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Gynecology and Obstetrics

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FIGO Generic Postpartum Haemorrhage Protocol and Care Pathways

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FIGO Generic Post-Partum Haemorrhage Protocol and Care Pathways

Foreword

Globally, postpartum haemorrhage (PPH) remains the largest direct cause of maternal death. Competent maternity care providers can achieve effective prevention and treatment of PPH through an evidence-based, coordinated approach. It is also vital to have a well-resourced and enabling environment and access to essential medicines.

MSD for Mothers* through Concept Foundation (CF) and WACI Health are supporting ministries of health in several African countries, to update their Essential Medicines List (EML) in line with World Health Organization (WHO) PPH recommendations for the use of uterotonics including tranexamic acid (TXA) and heat-stable carbetocin (HSC). FIGO, in partnership with ICM through the Improve Access to essential medicines to reduce PPH morbidity and mortality Project (IAP), is contributing to this work by partnering with national member societies and associations to update their protocols/guidelines for PPH prevention and treatment, and to develop job aids for health facility-based maternal care providers.

During the IAP project (2021 – 2022), we developed a generic PPH protocol and clinical pathway using the WHO PPH recommendations. This provides examples of key definitions, early identification of risk, estimation of blood loss, choice of uterotonics, prevention and treatment at various levels of care, effective multidisciplinary teamwork, communication, and referral – all of which can inform a systematic approach to developing policy for PPH management in health facilities.

FIGO and ICM were supported by national obstetrics and gynaecology societies and midwives' associations to engage with ministries of health and establish PPH expert working groups (EWG) in each country. The focal persons from each professional society/association met virtually every 1 – 2 weeks with the international coordination team to plan for in-country activities.

Two virtual, multi-stakeholder workshops with the identified PPH EWG were facilitated. Workshop 1 aimed to raise awareness of the WHO PPH recommendations, discuss, and appraise current national PPH guidelines and protocols, and develop a plan to adapt the FIGO generic PPH protocol and clinical pathway to meet the needs of the context. Digital feedback forms were developed, and comments were collected during, and two weeks following the workshop. FIGO incorporated the recommendations into the generic PPH protocol and clinical pathway and returned the document to the PPH EWG for review and validation by the Ministry of Health.

The objectives of workshop 2 were to present the country adapted PPH protocol, discuss the use and dissemination of the adapted protocol and to agree on the content and format of job aids, which could support maternity care providers better to prevent and treat PPH. The international team encouraged national government health promotion departments and graphic designers to be involved and contributed a FIGO design consultant for additional expertise. The PPH EWG gave feedback following the same process as the first workshop. FIGO and ICM further supported their member societies/associations to design and plan for dissemination of the job aids.

The design of the meetings and workshops ensured engagement and ownership of key maternal health stakeholders involved with policy development, education, and clinical practice. Other

countries can also adapt the generic PPH protocol and clinical care pathway and develop relevant job aids using a similar multidisciplinary approach led by professional societies and associations.

Combined with focused health system interventions, (procurement and supply of quality uterotonics etc.), it is anticipated that the IAP project interventions will contribute to prevention of PPH morbidity and mortality.

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Background

Globally, postpartum haemorrhage (PPH) remains the largest direct cause of maternal deaths. Effective prevention and treatment of PPH can be achieved by an evidence-based, coordinated approach by the main care providers of women during childbirth – Obstetrician & Gynaecologists, and Midwives.

Competent care providers can decrease PPH mortality by assessing for risk in the antenatal period, monitoring progress of labour and active management of third stage of labour (AMTSL). It is also vital to have a well-resourced and enabling environment and access to essential medicines.

In recent years, the World Health Organization (WHO) revised and published guidance to prevent and manage PPH. These include:

- WHO. (2012): Recommendations for the prevention and treatment of PPH.
- WHO. (2017): Recommendation on Tranexamic Acid for the treatment of PPH.
- WHO. (2018): Recommendations on the use of uterotonics for the prevention of PPH.
- WHO. (2019): Essential Medicines List (EML).

For these recommendations to have a positive impact on PPH prevention and treatment, a system-wide approach is needed.

MSD for Mothers have supported Concept Foundation (CF) and WACI Health during a two-year project to update countries national policy/protocols in line with the WHO Recommendations 2017/18, as well as updating their EML to reflect the recommended use of TXA and heat-stable carbetocin.

FIGO, in partnership with ICM, is joining CF and WACI Health to extend this effort for the next 18-months through the Improve access to essential medicines to reduce PPH morbidity and mortality (IAP) project from January 2021 to August 2022. FIGO and ICM will partner with their member societies/associations in these countries to develop appropriate tools so that frontline clinicians are able to implement the WHO Recommendations in health facilities.

The FIGO/ICM collaboration will work with policy makers, health care providers and supply chain experts to support increased availability of quality uterotonics and the anti-fibrinolytic drug, tranexamic acid (TXA).

The IAP project aims to facilitate adoption of updated WHO PPH Recommendations (2017 & 2018), at a country level into practice through dissemination of updated clinical guidelines and protocols. The expected outcomes of the project are:

1. Normative clinical standards are in place to support the implementation of effective practices at different levels of health care.
2. WHO Recommendations are translated from guidelines into clinical protocols and appropriate implementation resources for PPH prevention and treatment.
3. Dissemination efforts to facilitate replication and scale-up of the approach.

Introduction

It has been estimated that 295,000 (UI 279,000 to 340,000) maternal deaths occurred globally in 2017. Most of these deaths (86% or 254,000) occurred in sub-Saharan Africa (SSA) and Southern Asia (SA). Sixty-three percent of all maternal deaths globally are due to direct causes, most (27.1%) of these are due to haemorrhage. Haemorrhage is the primary underlying cause of 24.5% and 30.3% maternal deaths respectively in SSA and SA respectively. Sixty-two percent of all deaths due to haemorrhage globally occur in the postpartum period (62% in SSA and 86% in SA). The majority of postpartum haemorrhage (PPH) maternal deaths could be avoided by the use of prophylactic uterotonics during the third stage of labour.

To meet the ambitious maternal health targets of the Sustainable Development Goals, specifically SDG 3.1: reduce the global maternal mortality ratio to less than 70/100,000 live births by 2030. Practical steps are needed to scale up the implementation of evidence-based interventions to prevent and treat PPH.

Following the publication of updated WHO PPH recommendations by the World Health Organization in 2017 and 2018, there is limited application of these, as well as limited knowledge of effective uterotonics for PPH prevention and treatment.

This clinical protocol for the prevention and management of post-partum haemorrhage has been developed in line with the World Health Organization PPH guidelines, to improve awareness of uterotonic options and a translation of the guidelines to facilitate evidence based clinical practice.

Purpose

The purpose of this guideline is to support Skilled Health Personnel in providing care based on best practice and best available evidence to identify, prevent and manage PPH. Specifically, this clinical protocol will increase the capacity for

- Identification of high-risk groups and instituting measures to prevent/minimise post-partum haemorrhage.
- Clear and timely communication between surgical, anaesthetic and haematology/blood transfusion services.
- Prompt resuscitation and supportive measures including replacing the blood loss.
- Investigating the cause for and arresting the haemorrhage.
- Instituting appropriate monitoring.

Roles and responsibilities

This guideline defines the roles and responsibilities of midwives, medical interns, medical officers, obstetric registrars, obstetricians, anaesthetists, and staff involved in the care of women with post-partum haemorrhage in both basic and comprehensive Emergency Obstetric Care (EmOC) health facilities.⁶

These guidelines should be implemented along with current WHO guidelines that highlight women-centred care to optimise the experience of labour and childbirth for women and their babies through holistic, human rights and evidence based approach (WHO recommendations: Intrapartum care for a positive childbirth experience and WHO labour care guide).^{7,8}

The place of training and job aids

These guidelines should be incorporated into continuous professional development programmes for Skilled Health Personnel⁹ providing maternity services. The guidelines should also be used to update job aids to facilitate implementation.

- Regular drills and skills training are essential in the management of PPH.
- Trainees should be allowed dedicated and protected time for training.
- Simulation of obstetric procedures and emergencies can only augment, not replace, the learning that occurs by caring for actual patients.
- In-house training is cheap and associated with improved outcomes.
- Funding should be available for training to reduce the cost of medical litigation as a result of substandard care.
- Teamwork is essential for proper coordination of the management.
- Above all, patients and their relatives must be kept fully informed at all stages of management.

Monitoring and evaluating PPH clinical guideline implementation

The implementation of the country-adapted PPH clinical protocol should be monitored at all levels of care where maternity services are provided. Clinical audits or criterion-based audits can be used based on clearly defined review criteria and indicators, locally agreed. A good starting point are the relevant standards and indicators described in the WHO document 'Standards for improving quality of maternal and newborn care in health facilities'.¹⁰

Definitions

Postpartum haemorrhage is defined as estimated blood loss of **more than 500 ml*** within 24 hours of a vaginal birth or **1000 ml** after caesarean section, **or any blood loss sufficient to compromise haemodynamic stability**. In women with lower body mass (less than 60kg), a lower level of blood loss may be clinically significant.¹¹

PPH can be **minor (500-1000 ml)** or **major (more than 1000 ml)**. A severe PPH following Lower Segment Caesarean Section (LSCS) involves the loss of 1500 ml or more.

Massive PPH involves the loss of **2000 ml or more** of blood from the genital tract within 24 hours of the birth of the baby or when the woman is haemodynamically compromised or showing signs of shock as a result of obstetric haemorrhage of any amount **over 500 ml**.

A blood loss can be considered a **Massive Obstetric Haemorrhage** in cases where either four units of blood have been transfused and further units are required, regardless of blood loss or there is a blood loss >2000 ml.

Secondary PPH is defined as excessive blood loss from the genital tract after 24 hours following delivery, until six weeks post-delivery.

* 1 unit of packed red blood cells is approximately 280-450 ml.

Visual estimates of blood loss are very inaccurate, there is also a tendency to underestimate blood loss associated with a surgical procedure.

The physiological increase in circulating blood volume during pregnancy means that signs of hypovolaemic shock become less sensitive in pregnancy. Following PPH, a fall in blood pressure is usually a late sign. In women with normal haemoglobin levels, blood loss of 500-1000 ml may not be associated with any change in pulse rate and blood pressure. There is usually an increase in pulse and respiratory rate with blood loss of up to 1500 ml (30% loss in blood volume), the woman is usually pale and cold. With blood loss of more than 1500-2000 ml (up to 40% loss in blood volume) or more, in addition to raised pulse and respiratory rate, the blood pressure falls (hypotension). Additionally, signs associated with reduced perfusion of the skin, brain and skin such as cold clammy skin, confusion/agitation/drowsiness, and reduced urine output become evident.

These clinical signs associated with specific blood loss volumes above are more reliable than visual estimation. Swabs and clots can be weighed for a more accurate estimate of blood loss.

WHO PPH guidelines

This protocol has been developed based on three WHO PPH guidelines, the summary of key recommendations from these guidelines are provided in [Annex 2](#).

- WHO (2012): Recommendations for the prevention and treatment of PPH
- WHO (2017): Recommendation on Tranexamic Acid for the treatment of PPH
- WHO (2018): Recommendations on the use of uterotonics for the prevention of PPH

The main change in the 2012 WHO PPH guideline, is the use of tranexamic acid (indication, timing, and dosing) - [Table 1](#)

Table 1: The main change in recommendation on TXA in the WHO 2012 PPH recommendation.¹³

	Indication	Timing	Dosing
WHO 2012 TXA Recommendation	Use of TXA is recommended for the treatment of PPH if oxytocin and other uterotonics fail to stop the bleeding or if it is thought that the bleeding may be partly due to trauma.	For atonic uterus, use TXA if oxytocin and other uterotonics fail to stop the bleeding.	IV(slowly):1g Repeat after 30 minutes if bleeding continues.

WHO 2017 TXA Recommendation (updated)	Use TXA in all cases of PPH, regardless of whether the bleeding is due to genital tract trauma or other causes.	Use TXA within 3 hours and as early as possible after the onset of PPH. Do not initiate TXA more than 3 hours after birth, unless being used for bleeding that restarts within 24 hours of completing the first dose (see dosing).	Fixed dose of 1g in 10 ml (100mg/ml) IV at 1 ml per minute (i.e., administered over 10 minutes) Second dose of 1g IV if bleeding continues after 30 minutes or if bleeding restarts within 24 hours of completing the first dose.
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PPH Prevention

Minimising the risk of PPH starts during the antenatal period, by the identification and treatment of anaemia, identify any women with increased risk of PPH (**Table 2**) and plan for their delivery. Risk factors for developing PPH may present antenatally or intrapartum, so care plans should be modified as these risks emerge. ¹¹ Women with known risk factors should be delivered in health facilities with capacity for blood transfusion and surgery.

During the 3rd stage of labour, one of the following uterotonics, carbetocin, misoprostol, ergometrine/methylergometrine and oxytocin and ergometrine fixed-dose combination, should be administered ([Figure 1](#) and [Figure 2](#)). The characteristics of these uterotonics are provided in [Annex 1](#).

Oxytocin (10 IU, IM/IV) is the recommended uterotonic of choice (vaginal and caesarean birth). If oxytocin is unavailable or the quality cannot be guaranteed, the other uterotonics above can be used. The use of **carbetocin** (100 micrograms, IM/IV) is only recommended for the prevention of PPH for all births in contexts where its cost is comparable to other effective uterotonics. It is expected that heat-stable carbetocin (HSC) will be available in many low and lower-middle income countries, this is likely to address the issues of effectiveness, quality and affordability.

Any uterotonic that contains **ergometrine** could be used in the absence of oxytocin in contexts where hypertensive disorders can safely be excluded. Non Skilled Health Personnel should only administer **misoprostol** (oral 400 or 600 microgram). ⁴

Injectable prostaglandins such as carboprost or sulprostone are not recommended for PPH prevention.

Postpartum abdominal uterine tone assessment for the early identification of uterine atony is recommended for all women.

Figure 1: Deciding which uterotonic to take

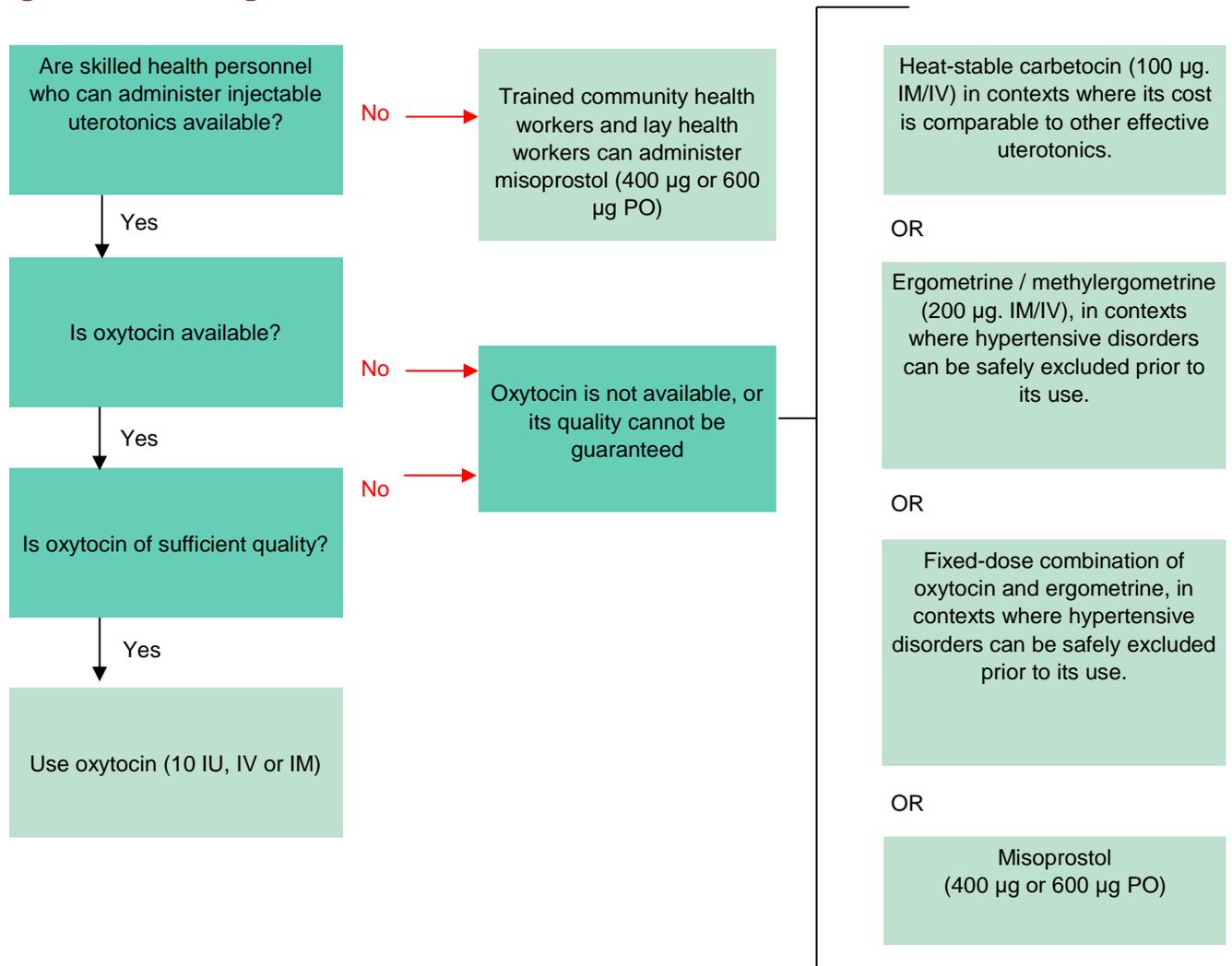
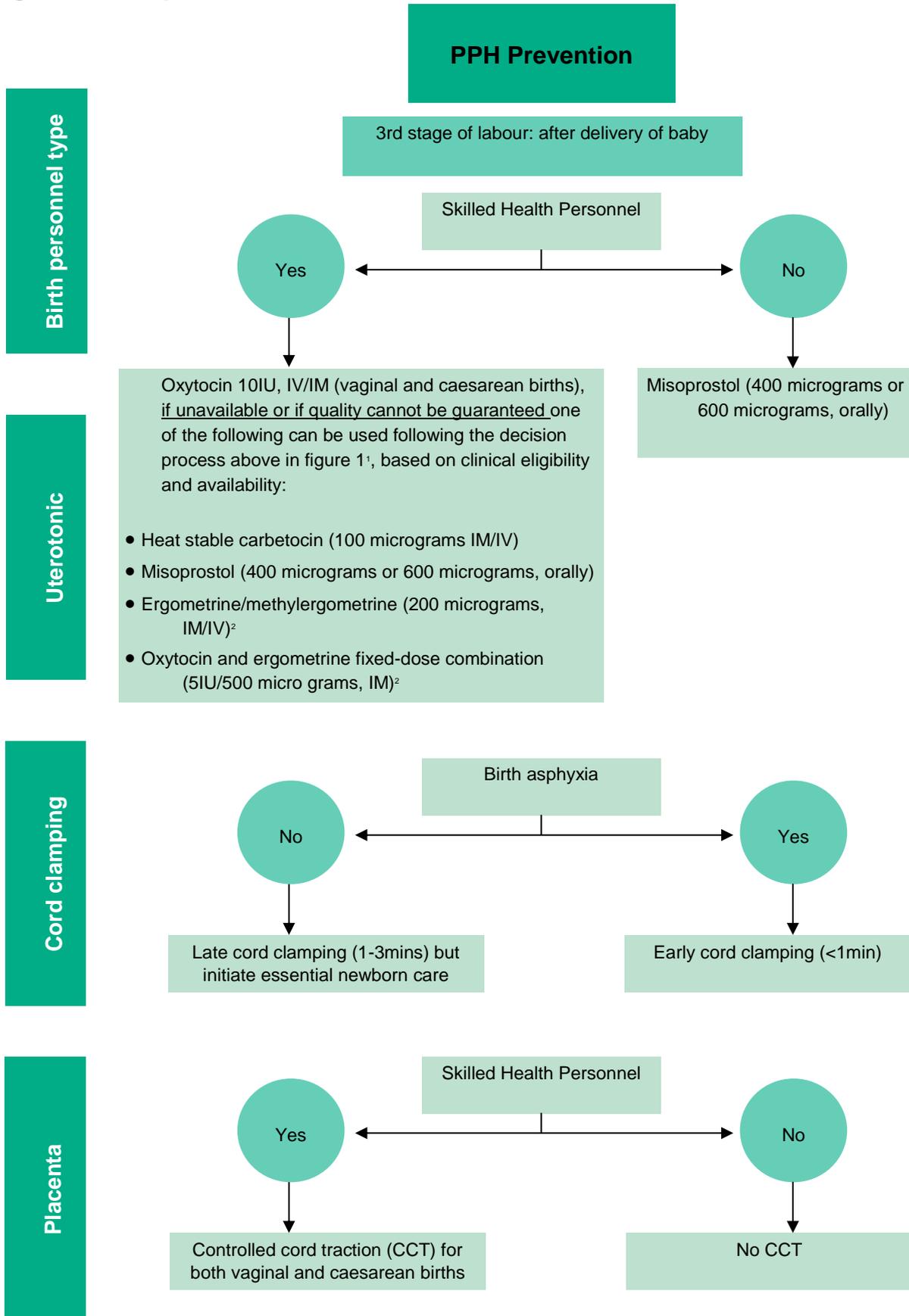


Figure 2: PPH prevention flow chart



1. Carboprost is not recommended for prevention of PPH
 2. In contexts where hypertensive disorders can be safely excluded prior to its use

Treatment of PPH

Minor PPH: blood loss 500 – 1000 ml without clinical shock

This management plan is for PPH with blood loss 500-1000 ml without clinical shock. Additionally, a smaller blood loss associated with clinical signs of shock, hypotension (systolic BP drop of 30mmHg), tachycardia (pulse rate rise of more than 30bpm), tachypnoea (respiratory rate more than 30 cycles/min) or oliguria (less than 30 ml of urine/hour) can also be managed following these steps.

Alert labour ward in-charge/coordinator, first line obstetric (medical intern/medical officer) and anaesthetic staff (if in a comprehensive EmOC facility)

The most senior skilled health personnel available should lead the management. The team leader will be responsible for key procedures, clear communications, and allocation of tasks (interventions, equipment and documentation, monitoring and communication with the family). Clear information should be provided to the woman and her partner about what is happening from the onset.

Conduct a primary survey

- Assess Airway, Birthing and Circulation
- Fluid replacement
- Establish intravenous access with 16G cannula and commence crystalloid infusion, for example Hartmans solution, normal saline
- Urgent venepuncture: FBC, Group and Save, Coagulation screen including fibrinogen
- Monitor vital signs: pulse, respiratory rate, blood pressure every 15 minutes. A modified early obstetric warning score (MEOWS) will aid monitoring, prompt action and escalating promptly when abnormal scores are observed.

Conduct a secondary survey

Look out for the Four T's (Tone, Tissue, Trauma and Thrombin) and associated risk factors (**Table 2**). The most common cause of PPH is uterine atony with placenta site bleeding, genital tract trauma or both. The initial evaluation is differential uterine atony from genital track lacerations.

Table 2: Risk factors and causes of obstetric haemorrhage

The Four T's	Risk factors/notes
Tone: abnormalities of uterine contraction	
Overdistension of uterus	Polyhydramnios, multiple gestation, macrosomia

The Four T's	Risk factors/notes
Intra-amniotic infection	Fever, prolonged rupture of membranes
Functional/ anatomical distortion of uterus	Rapid labour, prolonged labour, fibroids, placenta praevia, uterine anomalies
Uterine relaxants e.g. magnesium sulfate / nifedipine	Terbutaline, halogenated anaesthesia, Glyceryl trinitrate (GTN)
Bladder distension	May prevent uterine contractions
Tissue: retained products of conception	
Retained cotyledon or succenturiate lobe	
Retained blood clots	
Trauma: genital tract injury	
Lacerations of the cervix, vagina or perineum	Precipitate labour, instrumental delivery
Vaginal and paravaginal haematoma	
Extensions, lacerations at CS	Malposition deep engagement
Uterine rupture	Previous uterine surgery
Uterine inversion	High parity, excessive cord traction
Thrombin: abnormalities of coagulation	
<i>Pre-existing states</i> e.g. Von Willebrand Haemophilia	History of hereditary coagulopathies or liver disease
<i>Acquired in pregnancy:</i> Gestational thrombocytopenia, PET with HELLP	Bruising, Elevated blood pressure
<i>DIC:</i> IUD, severe infection, abruption, amniotic fluid embolus, Severe PIH/PET	Coagulopathy
<i>Therapeutic anticoagulation</i>	DVT/PE treatment

Clinical considerations

- Empty bladder – leave catheter in place and commence fluid balance chart
- Assess uterine tone and perform uterine massage as necessary “rub up a contraction”, bimanual compression if required.
- Uterotonic medications see **Figure 2**. Note that dose of misoprostol for treatment is 800 micrograms sublingual.
- Tranexamic acid (TXA) should be used in all cases of PPH, regardless of whether the bleeding is due to genital tract trauma or other causes within 3 hours of birth.
- TXA should be administered at a fixed dose of 1g in 10 ml (100 mg/ml) IV at 1ml per minute (i.e., administered over 10 minutes), with a second dose of 1g IV if bleeding continues after 30 minutes or if bleeding restarts within 24 hours of completing the first dose.¹⁴

- The reference point for the start of the 3-hour window for starting TXA administration is time of birth. If time of birth is unknown, the best estimate of time of birth should be used as the reference point.
- The use of TXA should be avoided in women with a clear contraindication to antifibrinolytic therapy (including TXA) for example known thromboembolic event during pregnancy.

- TXA should be part of the standard comprehensive PPH treatment package, including medical (uterotonics), non-surgical and surgical interventions in accordance with WHO guidelines or adapted local PPH treatment protocols.
- Early use of IV TXA (as early as possible after clinical diagnosis of PPH and only within 3 hours of birth) in addition to standard care is recommended for women with clinically diagnosed PPH following vaginal birth or caesarean section.
- The point estimates of effect of TXA use beyond 3 hours on death for trauma⁶ and for PPH were both in the direction of harm, albeit not statistically significant for women with PPH. In view of this evidence, WHO recommends against the use of TXA more than 3 hours after birth.
- Treatment delay in use of TXA appears to reduce benefit. The benefit appears to decrease by 10% for every 15-minute delay, with no benefit seen after 3 hours.

TXA Health system considerations

TXA should be readily available at all times in the delivery and postpartum areas of facilities providing emergency obstetric care.

TXA is relatively cheap in most contexts, easy to administer, often available in health care settings due to its use in trauma and surgery, has a shelf life of 3 years, and can be stored at room temperature (15–30C) in many places.

The clinical care pathway will depend on the type of facility where the diagnosis of PPH is made – a primary care/facility with Basic Emergency Obstetric Care capacity (BEmOC) ([Figure 3](#) and [Figure 4](#)) or a hospital with Comprehensive Emergency Obstetric Care facility (CEmOC) ([Figure 5](#)).

Situation-Background-Assessment-Recommendation

The SBAR (Situation-Background-Assessment-Recommendation) technique provides a framework for communication between members of the health care team about a patient's condition. ^{15,16}

S = Situation (a concise statement of the problem)

State clearly:

What is your grade

Where you are calling from

B = Background (pertinent and brief information related to the situation)

State the admission diagnosis and date of admission

State any important history

A = Assessment (analysis and considerations of options — what you found/think)

State the findings of the initial assessment

State the most recent vital signs: respiratory rate, heart/pulse rate, B/P, temperature, oxygen saturations, AVPU (Alert, Voice/or new confusion, Pain or Unresponsive), Blood sugar

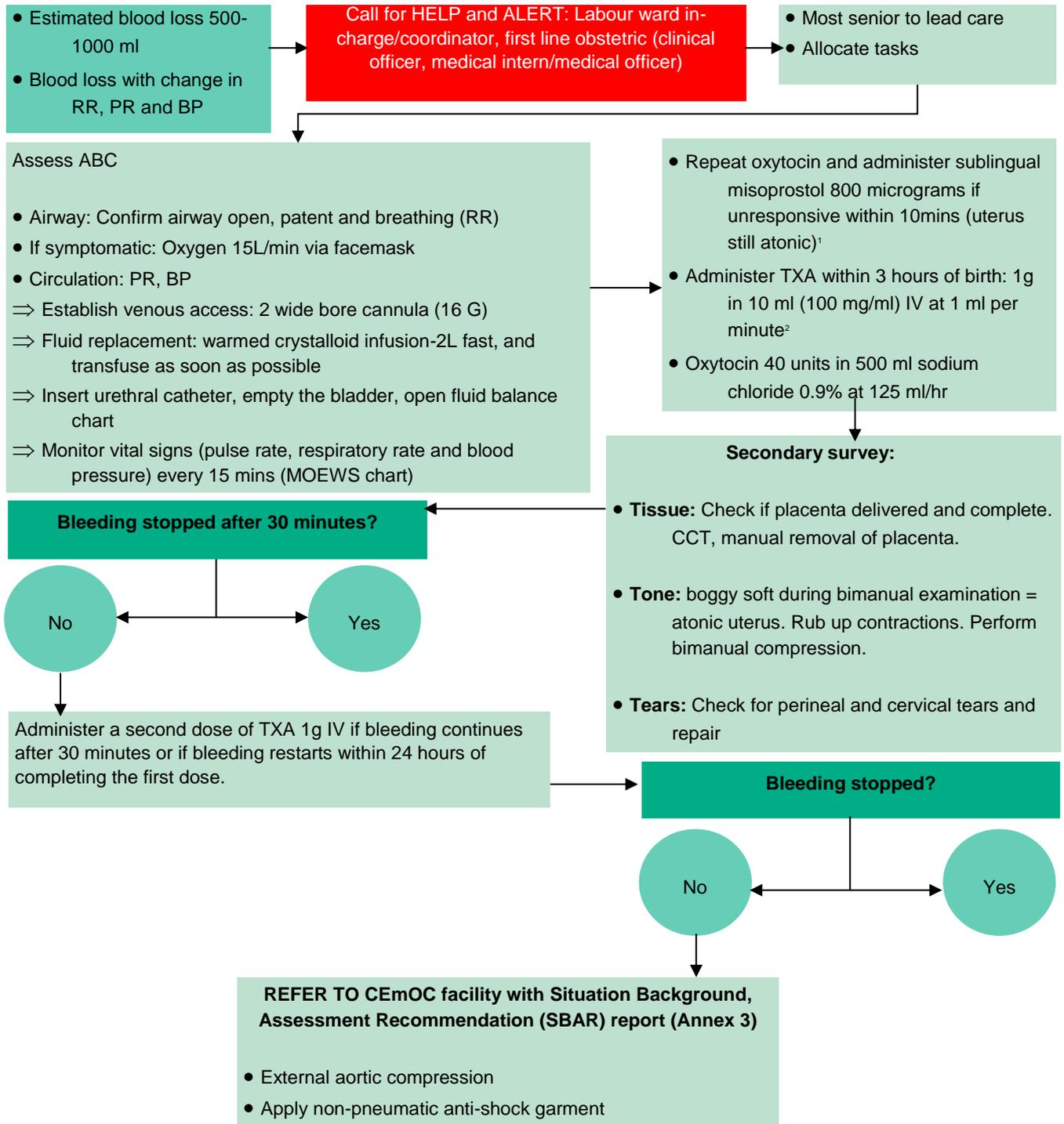
R = Recommendation (action requested/recommended — what you want)

State clearly what your recommendation is or what do you want?

SBAR allows for an easy and focused way to set expectations for what will be communicated and how between members of the team, which is essential for developing teamwork and fostering a culture of patient safety.

There is moderate evidence for improved patient safety through SBAR implementation, especially when used to structure communication over the phone¹⁶. A tool for SBAR implementation is provided in [Annex 3: SBAR communication and referral tool*](#).

Figure 3: Flow chart for PPH treatment at BEmOC facility



¹ IV oxytocin peak onset of action is immediate and peak concentration after 30 minutes while IM oxytocin onset of action is 3-7 minutes and duration of action is up to 1 hour (Annex 1).

²TXA should be avoided in women with clear contraindication to antifibrinolytic therapy such as a known thrombotic event during pregnancy

Uterine packing is not recommended for the treatment of PPH due to uterine atony

Women should remain in the delivery suite for 24 hours after major PPH has been resolved or after transfer from ICU/ITU

Figure 4: Flow chart for major PPH treatment at BEMOC facility

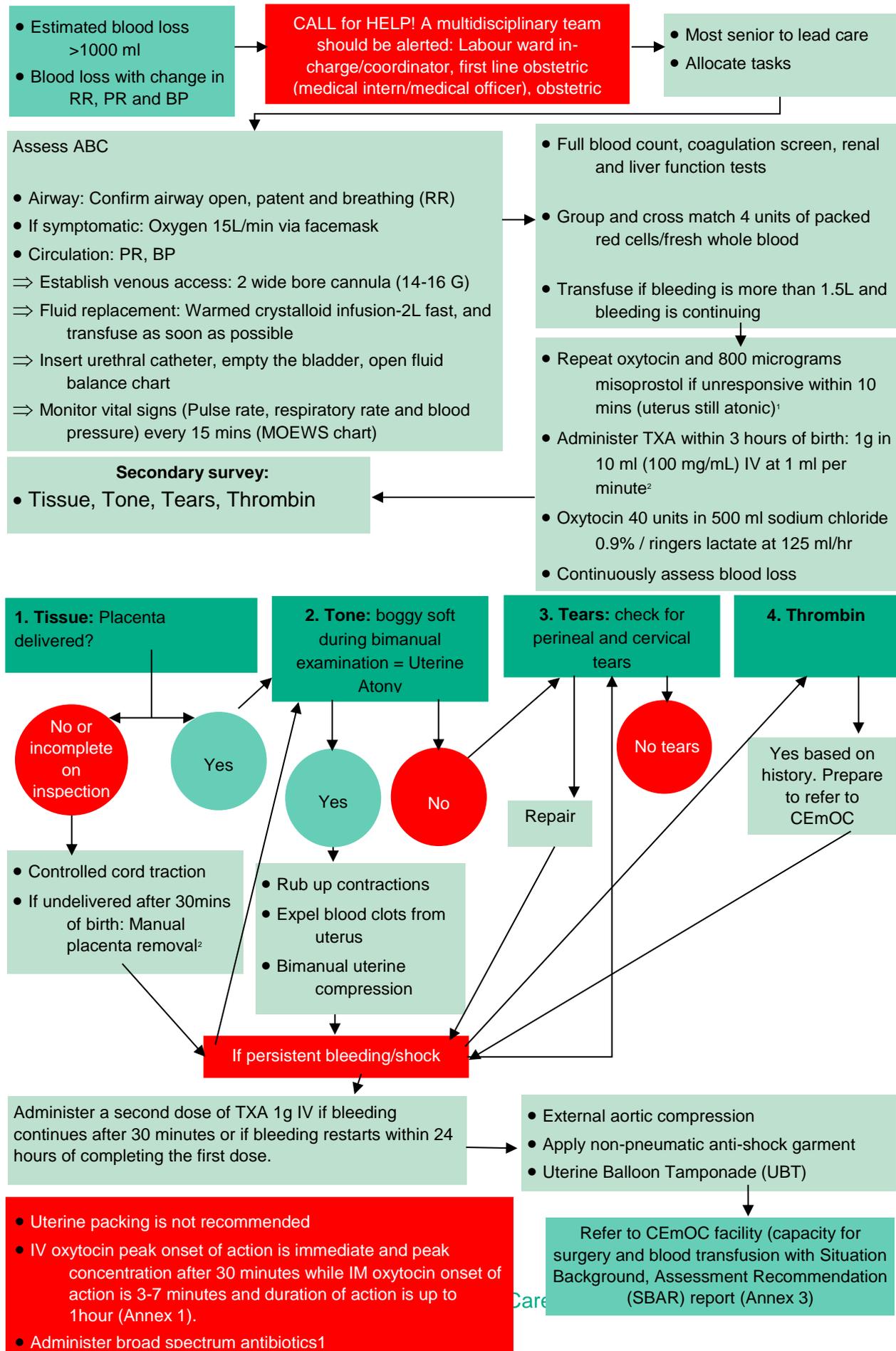
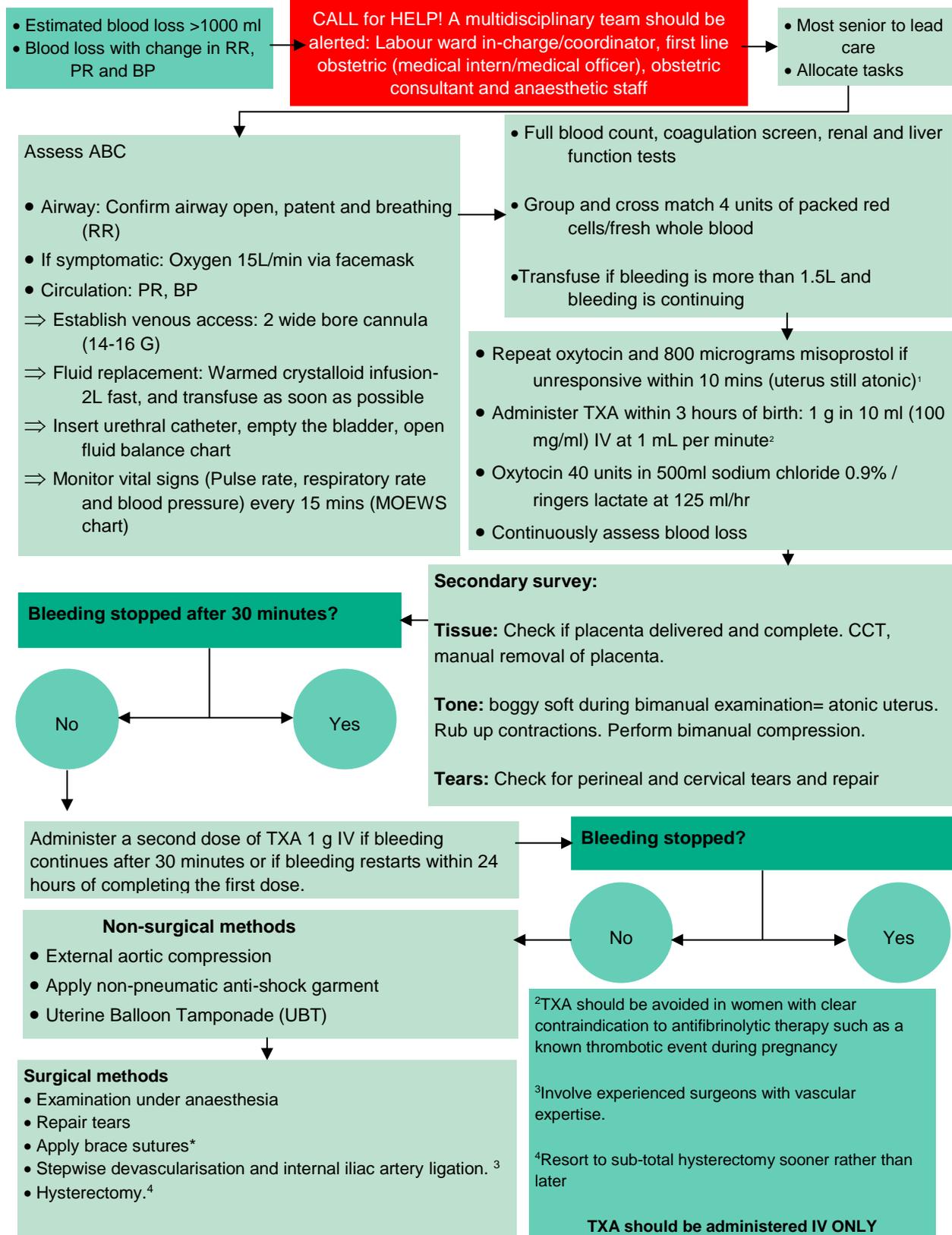


Figure 5: Flow chart for major PPH treatment at CEMOC facility



¹ IV oxytocin peak onset of action is immediate and peak concentration after 30 minutes while IM oxytocin onset of action is 3-7 minutes and duration of action is up to 1hour (Annex 1).

*Have a copy of BLYNCH suture on display in the operation theatre (Annex 4)

NASG garment instructional video [here](#). UBT instructional video [here](#).

Women should remain in the delivery suite for 24 hours after major PPH has been resolved or after transfer from ICU/ITU

Major PPH: Blood loss more than 1000 ml and ongoing bleeding or clinical shock

Call for help! Request Labour Ward in-charge/Coordinator, medical officer/Obstetric Registrar and Anaesthetist and alert Consultant Obstetrician and Consultant Anaesthetist.

The most senior skilled health personnel available should lead the management. The team leader will be responsible for key procedures, clear communications, and allocation of tasks (interventions, equipment and documentation, monitoring and communication with the family).

Conduct a primary survey

- ABC: assess airway and breathing; oxygen 15L/min via face mask
- Evaluate circulation
- Position the patient flat
- Give immediate clinical treatment:
 - Uterine massage “rub up a contraction”, bimanual compression if required
 - Empty bladder – leave catheter in place and commence fluid balance chart
 - Uterotonic medications – see **Figure 4**
 - Establish two 14-16g cannula, take bloods for full blood count, coagulation screen, renal and liver baseline and cross match packed red cells (4 units).
 - Volume replacement: involves restoration of both blood volume and oxygen carrying capacity.
 - As rapidly as possible give 2L of warmed Hartmann’s solution or normal saline, followed by whole blood as soon as available.
 - Blood transfusion as soon as blood is available, following blood transfusion clinical protocol. Not that near patient estimation of Hb can be misleading.
 - Controlled cord traction if placenta has not yet been delivered – remove any clots or remaining tissue
 - Continuously assess blood loss – weigh swabs and clots and keep a contemporaneous estimate of blood loss.
 - Monitor vital signs: pulse, respiratory rate, blood pressure every 15 minutes. A modified early obstetric warning score (MEOWS) will aid monitoring, prompt action and escalating promptly when abnormal scores are observed.^{17,18}. [Annex 5: Modified Early Obstetric Warning score chart](#).

Conduct a secondary survey (Table 2)

Care pathway

- If pharmacological measures fail to control the haemorrhage, surgical interventions should be initiated sooner rather than later.
- Intrauterine balloon tamponade is an appropriate first-line ‘surgical’ intervention for most women where uterine atony is the only or main cause of haemorrhage.

- Conservative surgical interventions may be attempted as second line, depending on clinical circumstances and available expertise.
- It is recommended that a laminated diagram of the brace suture technique be kept in theatre. (**Annex 4**)
- Resort to hysterectomy sooner rather than later (especially in cases of placenta accreta or uterine rupture).
- Ideally and when feasible, a second experienced clinician should be involved in the decision for hysterectomy.

Conservative surgical techniques

A description of the B-Lynch suture technique is provided here. See [Annex 4: B-Lynch surgical technique for control of massive postpartum haemorrhage](#).

The B-Lynch suture allows for even tension, free drainage of the uterine cavity and facilitates involution. With this technique it is easy to confirm haemostasis, that the uterine cavity is empty, confirm no decidual tear/trauma.

Requirements¹⁹

- Lloyd Davis or frog-legged position essential
- The uterus must be exteriorised
- Basic surgical competence required
- Bi-manual compression to test for potential success
- Transverse lower segment incision should be made
- Uterine cavity checked, explored, and evacuated
- A 70-mm half circle guarded needle (code: w3709) mounted on a 90-cm monocril No. 1 (Ethicon, Somerville, N.J.) or Catgut suture is appropriate
- Apply suture correctly with even tension (no shouldering)
- Allow free drainage of blood, debris, and inflammatory material
- Check bleeding control vaginally, using swabs and instruments

After application, the uterus should be exteriorised and the surgeon demonstrates to the assistant bimanual compression and ante version. The second assistant checks the vagina to ensure that bleeding is controlled and the surgical technique will work.

Causes of failure include the following:

- Placenta percreta
- Wrong technique causing uterine necrosis
- Uncontrolled DIC
- No pre-operative investigations done
- Poor technique i.e. not properly applied
- Delayed application

Secondary PPH

In women presenting with secondary PPH, 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.

A pelvic ultrasound may help to exclude the presence of retained products of conception, although the diagnosis of retained products is unreliable. Surgical evacuation of retained placental tissue should be undertaken or supervised by an experienced clinician.

Annex 1: Characteristics of potential uterotonics⁴

Characteristics	Brief description (14, 15)
Oxytocin	Synthetic cyclic peptide form of the naturally occurring posterior pituitary hormone Binds to oxytocin receptors in the uterine myometrium, stimulating contraction of this uterine smooth muscle by increasing the sodium permeability of uterine myofibrils.
Carbetocin	Long-acting synthetic analogue of oxytocin with agonist properties Binds to oxytocin receptors in the uterine smooth muscle, resulting in rhythmic contractions, increased frequency of existing contractions, and increased uterine tone.
Misoprostol	Synthetic analogue of natural prostaglandin E1 Has oxytocic properties, inhibits gastric acid and pepsin secretion, and enhances gastric mucosal resistance to injury.
Injectable prostaglandins	Injectable prostaglandins (systemic) trialled for PPH prevention include prostaglandin F2 analogues (carboprost), prostaglandin E2 (dinoprostone) and prostaglandin E2 analogues (sulprostone)
Ergometrine	Ergometrine and methylethergometrine are ergotalkaloids that increase uterine muscle tone by causing sustained uterine contractions
Oxytocin plus ergometrine	Fixed-drug combination ^a —oxytocin (5 IU) plus ergometrine (500 microgram)
Misoprostol plus oxytocin	See misoprostol and oxytocin Combination agents not in synthetic (fixed-dose) or naturally occurring forms

Characteristics	Pharmacokinetics(14, 15)	
Oxytocin	Intravenous (IV): almost immediate action with peak concentration after 30 minutes	Half-life: 1–6 minutes

	Intramuscular (IM): slower onset of action, taking 3–7 minutes, but produces a longer-lasting clinical effect of up to 1 hour	
Carbetocin	IV: sustained uterine contractions within 2 minutes, lasting for about 6 minutes and followed by rhythmic contractions for 60 minutes IM: sustained uterine contractions lasting for about 11 minutes and rhythmic contractions for 120 minutes	Half-life: 40 minutes
Misoprostol	Absorbed 9–15 minutes after sublingual, oral, vaginal or rectal use Oral and sublingual routes have the advantage of rapid onset of action, while the vaginal and rectal routes result in prolonged activity and greater bioavailability.	Half-life: 20–40 minutes
Injectable prostaglandins	IM: 15–60 minutes to peak plasma concentration	Half-life: 8 minutes
Ergometrine	IM: onset of action within 2–3 minutes, lasting for about 3 hours IV: onset of action within 1 minute, Lasting 45 minutes (although rhythmic contractions may persist for up to 3 hours)	Half-life: 30–120 minutes
Oxytocin plus ergometrine	See oxytocin and ergometrine Half-life: 1–6 minutes IM: latent period for the uterine response is about 2.5 minutes; uterotonic effects last for around 3 hours (16)	Half-life: 1–6 minutes (oxytocin) and 30–120 minutes (ergometrine)
Misoprostol plus oxytocin	See misoprostol and oxytocin	

Annex 2: WHO recommendations: Uterotonics for the prevention and treatment of postpartum haemorrhage

A. Uterotonics for the prevention and treatment of postpartum haemorrhage⁴

Context	Recommendation	Category of recommendation
Efficacy and safety of uterotonics for PPH prevention	<ol style="list-style-type: none"> The use of an effective uterotonic for the prevention of PPH during the third stage of labour is recommended for all births. To effectively prevent PPH, only <i>one</i> of the following uterotonics should be used: <ul style="list-style-type: none"> oxytocin (Recommendation 1.1) carbetocin (Recommendation 1.2) misoprostol (Recommendation 1.3) 	Recommended

Context	Recommendation	Category of recommendation
	<ul style="list-style-type: none"> ergometrine/methylergometrine (Recommendation 1.4) oxytocin and ergometrine fixed-dose combination (Recommendation 1.5). 	
	1.1 The use of oxytocin (10 IU, IM/IV) is recommended for the prevention of PPH for all births.	Recommended
	1.2 The use of carbetocin (100 micrograms, IM/IV) is recommended for the prevention of PPH for all births in contexts where its cost is comparable to other effective uterotonics.	Context-specific recommendation
	1.3 The use of misoprostol (either 400 micrograms or 600 micrograms PO) is recommended for the prevention of PPH for all births.	Recommended
	1.4 The use of ergometrine/methylergometrine (200 micrograms, IM/IV) is recommended for the prevention of PPH in contexts where hypertensive disorders can be safely excluded prior to its use.	Context-specific recommendation
	1.5 The use of a fixed-dose combination of oxytocin and ergometrine (5 IU/500 micrograms, IM) is recommended for the prevention of PPH in contexts where hypertensive disorders can be safely excluded prior to its use.	Context-specific recommendation
	1.6 Injectable prostaglandins (carboprost or sulprostone) are not recommended for the prevention of PPH.	Not recommended
Choice of uterotonics for PPH prevention	2. In settings where multiple uterotonic options are available, oxytocin (10 IU, IM/IV) is the recommended uterotonic agent for the prevention of PPH for all births.	Recommended
	3. In settings where oxytocin is unavailable (or its quality cannot be guaranteed), the use of other injectable uterotonics (carbetocin, or if appropriate ergometrine/methylergometrine, or oxytocin and ergometrine fixed-dose combination) or oral misoprostol is recommended for the prevention of PPH.	Recommended
	4. In settings where skilled health personnel are not present to administer injectable uterotonics, the administration of misoprostol (400 mcg or 600 mcg, PO) by community health workers and lay health workers is recommended for the prevention of PPH.	Recommended

B. Recommendations for the prevention of PPH ⁵

- a. The use of uterotonics for the prevention of PPH during the third stage of labour is recommended for all births. (Strong recommendation, moderate-quality evidence)

- b. Oxytocin (10 IU, IV/IM) is the recommended uterotonic drug for the prevention of PPH. (Strong recommendation, moderate-quality evidence)
- c. In settings where oxytocin is unavailable, the use of other injectable uterotonics (if appropriate ergometrine/methylergometrine or the fixed drug combination of oxytocin and ergometrine) or oral misoprostol (600 µg) is recommended. (Strong recommendation, moderate quality evidence)
- d. In settings where skilled birth attendants are not present and oxytocin is unavailable, the administration of misoprostol (600 µg PO) by community health care workers and lay health workers is recommended for the prevention of PPH. (Strong recommendation, moderate quality evidence)
- e. In settings where skilled birth attendants are available, CCT is recommended for vaginal births if the care provider and the parturient woman regard a small reduction in blood loss and a small reduction in the duration of the third stage of labour as important. (Weak recommendation, high-quality evidence)
- f. In settings where skilled birth attendants are unavailable, CCT is not recommended. (Strong recommendation, moderate-quality evidence)
- g. Late cord clamping (performed after 1 to 3 minutes after birth) is recommended for all births while initiating simultaneous essential newborn care. (Strong recommendation, moderate quality evidence)
- h. Early cord clamping (<1 minute after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation. (Strong recommendation, moderate-quality evidence)
- i. Sustained uterine massage is not recommended as an intervention to prevent PPH in women who have received prophylactic oxytocin. (Weak recommendation, low-quality evidence)
- j. Postpartum abdominal uterine tone assessment for early identification of uterine atony is recommended for all women. (Strong recommendation, very-low-quality evidence)
- k. Oxytocin (IV or IM) is the recommended uterotonic drug for the prevention of PPH in caesarean section. (Strong recommendation, moderate-quality evidence)
- l. Controlled cord traction is the recommended method for removal of the placenta in caesarean section. (Strong recommendation, moderate-quality evidence)

C. Recommendations for treatment of PPH⁵

- a. Intravenous oxytocin alone is the recommended uterotonic drug for the treatment of PPH. (Strong recommendation, moderate-quality evidence)
- b. If intravenous oxytocin is unavailable, or if the bleeding does not respond to oxytocin, the use of intravenous ergometrine, oxytocin-ergometrine fixed dose, or a prostaglandin drug (including sublingual misoprostol, 800 µg) is recommended. (Strong recommendation, low-quality evidence)
- c. The use of isotonic crystalloids is recommended in preference to the use of colloids for the initial intravenous fluid resuscitation of women with PPH. (Strong recommendation, low-quality evidence)

- d. *The use of tranexamic acid is recommended for the treatment of PPH if oxytocin and other uterotonics fail to stop bleeding or if it is thought that the bleeding may be partly due to trauma. (Weak recommendation, moderate-quality evidence)**
- e. Uterine massage is recommended for the treatment of PPH. (Strong recommendation, very low-quality evidence)
- f. If women do not respond to treatment using uterotonics, or if uterotonics are unavailable, the use of intrauterine balloon tamponade is recommended for the treatment of PPH due to uterine atony. (Weak recommendation, very-low-quality evidence)
- g. If other measures have failed and if the necessary resources are available, the use of uterine artery embolization is recommended as a treatment for PPH due to uterine atony. (Weak recommendation, very-low-quality evidence)
- h. If bleeding does not stop in spite of treatment using uterotonics and other available conservative interventions (e.g. uterine massage, balloon tamponade), the use of surgical interventions is recommended. (Strong recommendation, very-low-quality evidence)
- i. The use of bimanual uterine compression is recommended as a temporizing measure until appropriate care is available for the treatment of PPH due to uterine atony after vaginal delivery. (Weak recommendation, very-low-quality evidence)
- j. The use of external aortic compression for the treatment of PPH due to uterine atony after vaginal birth is recommended as a temporizing measure until appropriate care is available. (Weak recommendation, very-low-quality evidence)
- k. The use of non-pneumatic anti-shock garments is recommended as a temporizing measure until appropriate care is available. (Weak recommendation, low-quality evidence)
- l. The use of uterine packing is not recommended for the treatment of PPH due to uterine atony after vaginal birth. (Weak recommendation, very-low-quality evidence)
- m. If the placenta is not expelled spontaneously, the use of IV/IM oxytocin (10 IU) in combination with controlled cord traction is recommended. (Weak recommendation, very-low-quality evidence)
- n. The use of ergometrine for the management of retained placenta is not recommended as this may cause tetanic uterine contractions, which may delay the expulsion of the placenta. (Weak recommendation, very-low-quality evidence)
- o. The use of prostaglandin E2 alpha (dinoprostone or sulprostone) for the management of retained placenta is not recommended. (Weak recommendation, very-low-quality evidence)
- p. A single dose of antibiotics (ampicillin or first-generation cephalosporin) is recommended if manual removal of the placenta is practised. (Weak recommendation, very-low-quality evidence)

Organisation of care

* This recommendation has been updated in the WHO 2018 updated recommendation on tranexamic acid for the treatment of postpartum haemorrhage. ⁴

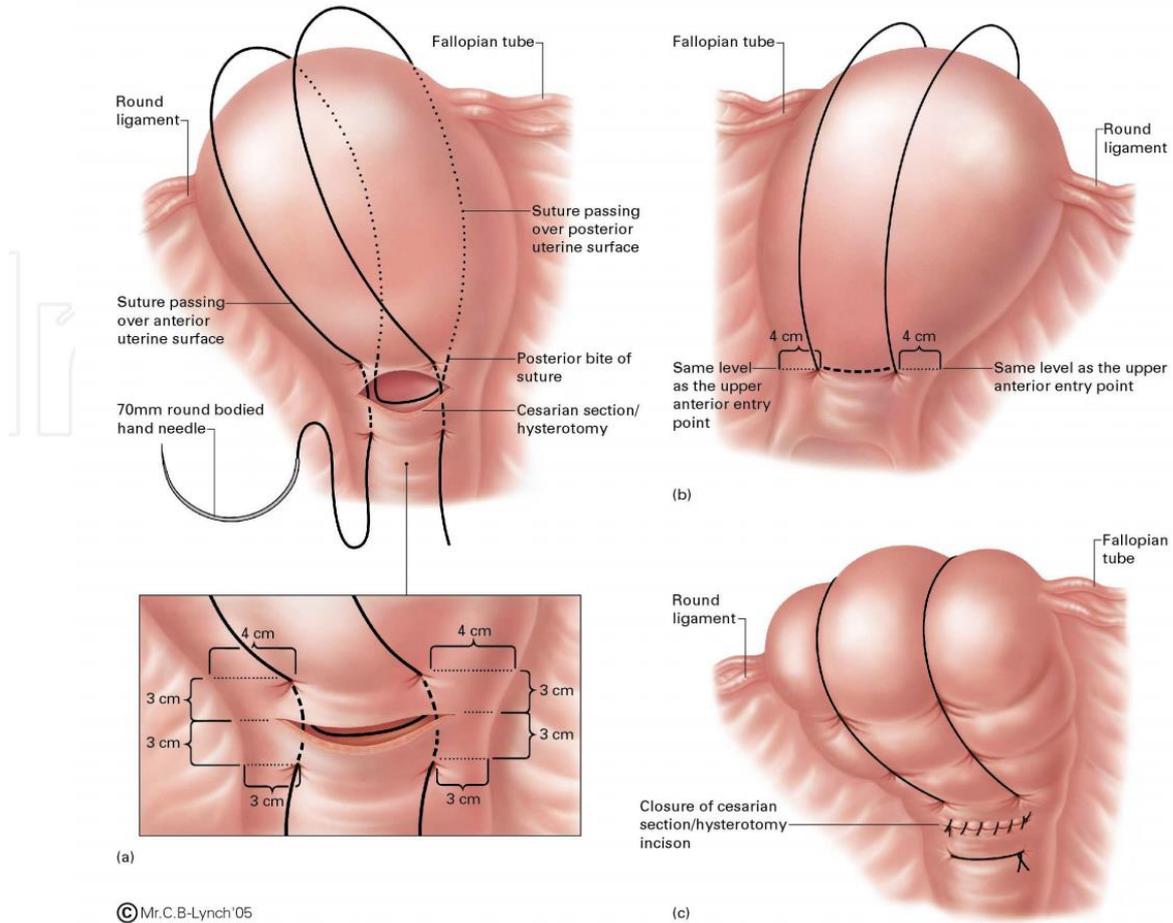
- a. The use of formal protocols by health facilities for the prevention and treatment of PPH is recommended. (Weak recommendation, moderate-quality evidence)
- b. The use of formal protocols for referral of women to a higher level of care is recommended for health facilities. (Weak recommendation, very-low-quality evidence)
- c. The use of simulations of PPH treatment is recommended for pre-service and in-service training programmes. (Weak recommendation, very-low-quality evidence)
- d. Monitoring the use of uterotonics after birth for the prevention of PPH is recommended as a process indicator for programmatic evaluation. (Weak recommendation, very-low-quality evidence)

Annex 3: SBAR communication and referral tool*

S	<p>Situation: a concise statement of the problem</p> <p>State clearly:</p> <ul style="list-style-type: none"> • What is your grade • Where you are calling from • Which patient you are calling about: name and age <p>Why are you calling?</p>
B	<p>Background (pertinent and brief information related to the situation)</p> <ul style="list-style-type: none"> • State the admission diagnosis and date of admission • State any important history <p>Give a brief summary of the treatment to date</p>
A	<p>Assessment (analysis and considerations of options — what you found/think)</p> <ul style="list-style-type: none"> • State the findings of the initial assessment • State the most recent vital signs: respiratory rate, heart/pulse rate, B/P, temperature, oxygen saturations, AVPU (Alert, Voice/or new confusion, Pain or Unresponsive), Blood sugar • What is the state of the uterus? • What is the state of the placenta? • What is your assessment of lacerations?
R	<p>Recommendation (action requested/recommended — what you want)</p> <p>State clearly what your recommendation is or what do you want?</p>

*If referral communication is via telephone, ask the receiver to repeat key information to ensure understanding

Annex 4: B-Lynch surgical technique for control of massive postpartum haemorrhage



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