



# **National Postpartum Hemorrhage Prevention and Management Protocol**

**2026- 2031**

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## FOREWORD



Postpartum hemorrhage (PPH) remains one of the leading causes of maternal mortality worldwide, claiming thousands of preventable lives each year. Although significant progress has been made in improving maternal health, PPH continues to pose a serious threat to women during childbirth and the immediate postpartum period. The challenge is especially urgent in low-resource settings, where limited supplies, delayed referrals, inadequate staffing, and gaps in emergency obstetric care can turn a manageable complication into a life-threatening emergency.

Every woman has the right to safe, respectful, and timely care during childbirth. Preventing maternal deaths from PPH requires more than the availability of medicines and equipment. It requires skilled health workers who can recognize excessive bleeding early, act decisively, communicate clearly, and work effectively as a team. It also requires health facilities to have organized systems for prevention, diagnosis, treatment, referral, documentation, and continued learning.

This PPH Protocol has been developed as a practical, evidence-based guide to support health workers in preventing, identifying, and managing postpartum haemorrhage. It brings together global best practices and context-specific strategies to promote a consistent and effective response across different levels of care. The protocol is intended to strengthen routine prevention, improve early diagnosis, and standardize the clinical management of PPH, while supporting appropriate escalation and referral when advanced care is required. The protocol recognizes that timely action is central to saving lives. It therefore emphasizes the importance of preparing for PPH before it occurs, assessing every woman carefully, quantifying blood loss, identifying the likely cause, and initiating treatment without delay. It also highlights the value of regular monitoring, accurate documentation, rational use of medicines and blood products, and prompt communication with senior clinicians and referral facilities.

By emphasizing teamwork, clear communication, respectful care, and proven interventions, this protocol aims to build provider confidence and promote consistency in care delivery. Effective management of PPH is rarely the responsibility of one individual. It depends on coordinated action among midwives, nurses, doctors, anesthesia providers, laboratory staff, blood-bank personnel, support workers, managers, and referral teams. Each member of the healthcare team has an important role to play in ensuring that care is timely, safe, and responsive to the needs of the woman and her family.

The protocol also serves as a tool for continuous improvement. Its implementation should be supported through orientation, mentorship, simulation exercises, regular clinical drills, supportive supervision, and review of maternal outcomes. Facilities are encouraged to use their experiences to identify delays, address gaps, strengthen supply systems, and improve coordination between departments and levels of care. Learning from every case, including near-misses, can help create safer maternity services for all women.

Most importantly, this document represents a commitment to protecting mothers' lives and improving the quality of care provided during childbirth. The successful implementation of the protocol will depend on the dedication of health professionals, the support of facility leadership, the availability of essential resources, and the continued engagement of communities and health-system partners.



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## ACKNOWLEDGMENT



The Ministry of Health, Republic of Liberia, through the Family Health Division, extends its deepest appreciation to all partners and stakeholders who contributed to the successful adaptation and contextualization of the World Health Organization (WHO) guidance on Prevention, and Management of Postpartum Haemorrhage (PPH), with particular emphasis on the E-MOTIVE Bundle of Care approach.

This achievement was made possible through the technical leadership, collaboration, and steadfast commitment of the core team - the Ministry of Health Policy and Planning Unit, WHO, United Nations Population Fund (UNFPA), Americares, Clinton Health Access Initiative (CHAI), Partner in Health, FHI-360 EpiC, ACHIEVE, Action Against Hunger, and University of Liberia E-Lab. Their collective expertise ensured that global recommendations were thoughtfully aligned with Liberia's health system realities, strengthening service delivery across all levels of care.

Our profound gratitude to the technical experts, academic institutions, professional associations, regulatory bodies, clinicians, and implementing partners whose insights, field experiences, and rigorous reviews enriched the process and enhanced the applicability and quality of this document. Their contributions have been vital in ensuring that the adapted guidance is practical, evidence-based, and responsive to the needs of mothers and women.

Special recognition goes to the County Health Teams, County Reproductive Health Supervisors, and our frontline health workers for their valuable inputs and participation. Their dedication and daily efforts remain the cornerstone of progress in improving maternal and newborn health outcomes.

This collaborative endeavor represents a significant milestone in the fight against preventable maternal deaths due to postpartum hemorrhage. It reaffirms our shared commitment to safeguarding the lives of women and ensuring that no mother dies while giving life.

  
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## ACRONYMS & ABBREVIATIONS

|                  |                                                   |
|------------------|---------------------------------------------------|
| AMTSL            | Active Management of Third Stage of Labour        |
| ANC              | Antenatal Care                                    |
| APH              | Antepartum Hemorrhage                             |
| ART              | Antiretroviral Therapy                            |
| BLMC             | Blood Loss Monitoring Chart                       |
| BP               | Blood Pressure                                    |
| bpm              | Beats Per Minute                                  |
| CBC              | Complete Blood Count                              |
| CCT              | Controlled Cord Traction                          |
| cpm              | Cycles Per Minute                                 |
| CS               | Cesarean Section                                  |
| EBC              | E-MOTIVE Bundle of Care                           |
| GDG              | Guideline Development Group (WHO)                 |
| HIV              | Human Immunodeficiency Virus                      |
| HR               | Heart Rate                                        |
| HSC              | Heat-Stable Carbetocin                            |
| IM               | Intramuscularly                                   |
| IU               | International Units                               |
| IV               | Intravenously                                     |
| LPM              | Liters Per Minute                                 |
| mmHg             | Millimeters of Mercury                            |
| NASG             | Non-Pneumatic Antishock Garment                   |
| NS               | Normal Saline                                     |
| OB               | Obstetrician / Obstetric                          |
| PO               | Per Os (by mouth / oral)                          |
| PPH              | Post-partum Hemorrhage                            |
| PR               | Per Rectum                                        |
| RL               | Ringer's Lactate                                  |
| RVF              | Rectovaginal Fistula                              |
| SBAR             | Situation, Background, Assessment, Recommendation |
| SI               | Shock Index (Pulse ÷ Systolic BP)                 |
| SL               | Sublingual                                        |
| SpO <sub>2</sub> | Peripheral Oxygen Saturation                      |
| TXA              | Tranexamic Acid                                   |
| WHO              | World Health Organization                         |

## INTRODUCTION

Post-partum Hemorrhage (PPH) is defined as a blood loss of 500ml or more, or 300mls plus abnormal clinical signs and symptoms after vaginal delivery or 1000mls or more following cesarean delivery within 24hours to 42 days following vaginal delivery. PPH remains a leading contributing factor to maternal death in Liberia. Approximately 34%-46% of all maternal deaths in Liberia are from PPH. Women who survive PPH suffer from anemia and other complications and are exposed to blood transfusions and their associated risks (such as transfusion reactions or infection with HIV or hepatitis). Actions to comprehensively address PPH are a public health imperative. PPH is both preventable and treatable with several low-cost and widely available medicines (uterotonics) and appropriate medical and surgical supplies.

In 2017 and 2018, based on extensive new evidence, the World Health Organization (WHO) issued two new recommendations for the prevention (Heat-Stable-Carbetocin-HSC) and treatment (Tranexamic Acid-TXA) of PPH. The (Heat-Stable-Carbetocin and Tranexamic Acid were the two new medicines included in the WHO Model List of Essential Medicines. These medications are effective in reducing PPH and PPH-related deaths. HSC is a newer analogue of oxytocin and has a greater biological effect and longer half-life. It is also more heat-stable than oxytocin and does not require a cold chain for storage. TXA has been widely used for many years in reducing blood loss during surgery and for trauma patients. Early administration of TXA following the birth of the baby was found to reduce maternal deaths from PPH; it requires no cold chain for storage. These two drugs are cost-effective and require no cold chain, which is essential to the Liberia setting. If these medicines are widely and efficiently used, these recommendations have the potential to contribute to a substantial reduction in maternal mortality in Liberia.

The protocol, modeled after the WHO 2025 consolidated guidelines, contains recommendations selected from the 47 recommendations made for the prevention, diagnosis, treatment, supportive care, and health system interventions for PPH. This includes new and updated recommendations that were adopted, contextualized to Liberia, and validate for use by a group of technical and regulatory experts.

## Classification

- 1) **Primary Post-Partum Hemorrhage:** Immediate hemorrhage occurs within the first 24hours after delivery.
- 2) **Secondary Post-Partum Hemorrhage:** Late hemorrhage that occurs 24hours after delivery up to 6weeks Post-Partum.

## Predisposing or Contributing Factors

- Maternal anemia
- Hypertensive disorders (Preeclampsia and eclampsia)
- Infection
- Blood clotting factor disorders
- Placenta abnormalities/Antepartum hemorrhage
- Augmented labor
- Chorioamnionitis
- Fetal macrosomia
- Maternal obesity
- Multiple gestation
- Primiparity
- Prolonged Labor

- Multiparity
- Polyhydramnios

## Causes of PPH

PPH is often a result of a major obstetric complication. The severity of PPH is determined by the speed and magnitude of blood loss. The cause of bleeding is diagnosed after an examination of the abdomen (for uterine contraction), the birth canal, the uterine cavity, or an ultrasound scan.

Causes of PPH are separated into the 4 'T's –

- 1) **Tone:** uterine atony, distended bladder. Account for ~70%
- 2) **Trauma:** lacerations of the uterus, cervix, or vagina. ~20%
- 3) **Tissue:** retained placenta or clots. ~9%
- 4) **Thrombin:** pre-existing or acquired coagulopathy. ~1%

However, there may be more than one cause present.

## Signs and Symptoms of PPH

- Heavy bleeding from the vagina that does not slow or stop over time. Bleeding may occur internally, either into the uterus or into the abdomen, if there has been a complication of Caesarean section or a uterine rupture.
- Shock consisting of increasing tachycardia, low pulse volume, prolonged capillary refill time (>3 seconds) with pallor, cold and clammy skin, raised respiratory rate, and changes in level of consciousness is a late sign of a fall in Blood Pressure.
- Restlessness/anxiety/confusion
- Profuse sweating
- Pallor
- Dyspnea
- Fainting
- Blurred Vision
- Weakness
- Drowsiness
- Increased Respiratory Rate
- Rapid and weak Pulse

As more blood is lost the woman may:

- Feel cold and clammy,
- Blood pressure may drop to systolic less than 100 mmHg and diastolic less than 60 mmHg
- Develop Shock
- Become unconscious.

## PREVENTION

About 20% of PPH occurs in women with no risk factors. Skilled health providers must be prepared to manage PPH at every delivery wherever it might occur. Strategies for decreasing the morbidity and mortality associated with PPH should be listed in facilities and providers should ensure that women at high risk of hemorrhage

deliver at facilities with immediately available surgical, intensive care, and blood bank/ transfusion services. The prevention of PPH does not differ for women with HIV or special needs. Women with HIV at risk for PPH should benefit from using uterotonic medications (and all other preventive/management measures) after vaginal delivery or caesarean delivery. Peri-natal ART services as per national AIDS protocol should be followed.

Methods used to prevent PPH:

- Focused Antenatal Care
- Non-Medicinal intervention
- Medicinal Intervention

## Preventing PPH begins well before the onset of labor.

### Antenatal Care

The updated WHO guidelines highlights four recommendations for addressing iron-deficiency anemia, a major risk factor for PPH, during ANC. It should be identified and corrected early, before birth, to reduce the risk of serious consequences of excessive post-partum bleeding. as well as the early identification of risk factors (for example, placental abnormalities and inherited or acquired bleeding disorders), counselling on the prevention of obstetric complications, encouraging birth preparedness, and supporting decisions to give birth in well-equipped health facilities with skilled personnel. This requires:

- Complete blood count testing as the recommended method for diagnosing anemia in pregnancy; or on-site hemoglobin/hematocrit testing with a hemoglobinometer, where CBC testing is not available.
- Daily ferrous (30-60mg) and folate (400mcg) supplement intake to prevent maternal anemia, puerperal sepsis, low birth weight, and preterm birth.
- Intravenous Ferrous can be used, if the above are not tolerable and Ferritin is less than 30%.

Table 1. Focused Antenatal Care to Prevent PPH

| Actions                                                                                              |
|------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Assessment of Maternal well being                                           |
| <input type="checkbox"/> Detection and treatment of complications                                    |
| <input type="checkbox"/> Prevention and control of Anemia                                            |
| <input type="checkbox"/> Prevention and control of other conditions such as: Malaria, HIV, STIs etc. |
| <input type="checkbox"/> Counselling on nutrition and adequate resting                               |
| <input type="checkbox"/> Development of birth preparedness and complication readiness plan           |
| <input type="checkbox"/> Advise on potential danger signs for both mothers and babies                |
| <input type="checkbox"/> Develop facility emergency preparedness plan                                |
| <input type="checkbox"/> Provide family planning advice and services as needed                       |
| <i>Note: for more detail refer to ANC guidelines</i>                                                 |

Table 2. ANC services to Prevent PPH in low/high risk pregnancies

| Actions                                                                                                     |
|-------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Encourage/ promote Regular prenatal visit                                          |
| <input type="checkbox"/> Promote healthy lifestyle                                                          |
| <input type="checkbox"/> Treat/manage pre-existing health conditions                                        |
| <input type="checkbox"/> Test for birth defects and genetic conditions                                      |
| <input type="checkbox"/> Prevent anemia with folic acid and iron supplement                                 |
| <input type="checkbox"/> Prevent malaria through acceptable interventions (nets distributions, drugs, etc.) |

|                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Prevent worms' infestation                                                                                                                                                           |
| <input type="checkbox"/> Screen and identify previous and present obstetric conditions                                                                                                                        |
| <input type="checkbox"/> Identifying and correcting anemia before labor and delivery is vital.                                                                                                                |
| <input type="checkbox"/> Encourage/provide an ultrasound scan during the early third trimester to help identify conditions such as Placenta Previa which can produce antepartum hemorrhage and severe anemia. |
| <input type="checkbox"/> identification on standby of live blood donors and for all mothers knowing their individual blood group identification,                                                              |
| <input type="checkbox"/> Record/establish mother's beliefs about blood transfusions and other traditional practices                                                                                           |

Table 3. Preventing PPH Before Delivery (During Labor)

| Actions                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Ensure completed medical history of mother is taken/available                               |
| <input type="checkbox"/> Ensure all essential medical drugs and supplies are available                               |
| <input type="checkbox"/> All patients at high-risk for PPH should have a large bore IV cannula inserted during labor |
| <input type="checkbox"/> Allow mother to be fully dilated before pushing                                             |
| <input type="checkbox"/> Encourage her to empty her bladder                                                          |
| <input type="checkbox"/> Encourage fluid intake                                                                      |
| <input type="checkbox"/> Ensure room is well lighted and ventilated                                                  |
| <input type="checkbox"/> Prepare/ have available emergency referral plan if at a lower-level facility                |
| <i>Note: for more detail refer to ANC and NLD guidelines</i>                                                         |

Note: It is important in high-risk cases to always perform delivery in a hospital or health facility with blood bank & surgical capability. Establish massive and emergency release transfusion protocol then train all obstetric staff.

## Intrapartum Care

Effective management of the first and second stages of labor can also reduce the risk of PPH and associated complications. This section outlines two key intrapartum interventions to help reduce trauma to the genital tract, which can cause or contribute to PPH.

- **“Hands on” guarding** of the perineum is a recommended technique that is used to reduce perineal trauma and facilitate spontaneous birth, during second stage of labor
- Routine or liberal use of episiotomy for women undergoing spontaneous vaginal birth is **NOT ALLOWED**. However, the selective/restrictive episiotomy is allowed to facilitate assisted delivery.

## Preventing PPH in C-Section Delivery

Table 4. Methods to prevent PPH during C-Section

| Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Ensure completed medical history of mother is taken/available                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <input type="checkbox"/> Ensure all essential medical drugs and supplies are available                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <input type="checkbox"/> Ensure all patients at high-risk for PPH should have a large bore (14-18G) IV cannula inserted during labor                                                                                                                                                                                                                                                                                                                                                                                         |
| <input type="checkbox"/> If bleeding occurs during the procedure, it is important to identify where the bleeding is coming from: Check and identify if: <ul style="list-style-type: none"> <li>– It is uterine atony.</li> <li>– Tear in the lower segment of the uterus</li> <li>– Failed stitching of the uterine incision when bleeding can occur vaginally or directly into the abdominal cavity or both.</li> <li>– or when the mother prior to CS has previously been in labor and has a tear in the cervix</li> </ul> |

|                                                                                           |                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>                                                                  | After the procedure if bleeding occurs: carry out an ultrasound scan to identify intra-abdominal or intra uterine bleeding                                                               |
| <input type="checkbox"/>                                                                  | Examine the uterus in case a tear or failed stitching is present and likely to be the cause of hemorrhage. Ensure that there should be no delay in performing laparotomy if necessary. * |
| <i>Note: Surgical interventions must be performed by an OB clinician or surgeon only.</i> |                                                                                                                                                                                          |

## Post-Partum Care

### Active Management of Third Stage of Labor (AMSTL)

**AMSTL** allows the use of a quality-assured uterotonic to prevent PPH during the third stage of labor for all births. The use of a quality-assured uterotonic is recommended for the prevention of PPH during the third stage of labor for all births.

To effectively prevent PPH, **one** of the following uterotonics should be used:

- (i) **Oxytocin – 10 IU intramuscularly (IM) or intravenously (IV)** given within 1 minute after delivery of the last baby, after confirming that there is no second twin.
  - The IV administration oxytocin 10 IU – diluted and administered slowly over 1 to 2 minutes – is recommended in preference to IM administration if IV line is already in place
  - Oxytocin (10 IU, IM/IV) is the recommended uterotonics of choice for the prevention of PPH for all births over others

OR

- (ii) If available, giving **heat-stable carbetocin (HSC) 100 µg IM/IV** is recommended for the prevention of PPH for all births.
  - It is the recommended uterotonics in settings where the oxytocin cold chain cannot be consistently maintained.

OR

- (iii) **Misoprostol 800 µg** administered rectal or sublingual (SL) if there is no oxytocin or HSC.

If oxytocin is not available or when quality cannot be guaranteed, it is advisable to use heat stable HSC or misoprostol for prevention of PPH. Both have different side effects than oxytocin but do not require cold chain storage method.

Delay Cord Clamping by 2-3 mins or until pulsation ceases, then perform controlled cord traction (CCT). Early cord clamping (<1 minute after birth) is **NOT RECOMMENDED** unless the neonate is asphyxiated and needs to be moved immediately for resuscitation. Use of CCT by skilled birth attendants is recommended for the third stage of labor after vaginal birth, while the use of cord traction is the recommended method used at cesarean section.

Providers should check uterine tone every 15 mins for the first 2 hours. If uterus is soft/not firm, then perform uterine massage. Sustained uterine massage is **NOT**

#### ▼ Important Notes ▼

- Ergometrine/methylergometrine (2mg IM) **should NOT be used** for the prevention of PPH. Similarly, fixed-dose combination of oxytocin and ergometrine (5 IU/500µg, IM) is **NOT RECOMMENDED** for the prevention of PPH
- Tranexamic acid is **NOT RECOMMENDED** for the prevention of PPH at vaginal birth or at Cesarean birth.
- If manual removal of the placenta was performed, treat patients with ampicillin 2g IV or IM stat.

**RECOMMENDED** in women who have received prophylactic oxytocin.

Table 5. PPH Prevention during Active Management of Third Stage of Labor (AMSTL)

| Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Check the uterus for the presence of a second baby                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <input type="checkbox"/> Administer a uterotonic drug:<br>(i) Oxytocin – 10 IU intramuscularly (IM) or intravenously (IV) given within 1 minute after delivery of the last baby, after confirming that there is no second twin.<br><u>OR</u><br>(ii) If available, giving heat-stable carbetocin (HSC) 100 µg IM/IV is recommended for the prevention of PPH for all births.<br><u>OR</u><br>(iii) Misoprostol 800 µg administered rectal or sublingual (SL) if there is no oxytocin or HSC. |
| <input type="checkbox"/> Delivery of the placenta using controlled cord traction with counter traction above the pubic bone.                                                                                                                                                                                                                                                                                                                                                                 |
| <input type="checkbox"/> Massage/palpate the uterus after delivery of the placenta to ensure firmness. If not firm/contracted massage the uterus.                                                                                                                                                                                                                                                                                                                                            |
| <input type="checkbox"/> Examine the placenta to make sure it is complete and none of it has been retained in the uterus.                                                                                                                                                                                                                                                                                                                                                                    |
| <input type="checkbox"/> Examine the woman's vagina, perineum and external genitalia for lacerations and active bleeding.                                                                                                                                                                                                                                                                                                                                                                    |

## Fourth Stage Monitoring

Post partum monitoring should include monitoring and detailed documentation of the below, **every 15 mins for the first 2hrs; every 30 mins for 1hr; every 1 hr for 3hrs. Then every 4hrs for 24hrs:**

- Uterine tone
- Blood loss (mL)
- Pulse (bpm)
- Systolic BP (mmHg)
- Diastolic BP (mmHg)
- Pulse > Systolic BP?
- Temperature (°C)
- Oxygen saturation (SpO<sub>2</sub>, %)
- Respiratory rate (cpm)
- Bladder / urine output (mL)
- Fluid input (mL, IV or PO)
- Medications and interventions

## PPH MANAGEMENT (DIAGNOSIS & TREATMENT)

Rapid recognition and diagnosis of PPH is essential for successful management. PPH can present in different clinical scenarios. Diagnosis of PPH can be done by quantitative (objective), and non-Quantitative measurement. When escalation or referral is required, communicate with the receiving facility or surgical team using the SBAR framework (Situation, Background, Assessment, Recommendation) to ensure a clear and structured handover.

### Objective Measurement of Blood Loss

This entails measuring cumulative blood loss. This can be done by:

- Using **calibrated drapes** or reusable **calibrated trays** to quantify the actual blood loss, applied after delivery of the baby and before the delivery of the Placenta to differentiate between amniotic fluid and actual blood or reusable well tray
- Using a calibrated under-buttocks drape, taking into consideration before the delivery of the placenta and after delivery of the placenta to differentiate between amniotic fluid and actual blood or reusable tray
- Close and frequent monitoring of vital signs immediately after delivery (heart rate, respiratory rates, level of consciousness, skin perfusion and BP)

## Clinical Measurement of Blood Loss

This includes other signals that triggers action:

- Recognition of excessive bleeding, rapid, uncontrolled bleeding, or
- Signs and symptoms of blood loss (Shocks)
- Targeted Physical examination to determine cause of blood loss.
- Estimation of blood loss

Combined use of these methods is also appropriate for obtaining an accurate measurement. Resuscitative measures and the diagnosis and treatment of the underlying cause must occur quickly before severe hypovolemia develops. Accurate and timely diagnosis of PPH is critical to saving lives. Yet many women, particularly in low-resource settings, continue to experience preventable morbidity and mortality because of delays in recognizing and responding to excessive bleeding.

**Early identification of abnormal blood loss allows prompt initiation of treatment and can prevent life-threatening complications.**

## EMOTIVE Bundle of Care

The WHO Treatment Bundle for PPH, or the **E-MOTIVE Bundle of Care (EBC)** is a mnemonic of a comprehensive strategy for treating PPH. It refers to a structured approach to manage PPH efficiently in emergency settings. Some treatment modalities are medicinal, while others are nonmedicinal interventions.

A standardized and timely approach to the management of PPH, comprising an objective assessment of blood loss and use of a treatment bundle supported by an implementation strategy, is recommended for all women having a vaginal birth.

- Routine objective measurement of post-partum blood loss is recommended through the use of calibrated drapes, or maternal well tray to objectively quantify blood loss
- The diagnostic criteria are recommended as the basis for first-response PPH treatment and referral decisions (where needed), not as an absolute trigger for initiating advanced therapies or surgical interventions. These include one of the following:
  - 1) Objectively measured blood loss threshold of  $\geq 500\text{ml}$
  - 2) Objectively measured blood loss threshold  $\geq 300\text{ mL}$ , plus any abnormal hemodynamic sign
    - **Quick rule of thumb: if the pulse is greater than the systolic BP, the shock index is greater than 1 and is a warning sign.**
    - **Example: pulse 110 / systolic BP 100 = shock index 1.1 = warning sign.**
  - 3) Clinical judgment

- Post-Partum abdominal uterine tonus assessment for early identification of uterine atony is recommended for all women
- Early use of IV tranexamic acid (TXA) (within 3 hours of birth) is recommended for women with PPH after vaginal birth or cesarean section. **Do not start TXA if 3 hours or more since birth**, or if there is a contraindication or hypersensitivity to TXA, known thromboembolic event, renal failure or history of convulsions. Note: TXA, injectable prostaglandins, and ergometrine (alone or in combination with oxytocin) are not recommended for the prevention of PPH.
- Administration of a uterotonic agent is recommended for the treatment of retained placenta after vaginal birth only in the presence of PPH. Isotonic crystalloids are recommended in preference to colloids for intravenous fluid resuscitation of women with PPH.
- Antibiotic prophylaxis (IV Ampicillin, first-generation cephalosporin, or single dose amoxicillin and clavulanic acid-1g+200 mg) should follow manual removal of the placenta.

Once PPH has been established, activate the EBC as the first response of care as noted above and below.

Table 6. E-MOTIVE Bundle of Care

| E-MOTIVE Bundle of Care                    | Administer all interventions, even if the woman improves after only one or two. The order does not matter. Finish all interventions in 15 min.                                                                                                                                                                                                                                                                        |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E</b> — Early detection                 | Early diagnosis is the first step. Be alert for PPH: blood loss $\geq 300$ mL with any other warning sign, or blood loss $\geq 500$ mL, or clinical judgment. Warning signs: pulse $>100$ , or systolic BP $<100$ , or diastolic BP $<60$ , or a SI $>1$ (pulse $>$ systolic BP); rapid blood flow, large clots, history of anemia. When in doubt, TREAT.                                                             |
| <b>M</b> — Massage the uterus              | To cause contraction, expel blood and clots, assess for distended bladder. If alone, massage first, then move on.                                                                                                                                                                                                                                                                                                     |
| <b>O</b> — Oxytocic / uterotonic drugs     | Give oxytocin 20 IU IV: diluted in 100–500 mL of crystalloid fluids as fast as possible (preferable to avoid hypotension) or as bolus over 1–2 min. If no IV access: give oxytocin 20 IU IM; give misoprostol 800 $\mu$ g rectal or SL; call for help to start IV. 20-40 IU in 500–1000 mL IV maintenance.                                                                                                            |
| <b>T</b> — Tranexamic acid (TXA)           | 1 g IV over 10 min. Faster administration can cause hypotension! TXA and oxytocin can be given in the same line, but not in the same IV fluid. Do not start TXA if: 3 hrs or more since birth, or if there is a contraindication or hypersensitivity to TXA, known thromboembolic event, renal failure or history of convulsions.                                                                                     |
| <b>IV</b> — IV access / fluids             | Use 2 large bore (14-18G) cannula or largest available. Collect blood for: bedside hemoglobinometer, or lab testing for Hb, cross-match, and clotting studies if available. Begin infusion of crystalloid fluids NS or RL (1L IV stat, then 1L IV every 8 hrs x 24hrs), if not given with oxytocin already.                                                                                                           |
| <b>E</b> — Examine for causes and escalate | As you are providing care, notice potential causes such as: atony when you massage; tears as you check blood flow; blood clots or retained tissue. During and after a caesarean section (CS): there is often more bleeding; interpreting the hemodynamic signs which may be affected by anesthesia; most PPH bundle components are already given; use clinical judgment to initiate treatment and decide to give TXA. |

If the sequence of treatments in the Table above fails to control bleeding, operative interventions through laparotomy for control of hemorrhage **must not be delayed** if there is a possibility of a uterine tear or bleeding from the uterine incision site.

Table 7. First Line Medicinal Intervention to Manage PPH

| Actions                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CALL FOR HELP!</b>                                                                                                                                                                                                                                                                                                                          |
| <input type="checkbox"/> Check for atony (poor uterine tone). If present, institute immediately continuous uterine massage). If tone is normal, check for and repair any cervical or vaginal tears. If repair is not possible, apply pressure or clamp and proceed to or with referral.                                                        |
| <input type="checkbox"/> Give oxytocin 20 IU IV: diluted in 100–500 mL of crystalloid fluids as fast as possible (preferable to avoid hypotension) or as bolus over 1–2 min. If no IV access: give oxytocin 20 IU IM. Maintenance infusion of oxytocin 20–40 IU in 500–1000 mL may be needed in the 4 h after treatment to prevent recurrence. |
| <input type="checkbox"/> Add misoprostol 800 µg rectal or SL                                                                                                                                                                                                                                                                                   |
| <input type="checkbox"/> Obtain IV line (14-18 gauge) and as soon as feasible a second IV line but do not delay measure below                                                                                                                                                                                                                  |
| <input type="checkbox"/> Take a blood sample for cross-matching and obtain a CBC or only hemoglobin if CBC is not available, carry out coagulation screen (whole blood clotting time in Liberia)                                                                                                                                               |
| <input type="checkbox"/> IF IV ACCESS IS NOT POSSIBLE USE EXTERNAL JUGULAR VEIN, CENTRAL VEIN, OR INTRAOSSEOUS NEEDLE                                                                                                                                                                                                                          |
| <input type="checkbox"/> Start oxygen at 6-8 liters per minute (LPM). <i>Refer to Liberia Clinical Guidelines for Oxygen Therapy.</i>                                                                                                                                                                                                          |
| <input type="checkbox"/> Give blood transfusion as soon as possible and ideally fresh donor blood. Give appropriate blood group or use O negative immediately if available.                                                                                                                                                                    |
| <input type="checkbox"/> Whilst waiting blood for transfusion give 500 ml of 0.9% saline or RL as a rapid bolus IV and reassess. If crystalloid boluses dilute clotting factors and urgent blood transfusion is much more effective                                                                                                            |
| <input type="checkbox"/> Ensure no tear is present in cervix or vagina: if present, repair as soon as possible                                                                                                                                                                                                                                 |
| <input type="checkbox"/> Monitor vital signs every 15 minutes including heart and respiratory rates, BP, skin perfusion, BP and quantity of bleeding                                                                                                                                                                                           |
| <input type="checkbox"/> If all above fails and PPH and shock continues do not wait too long to undertake emergency laparotomy in case of uterine tear or need to perform emergency obstetric hysterectomy *                                                                                                                                   |
| <i>Note: Surgical interventions must be performed by an OB clinician or surgeon only.</i>                                                                                                                                                                                                                                                      |

## Non-Medicinal Intervention

The initial treatment of PPH occurring after AMTSL and delivery of the placenta is focused on rapid diagnosis and treatment of PPH including atony uterus. Skilled health care providers (Nurse, midwives, obstetric clinicians, PAs, medical doctors, etc.) must perform all these steps as soon as possible:

Table 8. Non-Medicinal intervention to manage PPH

| Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Do, record and report vital signs; Undertake urgent vaginal exam to exclude a cervical or vaginal tear—if found, repair according to the Normal Labor and Delivery protocol                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <input type="checkbox"/> Ensure an empty bladder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <input type="checkbox"/> Uterine massage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <input type="checkbox"/> Conduct bimanual uterine compression as a temporizing measure until appropriate care is available for the treatment of PPH due to uterine atony after vaginal birth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <input type="checkbox"/> Establish 2 large bore IV lines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <input type="checkbox"/> Insert uterine balloon tamponade (e.g. Condom Catheter, Elvils, etc) for uterine atony after vaginal birth in women who do not respond to standard first-line treatment, provided the following conditions are met: <ul style="list-style-type: none"> <li>– Immediate recourse to surgical intervention and access to blood products is possible if needed.</li> <li>– Other retained placental tissue, trauma can be reasonably excluded.</li> <li>– The procedure is performed by trained and skilled health personnel.</li> <li>– Maternal condition can be regularly and adequately monitored for prompt identification of any signs of deterioration.</li> </ul> |
| <input type="checkbox"/> Apply Anti-shock garment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

- ☐ Encourage elevation of the legs, if bleeding continues, make plan for surgical management with laparotomy to repair any tears or uterine rupture and sometimes emergency subtotal hysterectomy.

*Note: Surgical interventions must be performed by an OB clinician or surgeon only.*

Table 9. NASG Use

| Actions                                                                                               |                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>                                                                              | Place NASG under the woman, with the top at the level of her lowest rib                                                                                                                                                  |
| <input type="checkbox"/>                                                                              | Close segment 1 tightly around the ankles (so that it makes a sharp sound when you snap it)                                                                                                                              |
| <input type="checkbox"/>                                                                              | Close garment 2 around the calves in the same way (leave the knee joint free)                                                                                                                                            |
| <input type="checkbox"/>                                                                              | Apply segment 3 around the thighs                                                                                                                                                                                        |
| <input type="checkbox"/>                                                                              | Apply segment 4 around the woman at the level of the pubic bone                                                                                                                                                          |
| <input type="checkbox"/>                                                                              | Place segment 5 with pressure ball directly over the umbilicus                                                                                                                                                           |
| <input type="checkbox"/>                                                                              | Close the NSAG using segment 6; should not be too tight so as not to restrict breathing.                                                                                                                                 |
| <b>Remember:</b>                                                                                      |                                                                                                                                                                                                                          |
| ❖                                                                                                     | When closing the segments- use as much strength as possible while ensuring the woman can breathe normally.                                                                                                               |
| ❖                                                                                                     | The NASG should remain on during procedures (including surgery) and must stay on until the source of bleeding is found and corrected.                                                                                    |
| ❖                                                                                                     | Monitor for shortness of breath and decreased urine outline.                                                                                                                                                             |
| ❖                                                                                                     | Segments 1,2,3 can be applied by two persons simultaneously, segments 4,5,6 should only be applied by one.                                                                                                               |
| <b>When to remove NASG</b> – Remove NASG if the following are met if bleeding subsides and the below: |                                                                                                                                                                                                                          |
| <input type="checkbox"/>                                                                              | Pulse is 100 bpm or less                                                                                                                                                                                                 |
| <input type="checkbox"/>                                                                              | Systolic BP is 100 or greater                                                                                                                                                                                            |
| <input type="checkbox"/>                                                                              | Bleeding has reduced to normal Post-Partum rate or ≤50 mL/h                                                                                                                                                              |
| <input type="checkbox"/>                                                                              | Repeat pulse and BP immediately before removal.                                                                                                                                                                          |
| <input type="checkbox"/>                                                                              | Keep IV running                                                                                                                                                                                                          |
| <input type="checkbox"/>                                                                              | Begin at ankle segments. Open both and wait for 15 minutes. Take BP and pulse.                                                                                                                                           |
| <input type="checkbox"/>                                                                              | Follow the rule of 20: if pulse does not increase > 20 BPM and if SBP does not decrease more than 20 mmHg, continue opening each segment pair, waiting 15 minutes, and checking vital signs before opening next segment. |
| <input type="checkbox"/>                                                                              | If BP or pulse change more than stated above, reclose the NASG. Look for the source of bleeding.                                                                                                                         |

## Managing the Cause

### 1) Uterine Atony (Tone)

The initial response to PPH secondary to uterine atony:

- Shout for help to alert a team of skilled care providers (midwives, nurses, obstetricians, anesthetists, blood bank personnel) and designate a team lead to simultaneously coordinate the actions.
- Insert 2 wide bore cannula (14-18gauge)
- Take sample for blood grouping and cross-matching
- Setup IV fluid (NS/RL)
- Insert foley catheter to empty bladder and monitor output.
- Perform gentle fundal massage till its firm
- Oxygen support
- Evaluate the facility's capacity and consider the need for referral.

Next steps include:

- Uterotonics, serve as is written in the table
- Monitor and escalate

- Concomitant maneuvers (bimanual compression, abdominal aorta compression, balloon tamponade, non-pneumatic antishock garment (NASG))
- TXA, serve as in chart
- Continuous monitoring and evaluation of the blood loss and patient's response to treatment.
- For Refractory PPH, Last response requires laparotomy for:
  - Uterine Artery Ligation
  - B-Lynch sutures or other compression suture techniques
  - Stepwise Devascularization
  - Hysterectomy

**In patients with PPH where Caesarean delivery has been completed (closed abdomen), uterine atony remains the most likely cause.** Medical and minimally invasive approaches are the preferred initial treatment approaches; uterotonic drugs are still the initial treatments for bleeding due to atony.

## **2) Tears** (cervical, perineal, vaginal)

Cervical and perineal tears may occur during delivery and increase the risk of PPH. Cervical tears are internal and may be mild, moderate, or severe. Perineal tears range from 1-4 degrees of severity, requiring different management depending on complexity. Perineal or vaginal tears may be repaired either in the wards or theaters.

### A) Cervical Tears

Post-partum bleeding with a contracted uterus is usually due to a cervical or vaginal tear. Tears to the lower genital tract is the second most frequent cause of PPH and may coexist with an atonic uterus. Bleeding from tear can be substantial and may be fatal, especially if there is pre-existing severe anemia.

#### *Causes:*

The main cause of cervical tear is vaginal delivery through **a cervix that is not fully dilated** when a mother begins pushing or is asked to push early.

Other causes include:

- Wrong application of forceps or a vacuum cup by an inexperienced operator
- Use of the vacuum cup or forceps when the cervix is not fully dilated
- Dangerous application of fundal pressure during labor (mostly undertaken at home or in clinics by untrained staff)
- Lack of pain control during labor and an urge to push by some mothers to push out her baby as quickly as possible, even when the cervix is not fully dilated.

#### *Diagnosis and management:*

Suspect a tear in cases of PPH where there is good uterine contraction and uterine rupture has been ruled out. The source of the bleeding is discovered during inspection of the birth canal, with careful examination of the vagina and cervix using two vaginal retractors.

A bucket-handle tear is a laceration of either the anterior lip or the posterior lip of the cervix so that it hangs like the handle of a bucket. These cervical injuries are more common in term deliveries and are associated with cervical cerclage, induction of labor, young maternal age, assisted vaginal delivery, prostaglandin use and precipitate labor.

- Examine under anesthesia, if required

- Apply fundal pressure for clear visualization with a sponge ring forceps in a 360-degree manner.
- Repair the identified tears.
- If tears extend above the vaginal vault, repair abdominally.

Table 10. Management of cervical tears

| Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> If the mother is bleeding heavily from a cervical tear, call for help!                                                                                                                                                                                                                                                                                                                                                                                          |
| <input type="checkbox"/> Insert an IV line (16-18G catheter), group and cross match blood for transfusion (ideally fresh blood) and administer 500ml to 1liter Ringer lactate or 0.9% sodium chloride.                                                                                                                                                                                                                                                                                   |
| <input type="checkbox"/> Manually pack the tear with sterile gauze whilst resuscitating with blood transfusion                                                                                                                                                                                                                                                                                                                                                                           |
| <input type="checkbox"/> Apply antiseptic solution (10% polyvidone iodine or chlorhexidine) to the vagina and cervix. Local anesthesia with 1% Lidocaine may be required.                                                                                                                                                                                                                                                                                                                |
| <input type="checkbox"/> For tears that are high and extensive, obtain urgent nurse anesthetist support to consider Ketamine or opiate analgesia (at hospital level only).                                                                                                                                                                                                                                                                                                               |
| <input type="checkbox"/> Repair when the mother is stable and most of the bleeding has stopped, unless there is heavy ongoing blood loss despite compression, in which case repair needs to be undertaken urgently while resuscitation continues.                                                                                                                                                                                                                                        |
| <input type="checkbox"/> Gently grasp the cervix with ring or sponge forceps. Apply the forceps on both sides of the tear and gently pull in various directions to see the entire cervix. There may be several tears.                                                                                                                                                                                                                                                                    |
| <input type="checkbox"/> Close the cervical tears with continuous 0 or 2/0 absorbable chromic catgut (or polyglycolic) suture starting at the apex (upper edge of tear), which is often the source of bleeding. Sometimes, the cervical tear bleeds heavily and requires a 2/0 absorbable Figure-of-eight suturing in a single layer. Place the initial suture above the apex of laceration to control bleeding from retracted arteries.                                                 |
| <input type="checkbox"/> If a long section of the rim of the cervix is tattered, under-run it with continuous 0 or 2/0 chromic catgut (or polyglycolic) suture.                                                                                                                                                                                                                                                                                                                          |
| <input type="checkbox"/> If the apex is difficult to reach and ligate, WHO advises that it may be possible to grasp it with artery or ring forceps. Leave the forceps in place for 4 hours. Do not persist in attempts to ligate the bleeding points as such attempts may increase the bleeding. Then: <ul style="list-style-type: none"> <li>– After 4 hours, open the forceps partially but do not remove.</li> <li>– After another 4 hours, remove the forceps completely.</li> </ul> |
| <input type="checkbox"/> A laparotomy may be required to repair a cervical tear that has extended above the vaginal vault.                                                                                                                                                                                                                                                                                                                                                               |
| <input type="checkbox"/> Assure patient that small cervical tears with minimal bleeding should heal spontaneously with no suturing and without complications.                                                                                                                                                                                                                                                                                                                            |
| <input type="checkbox"/> Tears in the vaginal walls should also be sutured if bleeding. For multiple vaginal lacerations with friable tissue that tears on suturing, insert a vaginal pack, and remove after 24 hours. Insert a Foley catheter while the pack is in place.                                                                                                                                                                                                               |
| <i>Note: Surgical interventions must be performed by an OB clinician or surgeon only. An assistant is usually needed to identify the tissues by holding retractors. Good lighting is essential.</i>                                                                                                                                                                                                                                                                                      |

## B) Perineal Tears

Perineal tears involve any type of damage to the female genitalia during labor, which can occur spontaneously or as a result of an episiotomy or instrumental delivery. Anterior perineal tears can affect the anterior vaginal wall, urethra, clitoris, and labia. Posterior perineal tear can affect the posterior vaginal wall, perineal muscle, perineal body, external and internal anal sphincters, and anal canal.

During labor, the majority of perineal tears occur along the posterior vaginal wall, extending towards the anus. Vaginal lateral wall tears can occur with other tears but also on their own.

*Classifications of perineal tears:*

- 1<sup>st</sup> degree: vaginal mucosa and connective tissue

- 2<sup>nd</sup> degree tear: involve vaginal mucosa, connective tissue, and underlying muscles.
- 3<sup>rd</sup> degree tears involve incomplete transection of the anal sphincter.
- 4<sup>th</sup> degree tears involve complete transection of the anal sphincter.

*Diagnosis of perineal tears:*

The perineum should always be assessed after a vaginal delivery to determine the presence of any lacerations. This examination should include a digital rectal examination to evaluate the tone of the anal sphincter.

*Repair of first- and second-degree tears:*

*Table 11. Repair of First- and Second-Degree tear*

| Actionss                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Provide emotional support                                                                                                                                                                       |
| <input type="checkbox"/> Initially stop the bleeding with sterile packing until a skilled healthcare provider is able to evaluate the tear                                                                               |
| <input type="checkbox"/> Ensure uterus well contracted, even when a traumatic condition is present                                                                                                                       |
| <input type="checkbox"/> Provide local anesthesia with lidocaine or pudendal block, if necessary.                                                                                                                        |
| <input type="checkbox"/> Carefully examine vagina, perineum, and cervix if tear is deep, rule out 3rd or 4th tear:                                                                                                       |
| <input type="checkbox"/> Feel for tone of sphincter by anal examination. Remember to change glove after examination.                                                                                                     |
| <input type="checkbox"/> Apply antiseptic solution around tear.                                                                                                                                                          |
| <input type="checkbox"/> If more than 40ml of lidocaine is required use adrenaline in addition                                                                                                                           |
| <input type="checkbox"/> Infiltrate beneath the mucosa, beneath the skin of perineum and deep into the perineal muscle using either 0.5 or 1%, or 2% lidocaine solution. Amount use should depend on the degrees of tear |
| <input type="checkbox"/> Check you are not in a vessel by aspirating                                                                                                                                                     |
| <input type="checkbox"/> Wait 2 minutes after injection then pinch the area with forceps. If woman still feels pain, wait two more minutes, and then retest. Administer additional doses until pain is absent.           |
| <input type="checkbox"/> Repair the vaginal mucosa using a continuous 2/0 suture, starting 1cm above the apex and repair by continuous stitch.                                                                           |
| <input type="checkbox"/> Repair the perineal muscle using interrupted 2/0 suture. If the tear is deep, use another layer of suture.                                                                                      |
| <input type="checkbox"/> Repair the skin using interrupted or subcuticular suture starting at the vaginal opening                                                                                                        |
| <input type="checkbox"/> If the tear is deep, perform a rectal examination, making sure no stitches are in the rectum.                                                                                                   |
| <i>Note: Use non-absorbable sutures for the skin of the perinium especially polyglycolic sutures.</i>                                                                                                                    |

*Repair of third and fourth-degree tears:*

**The repair of 3<sup>rd</sup> and 4<sup>th</sup> degree perineal tears should be done in a theatre.**

*Table 12. Repair of Third-and-Fourth degree tears*

| Actions                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Provide emotional support                                                                                                                                                                       |
| <input type="checkbox"/> Initially stop the bleeding with sterile packing until a health personnel are able to evaluate the tear                                                                                         |
| <input type="checkbox"/> Check if the sphincter is torn by placing the finger in anus, lifting, and identifying the sphincter or lack of it.                                                                             |
| <input type="checkbox"/> Provide patients with pudendal block, ketamine, or spinal anesthesia.                                                                                                                           |
| <input type="checkbox"/> Count swabs, needles, and instruments before starting the procedure.                                                                                                                            |
| <input type="checkbox"/> Start repair with rectal tear using 3/0 or 4/0. Do not go through the mucosa but the muscularis, then covering muscularis by bringing together the fascial layer with interrupted sutures.      |
| <input type="checkbox"/> Administer antibiotics                                                                                                                                                                          |
| <input type="checkbox"/> The torn anal epithelium must be repaired with interrupted or continuous polyglactin (VicrylTM) 2/0 with the knots tied in the anal lumen.                                                      |
| <input type="checkbox"/> <b>Internal anal sphincter</b> tears must, if identifiable, be repaired separately by end-to-end approximation with interrupted Polydioxanone (PDSTM) 3/0 or polyglactin (VicrylTM) 2/0 sutures |

|                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> The torn ends of the <b>external anal sphincter</b> must be identified and grasped with tissue forceps. The muscle is then mobilized and pulled across and repaired “end to end” with 3/0 PDSTM or polyglactin (Vicryl™) 2/0 sutures. |
| <input type="checkbox"/> Perform remainder of repair as for 2nd degree tear.                                                                                                                                                                                   |
| <input type="checkbox"/> A Foley catheter should be placed in the bladder either at the start or at the end of the procedure and should be left in situ for 24 hours.                                                                                          |
| <i>Note: Loss of control of stool and flatus may occur if the muscle is not repaired properly. Rectal defect not repaired may lead to Recto Vagina Fistula (RVF).</i>                                                                                          |

*Sphincter repair:*

*Table 13. Sphincter repair*

| <b>Actions</b>                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Grasp each end of the sphincter with an Allis clamp (sphincter retracts when torn). The fascial sheath is strong and will not tear if pulled with clamp.  |
| <input type="checkbox"/> Repair with interrupted 2/0 suture.                                                                                                                       |
| <input type="checkbox"/> Apply antiseptic solution to the area again.                                                                                                              |
| <input type="checkbox"/> Examine the anus with gloved finger to ensure correct repair of the rectum and sphincter. Then change to clean, high level disinfected or sterile gloves. |
| <input type="checkbox"/> Repair the vaginal mucosa, perineal muscle, and skin.                                                                                                     |

*Post-Procedural Care:*

4<sup>th</sup> degree perineal tear: single dose of prophylactic antibiotics (Ampicillin 500mg PO plus Metronidazole 400mg PO) and sitz bath. Follow up closely for signs of infection; avoid enemas or rectal examination for two weeks. Give stool softener by mouth for one week, encourage client to increase fluids intake and fruits.

*Delayed management of Tears:*

A perineal tear may be contaminated with fecal material. If closure is delayed more than 12 hours, infection is likely. Delayed primary closure is indicated in such cases.

- For 1<sup>st</sup> and 2<sup>nd</sup> degree perineal tear: If there are no other clinical complications, prescribe antibiotics and anti-inflammatories. If there are no signs of infection, proceed with delayed primary closure within 3-7 days.
- For 3<sup>rd</sup> and 4<sup>th</sup> degree perineal tears: Close the rectal mucosa with some supporting tissue and approximate the fascia of the anal sphincter with two or three sutures. Prescribe antibiotics and anti-inflammatories, and close the muscle and vaginal mucosa and perineal skin within 3-7 days.

### **3) Tissue** (retained placenta)

- Establish a double set up by informing the theater.
- Empty the bladder and leave in catheter.
- Additional 10 IU of oxytocin.
- Apply gentle CCT.
- Do manual removal if CCT fails.
- Perform uterine exploration to remove fragments of tissue.

### **4) Thrombin**

Use blood products to control bleeding:

- Fresh whole blood – replaces clotting factors.
- Packed red cells to replace red cells.

- Fresh frozen plasma (15ml/kg) to replace all clotting factors.
- Cryoprecipitate to replace fibrinogen and factor VIII in DIC.
- Platelet concentrate if platelet count is <20,000.

For acute or ongoing PPH, the decision to initiate transfusion of whole blood and/or fractionated blood products should be based on the underlying risk, continuous clinical and hematological assessments, and clear protocols for optimizing their use. The transfusion of individual blood components is preferred to whole blood alone. In settings where only whole blood is available, it should be considered, provided blood is cross-matched or low-titer type O blood is available. **Refer to national guidelines on transfusion for more details.**

## ADVANCED CARE

When to escalate care:

- If bleeding:
  - is heavy while giving the bundle, or
  - continues after bundle is complete, or
  - is more than 1000 mL at any time.
- If a woman:
  - has extensive trauma, or
  - has uterine inversion, or
  - is hypotensive or unresponsive.
- If you are unable to identify or manage the cause.

Call for more help:

- There should always be at least 2 health workers during an emergency.
- **Request the most senior health worker** to urgently attend the woman.
- Always continue monitoring and give what treatment you can while waiting for help or transfer.
- Call for the anesthetist if there is one at this facility.

Communicate and assign roles:

- Use **SBAR** technique to communicate clinical status.
- The most senior health worker leads the team and assigns roles.
- Use **closed-loop** communication to confirm understanding and completion of tasks.

Continually assess for shock:

| <b>Early signs of shock</b>                                                                                                                                          | <b>Late signs of shock</b>                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>▪ Fast or weak pulse &gt; 100 bpm.</li><li>▪ Systolic BP &lt; 100 mmHg.</li><li>▪ SI &gt;1 (pulse &gt; systolic BP).</li></ul> | <ul style="list-style-type: none"><li>▪ Very low BP and weak pulse.</li><li>▪ Rapid breathing &gt;30 breaths/min.</li><li>▪ Pale skin, including eyelids, mouth, palms.</li><li>▪ Sweating.</li><li>▪ Change in mental status – anxiety, confusion, unconsciousness.</li><li>▪ Scanty urine output (&lt;30 mL/h).</li></ul> |

If in shock, Check ABC and manage:

- Open airway and ensure breathing.
- If not breathing or in cardiac arrest, begin resuscitation.
- Start oxygen at 6-8 LPM.
- Assess circulation: BP and HR.
- Ensure 2<sup>nd</sup> IV for crystalloid fluids and blood transfusion.
- Support/increase blood volume.
- Apply NASG if shock or risk of shock.
- Prepare for blood transfusion.

*Advanced care note: Transfer immediately while still providing care if what the woman needs is beyond the scope of your facility.*

## Refractory PPH

Most women with PPH respond well to first-response interventions (uterotonics, uterine massage, TXA and intravenous fluid with isotonic crystalloids). However, between 10% and 20% of these women are unresponsive to these interventions. These cases are considered refractory PPH, and account for a substantial proportion of PPH-related morbidity and mortality overall, with 30-50% due to uterine atony.

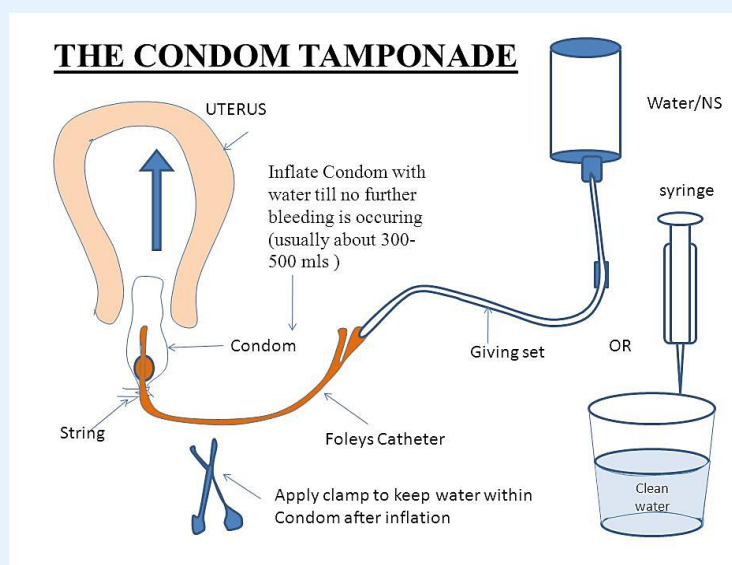
Non-surgical, temporizing measures may help stabilize the woman, slow down bleeding and allow time for referral or escalation of care and definitive treatments. These include:

- **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 birth.
- **External aortic compression** is recommended as a temporizing measure until appropriate care is available for the treatment of PPH due to uterine atony after vaginal birth.
- **Non-pneumatic anti-shock garment (NASG)** is recommended as a temporizing measure until appropriate care is available for the treatment of PPH. See Table for NASG Use above.
- 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.
- If bleeding does not stop in spite of treatment using uterotonics and other available conservative, the use of surgical interventions is recommended.
- Uterine packing with plain gauze or gauze impregnated with hemostatic agent(s) is **not recommended**.

**Uterine balloon tamponade** is recommended for the treatment of PPH due to uterine atony refractory to first line treatment. *It is only performed if the followings conditions are met:*

- Immediate recourse to surgical intervention and access to blood products is possible, if needed.
- First-line treatment protocol available and routinely implemented.
- Other causes of PPH (retained placental tissue, trauma) can be reasonably excluded.
- The procedure is performed by skilled birth attendant who is trained and skilled in the management of PPH, including the use of uterine balloon tamponade.
- Maternal condition can be regularly and adequately monitored for prompt identification of any signs of deterioration.

Figure 1. Use of the condom tamponade



## SUPPORTIVE CARE AFTER PPH

Supportive care after PPH is essential to ensure full physical recovery and address the emotional and psychological effects of what is often a life-threatening event. In the immediate period after bleeding has been controlled, women should receive close monitoring, including continued assessment of blood loss, regular evaluation of vital signs for hemodynamic stability, fluid balance and uterine tone while still in the health facility. Health workers should also assess for potential complications that commonly follow PPH, such as anemia, peripartum infection and blood pressure abnormalities.

### Special care after PPH

- Monitor closely until stable.
- Assess and record tone, blood loss and flow, pulse, BP:
  - at least every 15 min until stable
  - then every 30 min for 2 h
  - then as per routine.
- **Maintenance infusion of oxytocin 20–40 IU in 500–1000 mL** may be needed in the 4 h after treatment to prevent recurrence.
- Increase PO hydration and remove urinary catheter.
- Decrease oxygen per national guidelines – refer to Liberia Clinical Guidelines for Oxygen Therapy
- Support breastfeeding.
- Ensure the woman's record is complete with final measured blood loss, timing of escalation, all assessments and interventions.

### When stable:

- Repeat lab tests – FBC/Hb per protocol.
- Gradually increase physical activity.

### Home readiness

- Before discharge, ensure:
  - normal vital signs, urine output, and mental state
  - no dizziness with walking
  - she can care for herself and her baby
  - no sign of infection.
- Continue or begin antibiotics per protocol.

### Discharge instructions

#### Counsel the woman and her family:

- Ensure rest and good nutrition to support breastfeeding and recovery.
- Teach signs of anemia, bleeding, infection, and to seek care right away.
- Provide routine post-partum care including FP.
- Counsel on risk of PPH in future and importance of facility delivery.
- Recommend NSAIDs or paracetamol for pain relief.

Plan follow up for care at **48 h, 10 days, and 6 wks.**

#### In case of anemia:

- If Hb <7 g/dL:

- provide blood transfusion and consider IV iron
- **do not discharge until Hb >7 g/dl.**
- If Hb = 7–11 g/dL, discharge with at least 3 months of:
  - **Fe 120 mg supplement, and**
  - **folic acid 400 µg daily.**

**Instructions in case of perineal tears:**

- Wash the perineum gently front to back, 2x daily and after bowel movements.
- Change pads frequently.
- Wash hands before and after self-care.

## **Oral Iron Supplementation**

**Oral iron supplementation, either alone or in combination with folic acid**, may be provided to post-partum women for 6–12 weeks after delivery for reducing the risk of anemia in settings where gestational anemia is of public health concern. This recommendation is applicable to all post-partum women, irrespective of their lactation status.

For ease of implementation and continuity of care, post-partum supplementation should begin as early as possible after birth; the iron supplementation regimen.

**Intravenous iron therapy** is recommended over oral iron therapy for women with iron-deficiency anemia after birth when oral iron cannot be used or is not tolerated or there is a clinical need to treat women with severe iron-deficiency anemia rapidly, provided staff are trained to evaluate and manage anaphylactic reactions.

## ANNEXES

### Annex 1: Essential Medicines & Supplies for PPH Prevention and Treatment

| Drug                                | Prevention                                                                                  | Treatment (first dose)                                                                                      | Additional doses                                                               | Max dose                                                        | Storage                                                                                                   | Contraindications                                                                                                                                                                                                                                                 | Side Effects                                                                                                                                                                             | Other Notes                                                                                                                                                                                                                         |
|-------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Oxytocin</b>                     | 10 IU IM or slow IV push over 1–2 min.                                                      | 20 IU diluted bolus over 1–2 min, or diluted in 100–500 mL crystalloid fluids, infused as fast as possible. | 20–40 IU in 500–1000 mL crystalloid fluids, infused at 40 drops/min, over 4 h. | 60 IU in 24 h. Do not exceed 3 L IV fluids containing oxytocin. | <b>COLD CHAIN</b><br>2–8°C (36–46°F). If storage conditions cannot be guaranteed, use another uterotonic. | —                                                                                                                                                                                                                                                                 | Headache, tachycardia, bradycardia, nausea, and vomiting.<br><br><i>Fewer side effects than misoprostol monotherapy or combination therapy. Preferred uterotonic recommended by WHO.</i> |                                                                                                                                                                                                                                     |
| <b>Carbetocin</b>                   | 100 µg (1 mL) IM or slow IV push over 1 min.                                                | <i>Not for treatment.</i>                                                                                   | Only one dose, do not repeat.                                                  | —                                                               | <b>COLD CHAIN</b><br>2–8°C (36–46°F). Do not freeze. Protect from light.                                  | See below                                                                                                                                                                                                                                                         | Nausea, abdominal pain, headache, shivering, and fever.                                                                                                                                  | Use only when oxytocin is unavailable or quality cannot be guaranteed.                                                                                                                                                              |
| <b>Heat-stable Carbetocin (HSC)</b> | 100 µg (1 mL) IM or slow IV push over 1 min. Inject directly into IV port, not into IV bag. | <i>Not for treatment.</i>                                                                                   | Only one dose, do not repeat.                                                  | —                                                               | <b>NO COLD CHAIN</b><br>No refrigeration needed.                                                          | Women with cardiovascular disorders (e.g. heart disease). Women with liver or kidney disease. Women with epilepsy. Women with hypersensitivity to carbetocin or oxytocin. NOT for use during labor induction or augmentation (i.e. any time before baby is born). | Nausea, vomiting, hypotension, headache.                                                                                                                                                 | Use only when oxytocin is unavailable or quality cannot be guaranteed.                                                                                                                                                              |
| <b>Misoprostol</b>                  | 800 µg rectal or sublingual (SL)                                                            | 800 µg SL or PR.                                                                                            | 200–800 µg SL or PR.                                                           | 1600 µg in 24 h.                                                | <b>NO COLD CHAIN</b><br>No refrigeration needed. Protect from light and humidity.                         | — Pregnancy.<br>— Sensitivity to misoprostol                                                                                                                                                                                                                      | Shivering, diarrhea, and fever.                                                                                                                                                          | Can be used in combination with oxytocin for prevention, with women at high risk of PPH.<br><br>Warning: High doses (400–600 µg) during labor cause strong contractions that may rupture the uterus, or reduce oxygen to the fetus. |

| Drug                                           | Prevention                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Treatment (first dose)       | Additional doses                                                                                                                                                                                                                                                               | Max dose               | Storage                                          | Contraindications                                                                                                                                                                                                                                                                                                                                 | Side Effects                                                                                                                                                                                                                                                      | Other Notes                                                                                                                              |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tranexamic Acid (TXA)</b>                   | <i>Not for prevention.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1 g in 10 mL IV over 10 min. | At the primary clinic/PHC level: give 2nd dose TXA if the referral is delayed up to 3 hours after 1st TXA dose, and monitor for adverse effects.<br><br>At CEmONC facility: give 2nd dose TXA if still bleeding 30 min after initial dose, repeat 1 g in 10 mL IV over 10 min. | 2 doses, 2 g in total. | <b>NO COLD CHAIN</b><br>No refrigeration needed. | <ul style="list-style-type: none"> <li>– Pregnancy.</li> <li>– Thromboembolic Disease (DVT, PE).</li> <li>– Combination with drugs like estrogen, unless benefits outweigh risks.</li> <li>– Mild to moderate renal impairment.</li> <li>– Seizure Disorder (Epilepsy).</li> </ul> <b>Do <u>NOT</u> initiate TXA if 3 hr or more since birth.</b> | Dizziness, visual disturbances, headache; Nausea, vomiting, abdominal discomfort; Allergic reactions, nasal symptoms; Hypotension (if injected rapidly); Back pain, muscle pain, joint stiffness, fatigue; Thrombosis (sign of blood clot-sudden pain, swelling). | Reduces bleeding by inhibiting the breakdown of blood clots. Can be given in the same line as oxytocin but not mixed in the same IV bag. |
| <b>Other drugs, commodities &amp; supplies</b> | <p><i>IV Fluids (NS or RL)</i></p> <ul style="list-style-type: none"> <li>• 1000ml-1,500ml in the first hour, depending on hemodynamic status of patient. If shock: Give 3L for every 1L of blood loss.</li> <li>• Two IV access with 14G to 18G.</li> <li>• Caution for Preeclampsia with severe features, Severe anemia. Adverse effect: Fluid overload.</li> <li>• Infuse as soon as possible depending on hemodynamic status of the patient.</li> </ul> <p><i>Lidocaine (local anesthetic, tear repair)</i></p> <ul style="list-style-type: none"> <li>• Infiltrate beneath the mucosa, beneath the skin of perineum and deep into the perineal muscle using either 0.5 or 1%, or 2% lidocaine solution. Amount use should depend on the degrees of tear.</li> <li>• If more than 40ml of lidocaine is required use adrenaline in addition.</li> </ul> <p><i>Ampicillin (antibiotic prophylaxis)</i></p> <ul style="list-style-type: none"> <li>• If manual uterine massage was performed, treat patients with ampicillin 2g IV or IM stat.</li> <li>• Antibiotic prophylaxis (IV Ampicillin, first-generation cephalosporin, or single dose amoxicillin and clavulanic acid-1g+200 mg) should follow manual removal of the placenta.</li> <li>• 4th degree perineal tear: single dose of prophylactic antibiotics (Ampicillin 500mg PO plus Metronidazole 400mg PO) and sitz bath. Follow up closely for signs of infection; avoid enemas or rectal examination for two weeks. Give stool softener by mouth for one week, encourage client to increase fluids intake and fruits.</li> </ul> <p><i>Blood transfusion</i></p> <ul style="list-style-type: none"> <li>• Give blood transfusion as soon as possible and ideally fresh donor blood. Give appropriate blood group or use O negative immediately if available.</li> <li>• Whilst waiting blood for transfusion give 500 ml of 0.9% saline or RL as a rapid bolus IV and reassess. If crystalloid boluses dilute clotting factors and urgent blood transfusion is much more effective.</li> </ul> |                              |                                                                                                                                                                                                                                                                                |                        |                                                  |                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                          |

## Annex 2: PPH Interventions by Category and Responsible Cadre

| Category                                                                                     | Key Interventions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Responsible Cadre                                                                                                                                          |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E — Early Detection &amp; Trigger Criteria</b>                                            | <ul style="list-style-type: none"> <li>• Apply calibrated drape/blood tray with trigger lines (300 mL, 500 mL)</li> <li>• Observe and document blood loss, flow, and uterine tone every 15 min on the Blood Loss Monitoring Chart (BLMC)</li> <li>• Monitor and record BP and pulse every 15 min for the first 1–2 hours</li> <li>• Activate care based on trigger criteria: clinical judgement, blood loss <math>\geq 500</math> mL, or <math>\geq 300</math> mL plus one abnormal feature</li> </ul> | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b>M — Massage of the Uterus</b>                                                             | <ul style="list-style-type: none"> <li>• Uterine massage for atony</li> <li>• Bimanual uterine compression as a temporizing measure</li> </ul>                                                                                                                                                                                                                                                                                                                                                         | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b>O — Oxytocic Drugs</b>                                                                    | See Master Medication Table for oxytocin/carbetocin/HSC/misoprostol dosing                                                                                                                                                                                                                                                                                                                                                                                                                             | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b>T — Tranexamic Acid (TXA)</b>                                                             | See Master Medication Table for TXA dosing                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b>IV — IV Fluids</b>                                                                        | <ul style="list-style-type: none"> <li>• Start IV, 2 large bore lines (14–18G)</li> <li>• Crystalloid fluid resuscitation; blood transfusion if indicated</li> </ul>                                                                                                                                                                                                                                                                                                                                   | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b>E — Examination &amp; Escalation</b>                                                      | <ul style="list-style-type: none"> <li>• Empty bladder; evacuate blood clots</li> <li>• Examine for tears and retained placental tissue</li> <li>• Apply and remove NASG</li> <li>• Insert uterine balloon tamponade (trained personnel, with conditions met per Table 13)</li> <li>• Escalate/refer if bleeding is refractory or facility scope is exceeded</li> </ul>                                                                                                                                | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| <b><i>OTHERS — Prevention, Repair &amp; Surgical Content Outside the E-MOTIVE Bundle</i></b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                            |
| Antenatal & Pre-Delivery Prevention                                                          | <ul style="list-style-type: none"> <li>• ANC visits, anemia screening/treatment, birth preparedness planning</li> <li>• Supply and drug availability checks; IV cannula pre-positioning for high-risk patients</li> </ul>                                                                                                                                                                                                                                                                              | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| Delivery / AMTSL Prevention                                                                  | <ul style="list-style-type: none"> <li>• Check for second baby; administer uterotonic; controlled cord traction</li> <li>• Placenta examination; massage after delivery</li> </ul>                                                                                                                                                                                                                                                                                                                     | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| Tear & Laceration Repair (1st/2nd degree, cervical, vaginal)                                 | Identification, local anesthesia, and suturing per WHO technique                                                                                                                                                                                                                                                                                                                                                                                                                                       | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors                                                                           |
| 3rd/4th Degree & Sphincter Repair                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OB clinician or surgeon only                                                                                                                               |
| C-Section-Specific Prevention & Management                                                   | History-taking, drug availability, bleeding-source identification during surgery                                                                                                                                                                                                                                                                                                                                                                                                                       | Skilled birth attendants – nurses, midwives, physician assistants (PAs), doctors<br>Specifically for performing a C-Section, OB clinician or surgeon only. |
| Surgical Escalation                                                                          | <ul style="list-style-type: none"> <li>• Laparotomy, emergency/subtotal/total hysterectomy</li> <li>• Uterine compression sutures, uterine/utero-ovarian artery ligation</li> </ul>                                                                                                                                                                                                                                                                                                                    | OB clinician or surgeon only                                                                                                                               |