should be documented on a fluid balance chart

By stage 3 of the OBS Cymru 4 stage PPH management checklist (>1500mL blood loss or ongoing clinical concern);

- The local major obstetric haemorrhage protocol should be followed
- Temperature should be monitored every 15 minutes and active warming measure undertaken
- Frequency of patient monitoring should be increased and documented at least every 5 minutes
- Transfuse blood if clinically indicated and guided by point of care testing as soon as possible
- Invasive blood pressure monitoring should be considered to improve cardiovascular monitoring and facilitate ongoing blood testing
- Cell salvage should be considered

5.4.1 Pharmacological and mechanical

After administration of a prophylactic uterotonic (detailed in prophylactic measures), the following additional uterotonic medications may be given:

- Repeat dose of uterotonic, at least 5 minutes after prophylactic dose. This may be either oxytocin IM/IV or Ergometrine–oxytocin (Syntometrine 500 micrograms/5 units) IM
- Ergometrine 0.5 milligrams by IM injection or by slow IV infusion (IV in 5- 20 millilitres 0.9% saline) (contraindicated in women with hypertension). Total maximum dose 1milligram, including any previous doses of Ergometrine–oxytocin. Consider giving an antiemetic with administration.
- Oxytocin infusion (40 units over 4 hours)
- Carboprost 0.25 milligrams by deep intramuscular injection repeated at intervals of 15 minutes to a maximum of eight doses, although more than four doses are rarely effective and alternative interventions are usually required in this instance (caution with asthma)
- Misoprostol 800 micrograms rectal, vaginal or sublingual administration

Consider administration of Tranexamic acid 1gram IV during a PPH with ongoing bleeding [9]. This can be repeated after 30 minutes if bleeding continues (and within 3 hours of the start of the PPH).

Uterine massage

- If uterine atony is the cause, palpate the uterine fundus and rub it to stimulate contractions.

Bimanual uterine compression

- If bleeding continues bimanual compression of the uterus may be performed. To perform, insert one hand into the vagina and form a fist. Direct the fist into the anterior fornix and apply pressure against the anterior wall of the uterus. With the other hand press externally on the uterine fundus and compress the uterus between the hands. Maintain compression until bleeding is controlled and the uterus contracts. (PROMPT).

Urinary catheterisation

- Insertion of a self-retaining urinary catheter to empty the bladder and allow continuous drainage and monitoring of urine output.

5.5 Blood Transfusion

The decision to provide blood transfusion should be based on both clinical and haematological assessment. While blood transfusion is almost always required when the haemoglobin is less than 60 g/l, it is rarely required when the haemoglobin is more than 100 g/l. Patients with acute haemorrhage can have a normal haemoglobin level on initial testing due to haemo-concentration. Clinical evaluation and regular point of care testing (ROTEM, haemoglobin and lactate) in this situation is important.

Major obstetric haemorrhage protocols must include the provision of emergency blood with immediate issue of group O, rhesus D (RhD)-negative and K-negative units, with a switch to group-specific blood as soon as feasible.

If clinically significant red cell antibodies are present, close liaison with the transfusion laboratory is essential to avoid delay in transfusion in life-threatening haemorrhage. Further detail can be found in the [5].

The hospital transfusion laboratory can readily provide red cells that are ABO and RhD compatible using electronic issue with no cross-matching needed, provided that the woman does not have any antibodies and there are robust automated systems in place for antibody testing and identification of the patient. In this setting, there is no need to reserve units for individual cases.

Intraoperative cell salvage should be considered for use in PPH (Appendix 3). If blood is returned to the woman, guidance should be followed regarding potential maternal alloimmunisation [10].

5.6 Blood coagulation management

Coagulopathies may evolve rapidly and repeated testing (every 30 minutes or every 500mLblood loss) during continued bleeding for observation of trends are more useful than single measurements. Point of care testing using viscoelastometry (ROTEM), combined with

an agreed treatment algorithm has been associated with decreased blood loss and blood product use within the obstetric setting. The main advantage is that results are known sooner than laboratory tests.

During bleeding coagulation factor concentrations should be maintained within normal ranges. Clinicians should aim for:

- Normal PT/aPTT (refer to local laboratory ranges)
- Platelet count $\geq$ 75 x10^9L
- Fibrinogen (>2 g/L)
- Fibtem A5 (>11 mm)
- EXTEM CT (<75 seconds)

The ROTEM algorithm may not be suitable for women with inherited bleeding disorders, sepsis with coagulopathy and patients taking low molecular weight heparin, warfarin or other anticoagulation therapies due to a lack of published data. The potential is for results to falsely reassure clinicians, with the risk of administering inappropriate blood products. These cases should be managed jointly with haematology.

5.7 Blood Product Transfusion

Point of care testing for coagulation will inform decision making regarding the administration of blood components (Appendix 4&5). This includes Fibrinogen concentrate, cryoprecipitate and FFP. If bleeding ongoing after $\geq$4units RBC transfusion or >4000ml blood loss FFP transfusion should be considered, irrespective of EXTEM CT. If bleeding is ongoing after 8-12g fibrinogen concentrate transfusion, haematological advice should be sought and cryoprecipitate (factor XIII) transfusion considered (14).

Platelets should be transfused when the platelet count is < 75x10^9/L as per RCOG 47 [(10)].

If no haemostatic tests are available, early FFP should be considered for conditions with a suspected coagulopathy, such as placental abruption or amniotic fluid embolism, or where detection of PPH has been delayed. If no haemostatic results are available and bleeding is continuing, then, after 4 units of red blood cells, FFP should be infused at a dose of 12–15 ml/kg until haemostatic test results are known.

Clinicians should be aware that blood components must be ordered as soon as a need for them is anticipated, as there may be a delay in supply.

5.7.1 Obstetric Surgical Techniques

- **Ensure uterine cavity is empty** before proceeding with further surgical techniques

- **Balloon Tamponade**

Intrauterine balloon tamponade (Bakri balloon) is an appropriate first-line 'surgical' intervention for most women where uterine atony is the only or main cause of haemorrhage (Appendix 6). However, its failure rate due to expulsion is higher following vaginal delivery.

- **Brace Suture ('B Lynch suture')**

Conservative surgical interventions may be attempted as second line, depending on clinical circumstances and available expertise. A laminated diagram of the brace suture technique should be kept in theatre (Appendix 7). This may also be considered as a first line treatment at the time of Caesarean section or laparotomy.

- **Dealing with the placenta**

If the placenta does not separate, consideration should be given to leaving placenta in place and closing uterus or leaving it in place or closing the uterus and proceeding to hysterectomy. Both these methods are associated with less blood loss than trying to separate the placenta (RCOG, 2018). Ideally management should have been discussed during the antenatal period with the woman who has suspected morbid placental adhesion.
Refer to RCOG's Green Top Guidance No 27a [(7)] for more detailed recommendations.

- **Undiagnosed or unsuspected placenta accreta spectrum**

If at the time of an elective repeat caesarean section, where both mother and baby are stable, it is immediately apparent that morbidly-adherent placenta is present on opening the abdomen, the caesarean section should be delayed until the appropriate staff and resources have been assembled and adequate blood products are available. This may involve closure of the maternal abdomen and urgent transfer to a specialist unit for delivery (RCOG 27a, 2018)

- **Hysterectomy**

Resort to hysterectomy sooner rather than later (especially in cases of placenta accreta or uterine rupture). Ideally and when feasible, a second clinician (experienced Gynaecologist) should be involved in the decision for hysterectomy and attend the procedure. Please refer to the RCOG guideline 27a [(7)] for additional information in cases of placenta accreta and/or praevia.

- **Uterus-preserving surgery**

Uterus preserving surgical techniques should only be attempted by surgeons working in teams with appropriate expertise to manage such cases and after appropriate counselling regarding risks and with informed consent. There is limited evidence to support uterus preserving surgery in placenta percreta and women should be informed of the high risk of peripartum and secondary complications, including the need for secondary hysterectomy [(7)].

- **Interventional radiology**

Liaison with interventional radiology may be considered where available. Internal iliac cannulation, insertion of balloons (to reduce uterine blood flow), and/or uterine artery embolization may take place in an appropriate setting with trained staff, where available. If this requires transfer to a different location, this may not be appropriate in cases of maternal haemodynamic instability. The place of prophylactic vascular catheter placement for balloon occlusion or in readiness for embolization if bleeding ensues, requires further evaluation. (RCOG 27a, 2018).

6 Secondary PPH

A full clinical assessment with initiation of resuscitation as per primary PPH should be undertaken. The clinicians should be aware that the likely causes of bleeding are often different to those of a primary PPH and so management may differ. The more common causes are retained placental tissue and/or infection which may then lead to coagulopathy. Early surgical intervention may be required to arrest bleeding, including hysterectomy. If this occurs in the community setting prompt referral to a hospital setting should be initiated.

Surgical evacuation of retained placental tissue should be undertaken promptly by an experienced clinician in cases of ongoing haemorrhage.

A pelvic ultrasound may help to exclude the presence of significant retained products of conception (but may be misleading), or identify uterine artery pseudo-aneurysm if blood flow is assessed.

Concurrent or causative infection is very common. An assessment of vaginal microbiology should be performed (high vaginal and endocervical swabs) and appropriate use of antimicrobial therapy should be initiated when endometritis is suspected.

7 Care Following PPH

Care should be provided as clinically indicated. Ensure the post event care the woman receives is provided in an appropriate environment. Consider the need for enhanced maternity care on delivery suite, or level 2 or 3 care on a critical care unit, depending on local resources.

Anyone with a blood loss of $\geq$ 1500mL should receive a minimum of 6 hours enhanced maternity care on delivery suite by appropriately trained staff. The patient should have repeat blood tests taken at a minimum of 6 hours after the bleed, unless clinically indicated sooner. Thromboprophylaxis is important once bleeding has stopped.

7.1 Documentation

Accurate documentation is essential. The OBS Cymru 4 stage PPH Management Checklist should be completed contemporaneously for anyone whose measured blood loss exceeds 500ml. A senior clinician should take a helicopter view to avoid losing situational awareness.

7.2 Debriefing

An opportunity to discuss the events surrounding a major obstetric haemorrhage should be offered to the woman (possibly with her birthing partner/s) at a mutually convenient time. A later opportunity for discussion can be arranged once recovered via referral to birth after thoughts process.

The team of health professionals involved in care may also wish to conduct a staff debrief in the case of major haemorrhage.

7.3 Risk Management

- All staff should receive training in the management of obstetric emergencies, including the management of PPH. This should be included in PROMPT Wales's training.
- Training for PPH should be multi-professional and include team rehearsals (PROMPT).
- A Datix Cymru reporting form should be completed at agreed thresholds as per OBS Cymru
- All PPH events which are classified as Serious Incidents and/or require Root Cause Analysis should be reported to the Maternity Network Safety Subgroup for dissemination of learning across Wales. Learning from cases that were managed well is also encouraged.

7.4 Audit

- PPH rates >1000 mL, ≥1500 mL, ≥2500 mL
- Blood product transfusion rates
- Annual attendance at mandatory emergency skills training including PROMPT Wales
- The proportion of women who undergo standard risk assessment when they present in labour (OBS Cymru PPH Management Checklist Stage 0) in all settings
- Use of Measuring Blood Loss Pro Forma for all births
- 4 stage OBS Cymru PPH management approach followed and documented in checklist during PPH

8 References

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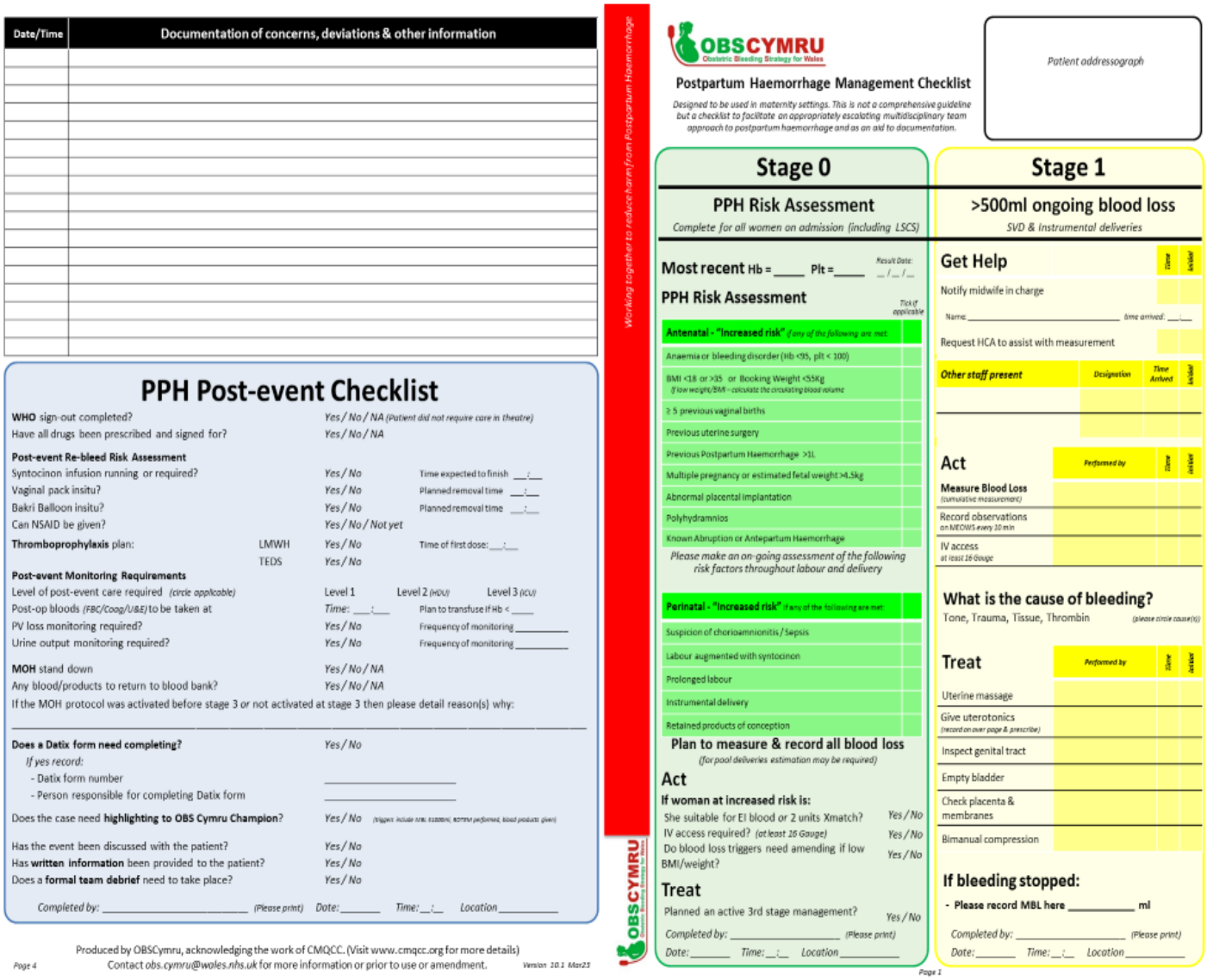
9 Guideline Summary

- Antenatal anaemia should be identified and treated
- All women should have a risk assessment completed on assessment in labour
- **ALL** blood loss should be measured and recorded following **ALL** births regardless of birth setting, wherever practical. There may be exceptions to this, such as in the case of pool births.
- Caution should be given in women with low actual body weight (e.g. less than 50 kg and or BMI <18kg/m^2).

  Local protocol should be followed regarding prophylactic uterotonic following vaginal delivery
- For women undergoing Caesarean section, Oxytocin 5iu should be given IV as the prophylactic uterotonic
- When MBL reaches 500mL, Stage 1 PPH Management should be commenced and help should be summoned from the midwife in charge as a minimum.
- When MBL reaches 1000mL, Stage 2 PPH management should be commenced, and a multidisciplinary team should be summoned to attend (midwife labour ward co-ordinator, obstetric anaesthetist, obstetric registrar, healthcare support worker).
- When MBL reaches 1000 mL, Tranexamic Acid 1 gram IV should be given. If bleeding continues, a further 1 gram should be administered after 30 minutes and within 3 hours.
- When there is a PPH of more than 1500 mL (major obstetric haemorrhage) and the bleeding is ongoing, Stage 3 should be commenced. The Major Obstetric Haemorrhage Protocol should be activated, and appropriate staff requested to attend. A senior clinician should take a helicopter view to avoid losing situational awareness.

Appendix 1: Postpartum Haemorrhage Management Checklist



Date/Time	Documentation of concerns, deviations & other information

PPH Post-event Checklist

WHO sign-out completed? *Yes / No / NA (Patient did not require care in theatre)*
Have all drugs been prescribed and signed for? *Yes / No / NA*

Post-event Re-bleed Risk Assessment
Syntocinon infusion running or required? *Yes / No* Time expected to finish ___:___
Vaginal pack insitu? *Yes / No* Planned removal time ___:___
Bakri Balloon insitu? *Yes / No* Planned removal time ___:___
Can NSAID be given? *Yes / No / Not yet*
Thromboprophylaxis plan: LMWH *Yes / No* Time of first dose: ___:___
TEDS *Yes / No*

Post-event Monitoring Requirements
Level of post-event care required *(circle applicable)* Level 1 Level 2 *(HDU)* Level 3 *(ICU)*
Post-op bloods *(FBC/Coag/U&E)* to be taken at *Time:* ___:___ Plan to transfuse if Hb < ____
PV loss monitoring required? *Yes / No* Frequency of monitoring _____
Urine output monitoring required? *Yes / No* Frequency of monitoring _____

MOH stand down *Yes / No / NA*
Any blood/products to return to blood bank? *Yes / No / NA*
If the MOH protocol was activated before stage 3 or not activated at stage 3 then please detail reason(s) why:

_____

Does a Datix form need completing? *Yes / No*
If yes record:
- Datix form number _____
- Person responsible for completing Datix form _____

Does the case need **highlighting to OBS Cymru Champion**? *Yes / No* *(triggers include MBL ≥2000ml, BOTHH performed, blood products given)*

Has the event been discussed with the patient? *Yes / No*
Has **written information** been provided to the patient? *Yes / No*
Does a **formal team debrief** need to take place? *Yes / No*

Completed by: _____ *(Please print)* *Date:* _____ *Time:* __:__ *Location* _____

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Contact *obs.cymru@wales.nhs.uk* for more information or prior to use or amendment.

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Working together to reduce harm from Postpartum Haemorrhage

OBSCYMRU
Obstetric Bleeding Strategy for Wales

Postpartum Haemorrhage Management Checklist

Designed to be used in maternity settings. This is not a comprehensive guideline but a checklist to facilitate an appropriately escalating multidisciplinary team approach to postpartum haemorrhage and as an aid to documentation.

Patient addressograph

Stage 0

PPH Risk Assessment

Complete for all women on admission (including LSCS)

Most recent Hb = ____ Plt = ____ *Result Date:* __/__/__

PPH Risk Assessment *Tick if applicable*

Antenatal - "Increased risk" *if any of the following are met:*
- Anaemia or bleeding disorder (Hb <95, plt < 100)
- BMI <18 or >35 or Booking Weight <55Kg *If low weight/BMI – calculate the circulating blood volume*
- ≥ 5 previous vaginal births
- Previous uterine surgery
- Previous Postpartum Haemorrhage >1L
- Multiple pregnancy or estimated fetal weight >4.5kg
- Abnormal placental implantation
- Polyhydramnios
- Known Abruption or Antepartum Haemorrhage

Please make an on-going assessment of the following risk factors throughout labour and delivery

Perinatal - "Increased risk" *if any of the following are met:*
- Suspicion of chorioamnionitis / Sepsis
- Labour augmented with syntocinon
- Prolonged labour
- Instrumental delivery
- Retained products of conception

Plan to measure & record all blood loss
(for pool deliveries estimation may be required)

Act

If woman at increased risk is:
She suitable for EI blood or 2 units Xmatch? *Yes / No*
IV access required? *(at least 16 Gauge)* *Yes / No*
Do blood loss triggers need amending if low BMI/weight? *Yes / No*

Treat

Planned an active 3rd stage management? *Yes / No*

Completed by: _____ *(Please print)*
Date: _____ *Time:* __:__ *Location* _____

Stage 1

>500ml ongoing blood loss

SVD & Instrumental deliveries

Get Help *Time* *Initials*
Notify midwife in charge
Name: _____ *time arrived:* __:__
Request HCA to assist with measurement

Other staff present	*Designation*	*Time Arrived*	*Initials*

Act *Performed by* *Time* *Initials*
- **Measure Blood Loss** *(cumulative measurement)*
- Record observations on MEOWS every 10 min
- IV access *at least 16 Gauge*

What is the cause of bleeding?
Tone, Trauma, Tissue, Thrombin *(please circle cause(s))*

Treat *Performed by* *Time* *Initials*
- Uterine massage
- Give uterotonics *(record on over page & prescribe)*
- Inspect genital tract
- Empty bladder
- Check placenta & membranes
- Bimanual compression

If bleeding stopped:
- **Please record MBL here** _____ **ml**

Completed by: _____ *(Please print)*
Date: _____ *Time:* __:__ *Location* _____

Page 1

Stage 2 >1000mL blood loss *OR* clinical concern (eg. Abruption or concealed bleeding) *OR* abnormal vital signs indicating urgent medical review

Progress to here from stage 1 if SVD / instrumental delivery. Re-start here after stage 0 if LSCS

Get Help

		Time arrived:	Other staff:		Time arrived:
MW in charge	Name:	time: __:__	Name:	Designation:	time: __:__
Obstetrician	Name:	time: __:__	Name:	Designation:	time: __:__
Anaesthetist	Name:	time: __:__	Name:	Designation:	time: __:__
HCA	Name:	time: __:__			

Act

	Performed by	Time	Initial
Measure & record cumulative blood loss			
Record observations on MEOWS *every 10 min*			
2nd IV access *(at least 16 Gauge)* & fluid bolus			
Take bloods — Point of care tests - ROTEM, venous lactate, venous Hb; Lab test - FBC, Coag, XMatch, U&E			

Initial VBG Test Results			Initial ROTEM Test Results	
Time:	Hb =	Lactate =	FIBTEM A5 = (Aim ≥ 12mm)	EXTEM CT = (Aim < 75 sec)

Review causes *(circle all identified)* Tone / Trauma / Tissue / Thrombin

Treat

	Performed by	Time	Initial		Performed by	Time	Initial
Review uterotonics *(record on page 3)*				Empty bladder			
Give tranexamic acid *(1g IV, if no CI's)*				Foley catheter inserted			
Bimanual compression				Inspect genital tract			
Consider ranitidine				Repair genital tract			
				Check placenta & membranes			

If bleeding stopped ensure PPH post-event checklist completed & Management plan written in notes

Completed by: _____ *(Please print)* *Date:*_____ *Time:*__:__ *Location*_____

If bleeding *ongoing* transfer patient to theatre *time arrived:* __:__

Stage 3 >1500mL blood loss *OR* ongoing clinical concern

Act

	Performed by	Time	Initial
Communicate current measured blood loss to team			
Activate MOH protocol			
Inform Obstetric and Anaesthetic consultants			
Order blood and coagulation products as per MOH and ROTEM protocol - *Do you need to discuss the case with a haematologist?*			

Review causes *(circle all identified)* Tone / Trauma / Tissue / Thrombin

Treat

	Performed by	Time	Initial
Review uterotonics *(Record on page 3)*			
Consider repeat tranexamic acid if bleeding ongoing *(1g IV, if no CI's)*			
Consider advanced surgical techniques *(Document on page 4)*			

Additional Staff Present:		Time arrived:			Time arrived:
Name:	Designation:	time: __:__	Name:	Designation:	time: __:__
Name:	Designation:	time: __:__	Name:	Designation:	time: __:__

Once bleeding stopped ensure PPH post-event checklist completed & Management plan written in notes

Completed by: _____ *(Please print)* *Date:*_____ *Time:*__:__ *Location*_____

Working Together to reduce harm from Postpartum Haemorrhage

Record of Uterotonics used

Please record all uterotonics used here and prescribe on medication or anaesthetic chart

Drug	Dose *(please circle route)*	Time	Drug	Dose	Time
Oxytocin	10 units IM *or* 5 units IV		Carboprost *(caution in asthma)*	250microg IM *(repeat up to every 15min)*	
Other			Carboprost	250microg IM	
Ergometrine *(caution in HTN/PET)*	500 microg IV or IM		Carboprost	250microg IM	
Syntometrine *(caution in HTN/PET)*	500 microg/5 units IM or IV		Carboprost	250microg IM	
Oxytocin INF	40 units over 4hr IV		Carboprost	250microg IM	
Other			Carboprost	250microg IM	
Misoprostol			Carboprost	250microg IM	
Misoprostol			Other		

Blood & Blood products transfused

Time	Product given	Time	Product given

Measured cumulative blood loss

Time	Blood Loss (ml)	Running Total (ml)

Total Measured Blood Loss = _____ml

Record of further blood test results

(Please do not duplicate records of blood results recorded in stage 2)

	Further VBG Test Results		Further ROTEM Test Results	
Time Token	*Hb*	*Lactate*	*FBTEM A5 (Aim ≥ 12mm)*	*EXTEM CT (Aim < 75 sec)*

Appendix 2: Measured Blood Loss (MBL)

(To be completed for **ALL** births wherever possible)

Type of birth: SVD LSCS – Emergency/ Elective Instrumental- Vent / Forceps **Time of birth**:……

Time	Type (small swabs, suction, inco etc)	Gross Weight (g)	Dry Weight (g)	Blood Weight (ml)	Cumulative Loss (ml)
TOTAL					

5 small swabs =___g 5 chest swabs =___g 5 abdo swabs =___g Inco sheet =___g Towel =___g

Sanitary pad =___g

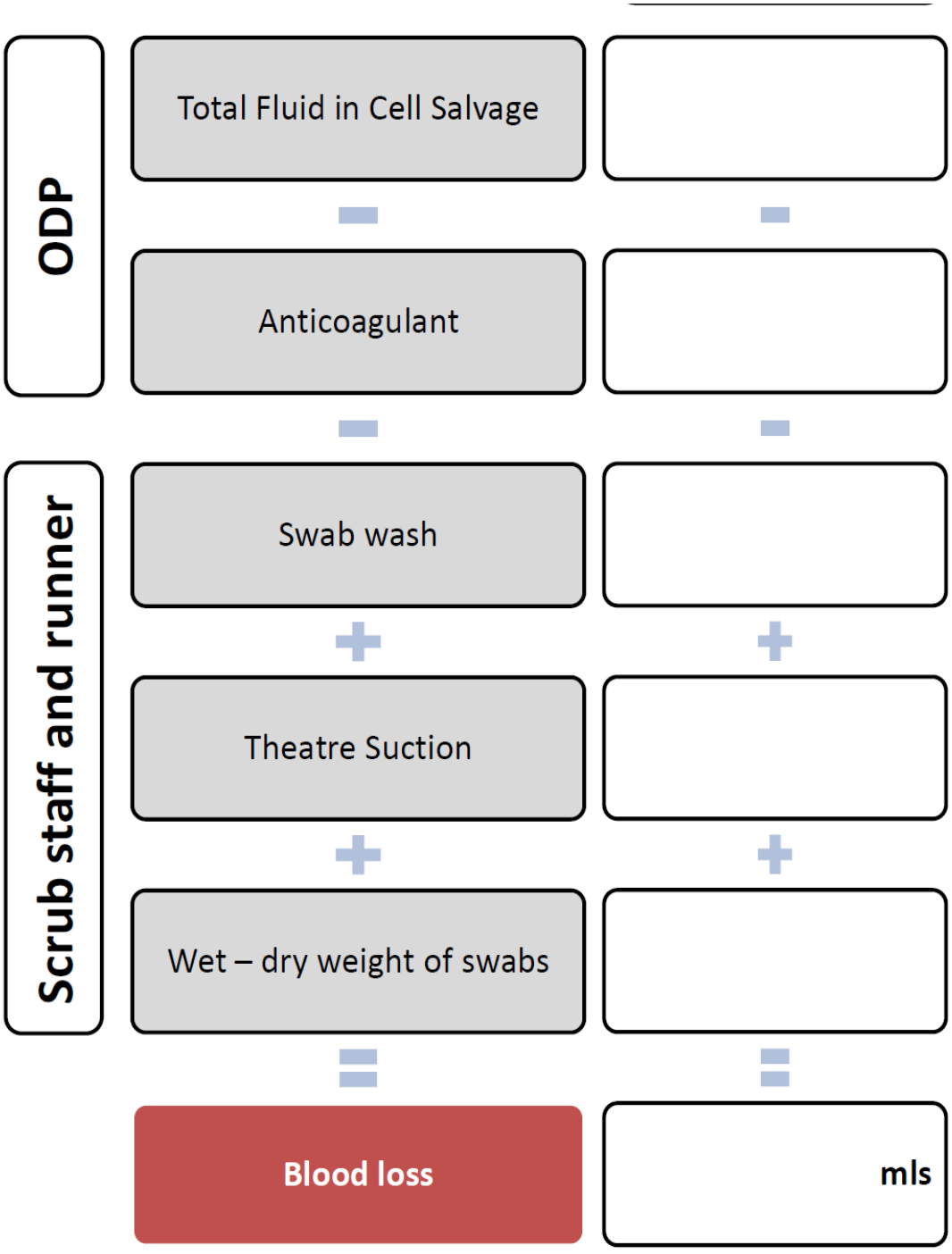
(**1g of weighed blood = 1ml**)

To calculate blood loss; Gross weight- Dry weight

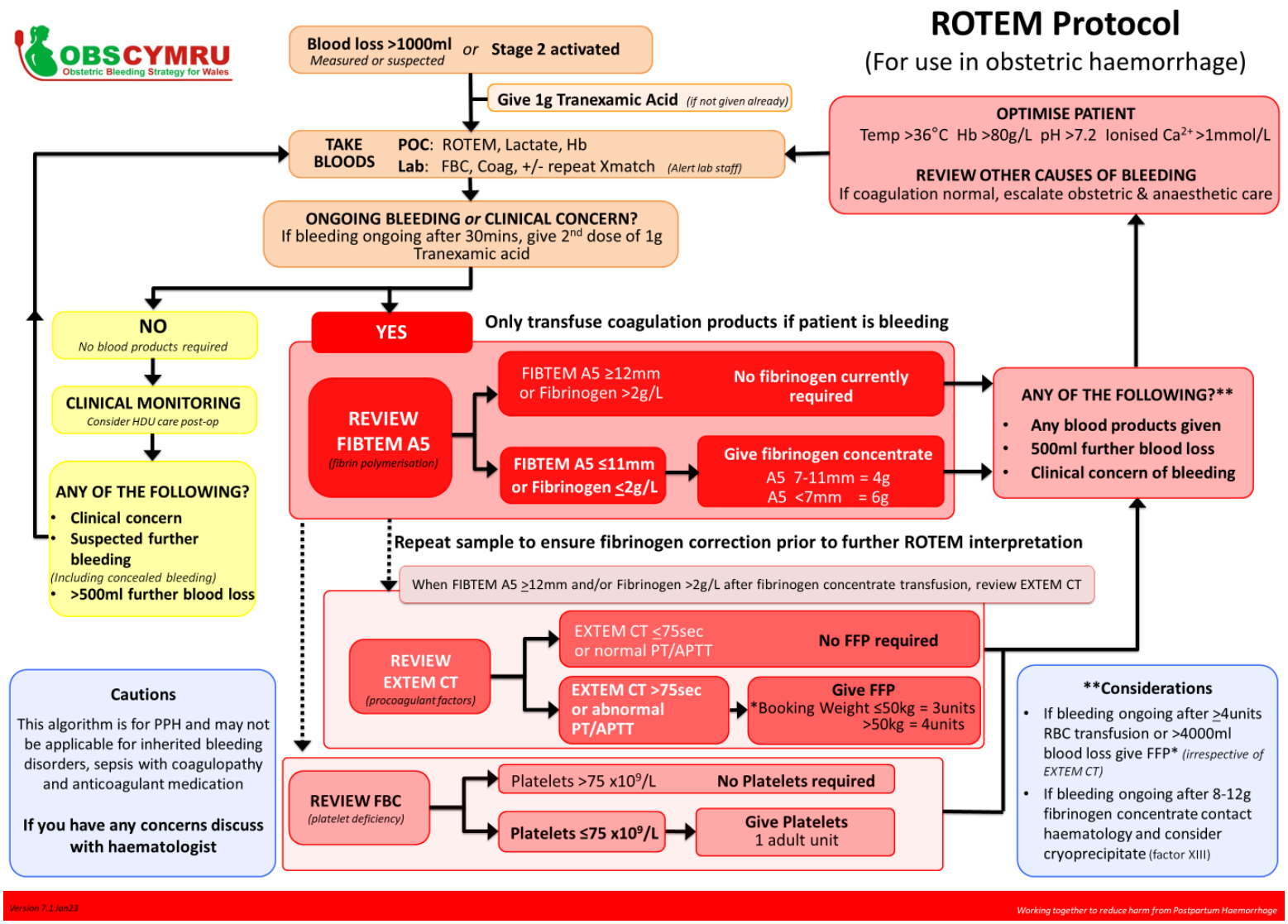
TOTAL MEASURED BLOOD LOSS =…….ml

- MBL ≥ 500ml, call for help and commence Stage 1 of the PPH Management Checklist
- MBL ≥ 1000ml commence Stage 2 of the PPH Management Checklist
- MBL ≥ 1500ml commence Stage 3 of the PPH Management Checklist and activate massive haemorrhage protocol

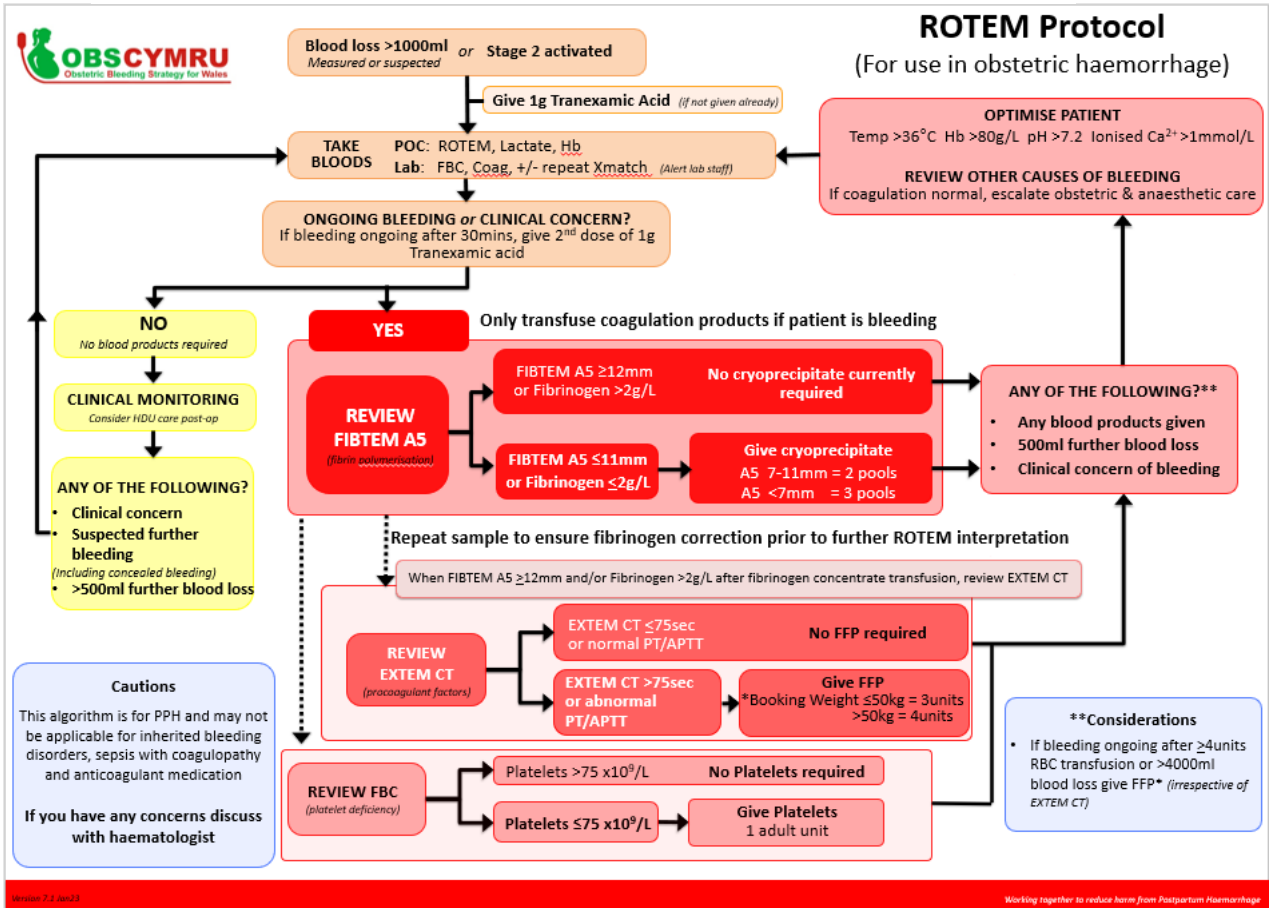
Appendix 3: Cell Salvage Blood Loss Calculation



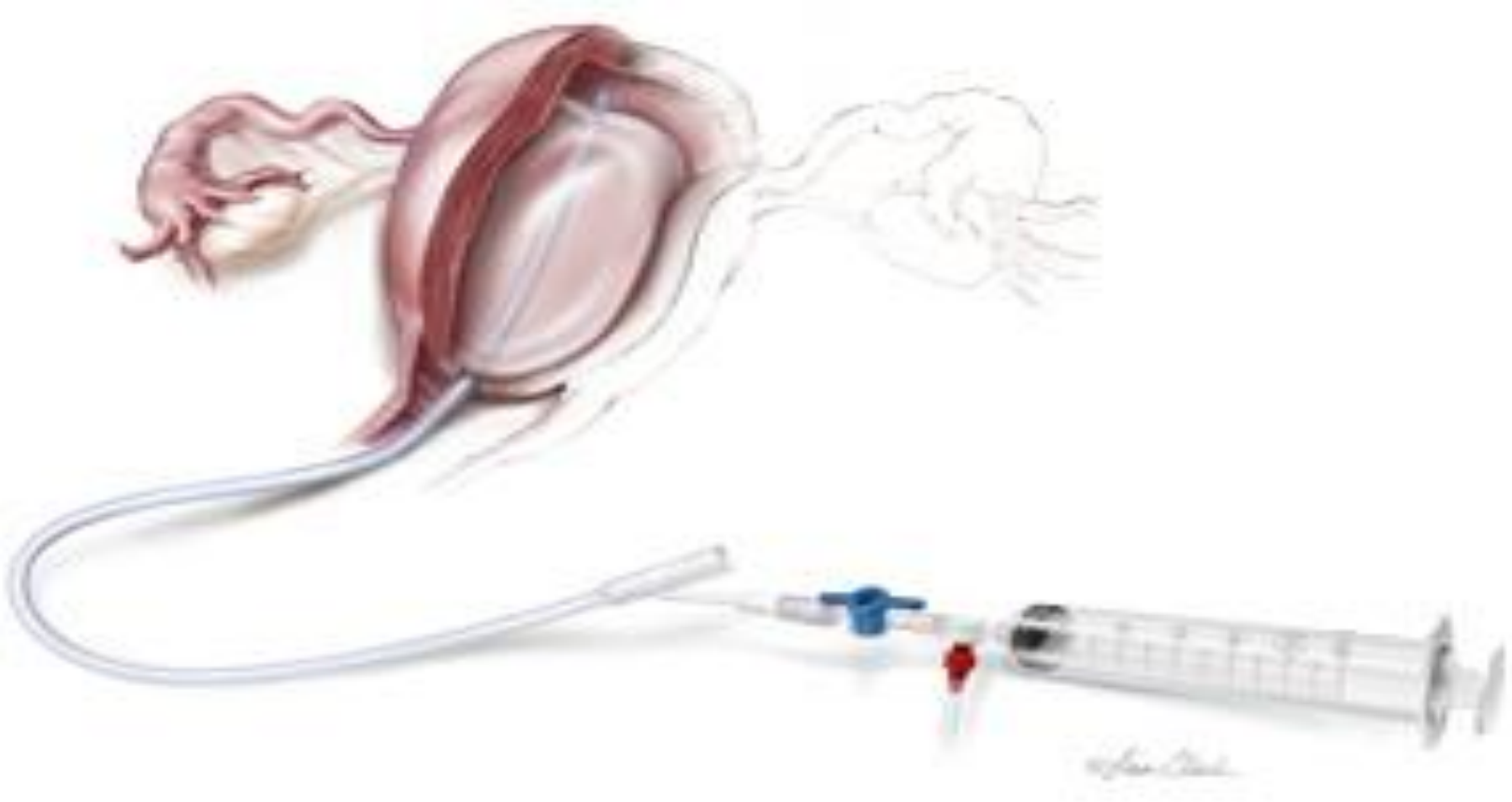
Appendix 4: ROTEM with Fibrinogen



Appendix 5: ROTEM with Cryoprecipitate



Appendix 6: Bakri Balloon



Appendix 7: Brace Suture