Literature Review

Risk Factors, Preventive Measures and Managing for Primary Postpartum Hemorrhage.

Reda Mohamed Nabil Aboushady & Amel Dawod Kamel

Department of Maternity and Newborn Health Nursing, Faculty of Nursing, Cairo University

Corresponding author’s email: dawod_m3@yahoo.com

Abstract

One of the millennium development goals set by the United Nations is to reduce maternal mortality by three quarters by 2015. The achievement of this goal must focus on understanding the dynamics of the causes of maternal mortality and removing such causes. Postpartum hemorrhage (PPH) is a major cause of perinatal morbidity and mortality worldwide. This paper highlights currently risk factors and preventive measure for managing PPH. View their prevalence of PPH, causes and risk factors, pathophysiology, signs and symptoms, clinical examination, diagnosis, prognosis, complications and adverse outcomes from PPH. Finally, management, nursing responsibility for women anticipating PPH and prevention measures of PPH.

Key words: Primary Postpartum Hemorrhage (PPH), Risk Factors, Preventive Measure.
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Introduction

Gynecologic hemorrhage represents excessive bleeding of the female reproductive system. Such bleeding could be visible or external, namely bleeding from the vagina, or it could be internal into the pelvic cavity or form a hematoma. Hemorrhage associated with a pregnant state or during delivery is an obstetrical hemorrhage. All women lose some blood as the placenta separates from the uterus and immediately afterward. Women who have C-sections generally lose more than those who give birth vaginally. But because the amount of blood in your body increases by almost 50 percent during your pregnancy, your body is well prepared to deal with this expected blood loss. Normal just after childbirth is primarily from open blood vessels in the uterus, where the placenta was attached. As the placenta begins to separate, these vessels bleed into the uterus. After the placenta is delivered, the uterus usually continues to contract, closing off these blood vessels (Fridman & Korst, 2005). Primary postpartum hemorrhage (PPH) remains an important complication of child birth and contributes significantly to maternal mortality. PPH is the direct cause of maternal deaths and is a major contributor factor in a further 5 fatalities. The reported incidence of PPH in UK varies from 4% to 11%. In USA a reasonable consensus of 1%-10% of pregnancies is complicated by PPH, with the actual number range of 2-4% (Michael & Wainscott, 2006).

Magnitude of the problem

Death as a result of pregnancy remains the main cause of premature mortality worldwide (Fawcus et al., 1995). Every year, 536,000 women die as a result of complications during pregnancy, childbirth and/or postpartum period. This
amounts to one death every minute with an estimated quarter of these deaths occurring as a consequence of hemorrhage (World Health Organization (WHO), 2007; Millennium Development Goals Report, 2009). PPH is a major cause of maternal morbidity and mortality worldwide. The traditional definition of PPH used in most textbooks is sequence of hemorrhage (WHO, 2012) excessive bleeding from the genital tract after delivery of a child and it could be primary or secondary. It is primary when there is a blood loss of 500 ml or more within the first twenty four hours after child birth and secondary if the excessive loss of blood occurred at any time after first day to 42 days of puerperium.

The incidence of PPHis about 1 in 5 pregnancies, in the developing world, several countries have maternal mortality rates in excess of 1000 women per 100,000 live births, and WHO statistics suggest that 25% of maternal deaths are due to PPH, accounting for more than 100,000 maternal deaths per year (Abouzahr, 1998). Increasing incidence of PPH over the years, imbalance between resource-rich and resource-poor areas are probably due to a combination of increased prevalence of risk factors such as grand multiparty, lack of safe blood banking, non-routine use of prophylaxis against hemorrhage, and lack of measures for drug and surgical management of a tony are all rate of 2.8%, again with the highest rate in Africa (5.1%). Although accountable for only 8% of maternal deaths in developed countries, postpartum hemorrhage is the second leading single cause of maternal mortality, ranking behind preeclampsia/ eclampsia.

Globally, postpartum hemorrhage is the leading cause of maternal mortality. The condition is responsible for 25% of delivery-associated deaths, and this figure is as high as 60% in some countries (Mininoetal., 2007). International initiatives to improve outcomes have invested in training birth attendants (traditional or otherwise) and nurse midwives on the active management of the third stage of
labor (the period immediately after delivering of the infant). Most efforts focus on uterine atony, which is the primary cause of PPH. This has included education on manual techniques to increase uterine contraction-retraction and making pharmacologic uterotonics such as oxytocin and misoprostol more available. Postpartum hemorrhage is a potentially life-threatening complication of both vaginal and cesarean delivery. Associated morbidity is related to the direct consequences of blood loss as well as the potential complications of haemostatic and resuscitative interventions (Miller, Lester & Hensleigh, 2004; USAID, 2008).

1) - Conceptual framework

The theoretical framework for primary postpartum hemorrhage is the nursing process according to NANDA (North American Nursing Diagnosis Association, 1982), as it uses clinical judgment to strike a balance of epistemology between personal interpretation and research evidence in which critical thinking may play a part to categorize the women issue and course of action. It encourages nurses with orderly thought, analysis, and planning when working with women and deciding on what care needs must be met. There are five steps in the nursing process; Assessment, Diagnosis, Planning, Implementation, and Evaluation. Nurse’s use critical thinking in each of the steps involved in order to solve problems, make decisions, and/or collaborate with other disciplinary team members in providing patient care. Once a nurse has identified the needs of the patient, the nurse is better equipped to create a nursing care plan that will meet health goals.

Nursing process is the framework for providing professional, quality nursing care; it directs nursing activities for health promotion, health protection and disease prevention and is used by nurses in every practice setting and specialty.
2)–Definition of Postpartum hemorrhage (PPH)

There is no single definition of PPH exists and a number of definitions are currently in use worldwide. The definition of obstetric hemorrhage varies widely in the literature. The severity of PPH will be influenced by the rate and the total volume of blood loss and also the response to treatment. According to the World Health Organization (WHO) PPH is defined as a blood loss of 500 ml or more within 24 hours after birth.

Blood loss of more than 500 ml for vaginal delivery and more than 1000 ml for caesarean section are considered abnormal (Wise & Clark, 2008; Society of Obstetricians and Gynecologists of Canada (SOGC), 2009). Additional resources should be mobilized if blood loss exceeds 1500 ml. A practical definition of major obstetric hemorrhage includes:

(1) An estimated blood loss of 2500 ml or more, (2) Transfusion of five or more units of blood or 
(3) Treatment for coagulopathy. Arias, (2005) found that, the average blood loss following vaginal delivery and cesarean section was approximately 500-100ml, respectively. It follows that postpartum hemorrhage should exceed significantly that number. The problem is that the estimation of blood loss at delivery is notoriously inaccurate because it is based on the visual observation of obstetrician rather than on any objective measurement. In a recent study a hematocrit change of 10% or need for red blood cell transfusion was adopted as a definition of postpartum bleeding. This definition has multiple advantages and should be universally accepted.

Williams 23rd Edition, (2010) “Traditionally, postpartum hemorrhage has been defined as the loss of 500 mL of blood or more after completion of the third stage
of labor. This is problematic because half of all women delivered vaginally shed that amount of blood or more when losses are measured quantitatively”.

According to UK Royal College of Obstetricians and Gynecologists, (2009), Primary PPH defined as; estimated blood loss of 500-1000 mL in the absence of clinical signs of shock and Severe PPH defined as, estimated blood loss of >1000 mL or clinical signs of shock or tachycardia with a smaller estimated loss.

According to Rath, (2011) PPH is commonly defined as blood loss exceeding 500 mL following vaginal birth and 1000 mL following cesarean. Definitions vary, however, and are often based on inaccurate estimates of blood loss. Moreover, average blood loss at birth frequently exceeds 500 or 1000 mL. PPH is frequently classified as primary/immediate/early, occurring within 24 hours of birth, and secondary/delayed/late, occurring more than 24 hours post-birth to up to 12 weeks postpartum. In addition, PPH may be described as third or fourth stage depending on whether it occurs before or after delivery of the placenta respectively (Schorn, 2010).

**Table (1) Summary of PPH definitions**

<table>
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<th>Clinical Aspects</th>
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<tr>
<td>Blood loss volume</td>
<td>Traditional definitions of PPH include:</td>
</tr>
<tr>
<td></td>
<td>• A blood loss in excess of 500 mL (WHO, 2009; SOGC), 2009) after vaginal birth.</td>
</tr>
<tr>
<td></td>
<td>• A blood loss in excess of 1000 mL (WHO, 2009) after caesarean section (CS)</td>
</tr>
<tr>
<td></td>
<td>• Severe PPH is used to describe a blood loss greater than or equal to 1000mL(Begley et al., 2011).</td>
</tr>
<tr>
<td></td>
<td>• Very severe(Begley et al., 2011) PPH are used to describe</td>
</tr>
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</table>
Hemodynamic compromise

Due to frequent underestimation of blood loss (Moussa & Alfirevic, 2007). PPH may first be detected through hemodynamic compromise. **Manifests as increasing tachycardia and hypotension**

- A healthy pregnant woman will only show mild signs of shock after a blood loss of 1000 mL
- Conversely, **compromise** may occur earlier in women with (SOGC, 2009): Gestational hypertension with proteinuria- anemia- dehydration and small stature (Royal Australian and New Zealand College of Obstetricians and Gynecologists (RANZCOG), 2011).

<table>
<thead>
<tr>
<th>Hematocrit</th>
<th>PPH can be retrospectively diagnosed by a 10% decline in postpartum hematocrit levels (ACOG, 2006).</th>
</tr>
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</table>

| Blood transfusion | The Australian Council on Healthcare Standards, (2012) indicator for PPH is blood transfusion required after a massive blood loss equal to or greater than 1000 mL or in response to a postpartum hemoglobin (Hb) of less than 80 g/L. |

| Secondary | Secondary PPH is outside the scope of this guideline as it refers to excessive bleeding that occurs between 24 hours post birth and 6 weeks postnatal (RANZCOG, 2011). |

### 3)-Prevalence of postpartum hemorrhage (PPH)

Worldwide the overall prevalence of PPH is estimated to be 6 to 11 percent (Calvert et al., 2012). Rates vary by data source and country as well as assessment
method with a prevalence of 10.6 percent when measured by objective appraisal of blood loss and 7.2 percent when assessed with subjective techniques (Carroli et al., 2008). A systematic review estimated prevalence of PPH with 500 mL of blood loss or more at 10.5 percent in Africa, 8.9 percent in Latin America and the Caribbean, 6.3 percent in North America and Europe, and 2.6 percent in Asia (Carroli et al., 2008).

Another systematic review was higher, with similarly wide regional variation: 26 percent in Africa, 13 percent in North America and Europe, and 8 percent in Latin America and Asia (Calvert et al., 2012). The prevalence of PPH with 1000 mL blood loss or more was considerably lower in both reviews with overall estimates of 1.9 to 2.8 percent (Carroli et al., 2008; Calvert et al., 2012). In spite of lower estimates for PPH in developed countries compared with developing countries, several studies have noted an increase in PPH in high-resource regions (Rossen et al., 2010; Lutomski et al., 2012; Mehrabadi et al., 2012; Mehrabadi et al., 2013). In the United States, the prevalence of PPH rose from 2.3 percent in 1994 to 2.9 percent in 2006, a 26 percent increase (Callaghan, Kuklina & Berg, 2010). Defining PPH has historically been difficult. Waiting for a patient to meet PPH criteria, particularly in resource-poor settings or in cases of sudden hemorrhage, may delay appropriate intervention. Any bleeding that has the potential to result in hemodynamic instability, if left untreated, should be considered PPH and managed accordingly. PPH can be divided into 2 types: early (< 24 hours after delivery) and late (24 hours to 6 weeks after delivery). Most cases of PPH (>99%) are early.
4) - Causes and risk factors

According to Royal College of Obstetricians and Gynecologists, (2009) the most common causes of PPH is uterine atony (impaired uterine contraction after birth), which occurs in about 80 percent of cases. Atony may be related to over distention of the uterus, infection, placental abnormalities, or bladder distention. Though the majority of women who develop PPH have no identifiable risk factors, clinical factors associated with uterine atony as multiple gestation, polyhydramnios, high parity, and prolonged labor. Other causes of PPH include retained placenta or clots, lacerations, uterine rupture or inversion, and inherited or acquired coagulation abnormalities (McLintock, & James, 2011; Zelop, 2011).

The common causes (etiology) of PPH are referred to as the ‘Four T’s’ and in order of most to least commonly occurring are (Maame & Yiadom, 2013).

1. **Tone** (70%):
   - Atonic uterus

2. **Trauma** (20%): o Lacerations of the cervix, vagina and perineum
   - Extension lacerations at CS
   - Uterine rupture or inversion
   - Consider non-genital tract trauma (e.g. subcapsular liver rupture)

3. **Tissue** (10%):
   - Retained products, placenta (cotyledon or succenturiate lobe), membranes or clots, abnormal placenta

4. **Thrombin** (< 1%):
   - Coagulation abnormalities
**Uterine atony**

A tony is by far the most common cause of postpartum hemorrhage. Uterine contraction is essential for appropriate hemostasis, and disruption of this process can lead to significant bleeding. Uterine atony is the typical cause of postpartum hemorrhage that occurs in the first 4 hours after delivery.

**Risk factors for a tony include the following**

- Over distended uterus (eg, multiple gestation, fetal macrosomia, polyhydramnios)
- Fatigued uterus (eg, augmented or prolonged labor, amnionitis, use of uterine tocolytics such as magnesium or calcium channel blockers)
- Obstructed uterus (eg, retained placenta or fetal parts, placenta accreta, or an overly distended bladder)

**Laceration or hematoma**

Trauma to the uterus, cervix, and/or vagina is the second most frequent cause of PPH. Injury to these tissues during or after delivery can cause significant bleeding because of their increased vascularity during pregnancy. Vaginal trauma is most common with surgical or assisted vaginal deliveries. It occurs frequently with deliveries that involve a large fetus, manual exploration, instrumentation, a fetal hand presenting with the head, or spontaneously from friction between mucosal tissue and the fetus during delivery. Cervical lacerations are fewer now that forceps-assisted deliveries are less common. They are more likely to occur when delivery assistance is provided before the cervix is fully dilated.

**Risk factors for trauma include the following:**

- Delivery of a large infant
- Any instrumentation or intrauterine manipulation (e.g., forceps, vacuum, manual removal of retained placental fragments)
- Vaginal birth after cesarean section (VBAC)
- Episiotomy

**Retained Placenta**

Retained placental tissue is most likely to occur with a placenta that has an accessory lobe, deliveries that are extremely preterm, or variants of placenta accrete. Retained or adherent placental tissue prevents adequate contraction of the uterus allowing for increased blood loss.

**Risk Factors for Retained Products of Conception Include the Following:**

- Prior uterine surgery or procedures
- Premature delivery
- Difficult or prolonged placental delivery
- Multilobed placenta
- Signs of placental accrete by antepartum ultrasonography or MRI

**Clotting Disorder**

During the third stage of labor (after delivery of the fetus), hemostasis is most dependent on contraction and retraction of the myometrium. During this period, coagulation disorders are not often a contributing factor. However, hours to days after delivery, the deposition of fibrin (within the vessels in the area where the placenta adhered to the uterine wall and/or at cesarean delivery incision sites) plays a more prominent role. In this delayed period, coagulation abnormalities can cause PPH alone or contribute to bleeding from other causes, most notably trauma. These abnormalities may be preexistent or acquired during pregnancy, delivery, or the postpartum period.
**Potential causes include the following:**

- **Platelet dysfunction:** Thrombocytopenia may be related to preexisting disease, such as idiopathic thrombocytopenic purpura (ITP) or, less commonly, functional platelet abnormalities. Platelet dysfunction can also be acquired secondary to HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count).
- **Inherited coagulopathy:** Preexisting abnormalities of the clotting system, as factor X deficiency or familial hypofibrinogenemia
- **Use of anticoagulants:** This is an iatrogenic coagulopathy from the use of heparin, enoxaparin, aspirin, or postpartum warfarin.
- **Disseminated intravascular coagulation (DIC):** This can occur, such as from sepsis, placental abruption, amniotic fluid embolism, HELLP syndrome, or intrauterine fetal demise.
- **Dilutional coagulopathy:** Large blood loss, or large volume resuscitation with crystalloid and/or packed red blood cells (PRBCs), can cause a dilutional coagulopathy and worsen hemorrhage from other causes.
- **Physiologic factors:** These factors may develop during the hemorrhage such as hypocalcemia, hypothermia, and acidemia.
**Uterine inversion**

"Traction": The traditional teaching is that uterine inversion occurs with an atonic uterus that has not separated well from the placenta as it is being delivered or from excessive traction on the umbilical cord while placental delivery is being assisted. Studies have yet to demonstrate the typical mechanism for uterine inversion. However, clinical vigilance for inversion, secondary to these potential causes, is generally practiced. Inversion prevents the myometrium from contracting and retracting, and it is associated with life-threatening blood losses as well as profound hypotension from vagal activation.

Factors underlying the increase remain unknown; however, studies investigating changes in maternal age, obesity, mode of delivery, multiple birth, duration of labor, and placental abnormalities [*Ford et al., 2007*]. A large proportion of women who develop PPH do not have identifiable risk factors, so all women must be considered to be at risk. However, antenatal screening is important to identify women who are at high risk of PPH, so that appropriate management plans can be developed and implemented.
Table (2) summary of Risk factors for PPH

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Etiology</th>
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<tr>
<td><strong>Antenatal</strong></td>
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<tr>
<td>Increased maternal age – more than 35 years</td>
<td>Tone</td>
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<tr>
<td>Asian ethnicity.</td>
<td>Tone/trauma</td>
</tr>
<tr>
<td>Obesity – Body mass index (BMI) of more than 35 kg/m</td>
<td>Tone</td>
</tr>
<tr>
<td>Grand multiparty – uncertain as mixed findings</td>
<td>Tone/tissue</td>
</tr>
<tr>
<td>Existing uterine abnormalities (e.g. anatomical anomalies, fibroids)</td>
<td>Tone</td>
</tr>
<tr>
<td>Maternal blood disorders:</td>
<td>Thrombin</td>
</tr>
<tr>
<td>• Idiopathic thrombocytopenia purpura</td>
<td></td>
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<tr>
<td>• Thrombocytopenia caused by pre-eclampsia/gestational hypertension</td>
<td></td>
</tr>
<tr>
<td>• Disseminating intravascular coagulation (DIC)</td>
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</tr>
<tr>
<td>History of previous PPH or retained placenta</td>
<td>Tone/tissue</td>
</tr>
<tr>
<td>Anaemia of less than 9 g/dL at onset of labour.</td>
<td>No reserve</td>
</tr>
<tr>
<td>Antepartum haemorrhage associated with:</td>
<td>Tissue/Tone/Thrombin</td>
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<tr>
<td>• Suspected or proven placental abruption</td>
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<tr>
<td>• Known placenta praevia</td>
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<tr>
<td>Over distension of the uterus:</td>
<td>Tone</td>
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<tr>
<td>• Multiple pregnancy</td>
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<tr>
<td>• Polyhydramnios</td>
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<tr>
<td>• Macrosomia – greater than 4 kg</td>
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<tr>
<td>Intrauterine fetal death</td>
<td>Thrombin</td>
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<tr>
<td><strong>Intrapartum</strong></td>
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<tr>
<td>Precipitate labour</td>
<td>Trauma/Tone</td>
</tr>
<tr>
<td>Prolonged labour – first, second or third stage</td>
<td>Tone</td>
</tr>
<tr>
<td>Chorioamnionitis, pyrexia in labour (e.g. prolonged membrane rupture)</td>
<td>Tone/Thrombin</td>
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<tr>
<td>Oxytocin use31 – induction of labour</td>
<td>Tone</td>
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<tr>
<td>Amniotic fluid emboli (AFE)/DIC</td>
<td>Thrombin</td>
</tr>
<tr>
<td>Uterine inversion</td>
<td>Trauma/Tone</td>
</tr>
<tr>
<td>Genital tract trauma (e.g. episiotomy, ruptured uterus)</td>
<td>Trauma</td>
</tr>
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According to Royal Australian and New Zealand College of Obstetricians and Gynecologists (2010)

<table>
<thead>
<tr>
<th>Assisted vaginal birth2</th>
<th>Trauma/Tone</th>
</tr>
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<tr>
<td>CS – more risk with emergency (e.g. extension or lacerations from deep engagement or malpresentation.)</td>
<td>Trauma/Tone</td>
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<table>
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<th>Postnatal</th>
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<tr>
<td>Retained products (e.g. placenta, cotyledons or succenturiate lobe, membranes, clots)</td>
<td>Tissue</td>
</tr>
<tr>
<td>Drug-induced hypotonia10 (e.g. anaesthetic, magnesium sulphate)</td>
<td>Tone</td>
</tr>
<tr>
<td>Bladder distension preventing uterine contraction (e.g. obstructed indwelling catheter (IDC), unable to void)</td>
<td>Tone</td>
</tr>
<tr>
<td>AFE/DIC</td>
<td>Thrombin</td>
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5)-Pathophysiology of occurrence PPH

At term, the uterus and placenta receive 500-800 mL of blood per minute through their low resistance network of vessels. This high flow predisposes a gravid uterus to significant bleeding if not well physiologically or medically controlled. By the third trimester, maternal blood volume increases by 50%, which increases the body's tolerance of blood loss during delivery. Following delivery of the fetus; the gravid uterus is able to contract down significantly given the reduction in volume. This allows the placenta to separate from the uterine interface, exposing maternal blood vessels that interface with the placental surface.
After separation and delivery of the placenta, the uterus initiates a process of contraction and retraction, shortening its fiber and kinking the supplying blood vessels, like physiologic sutures or "living ligatures (Bouwmeester, et al., 2003).

If the uterus fails to contract, or the placenta fails to separate or deliver, then significant hemorrhage may ensue. Uterine atony, or decrease myometrial contractility, accounts for 80% of postpartum hemorrhage. The other major causes include abnormal placental attachment or retained placental tissue, laceration of tissues or blood vessels in the pelvis and genital tract, and maternal coagulopathies. An additional, though uncommon, cause is inversion of the uterus during placental delivery. The traditional pneumonic "4Ts: tone, tissue, trauma, and thrombosis" can be used to remember the potential causes. Here, a 5th is added; “T” for uterine inversion that will be called “traction” (Tintinalli, Kelen & Stapczynski, 2004; ACOG, 2006).

6)-Signs and symptoms

The following are the most common signs and symptoms of PPH. However, each woman may experience symptoms differently (Carroli et al., 2008).

- decreased blood pressure
- increased and pain in tissues in the vaginal and perennial area
- Uncontrolled bleeding heart rate
- decrease in the red blood cell count (hematocrit)
- swelling

The abnormal blood loss will be picked up by the midwifery staff or obstetrician caring for you. However, if the excessive blood loss is occurs following the first 24 hours after delivery (secondary postpartum hemorrhage)
yourself may notice the increased blood loss as increased need for sanitary napkin changes and/or increased loss into the toilet/shower.

Depending on the amount of blood loss, you may experience some of the symptoms of anemia including tiredness and lethargy. The amount of blood loss may be severe that you may require a blood transfusion. You may even need to undergo other treatments including surgery to prevent further blood loss. You may experience difficulty breastfeeding your baby if your pituitary gland has been affected by the blood loss as well as other symptoms of Sheehan’s syndrome in PPH, massive blood loss can diminish the supply of blood to the gland and cause cell death. If greater than 10% of the gland is affected, then the woman can are affected symptoms of anterior pituitary insufficiency including:

- Failure to lactate (breastfeed);
- Weakness;
- Lethargy;
- Hypersensitivity to cold;
- Decreased sweating;
- Atrophy (shrinking) of the external genitalia;
- Amenorrhea (loss of periods) or oligomenorrhea (reduced periods);
- Hair loss; and
- Absences of menopausal symptoms (KEMH, 2009).

7)-Clinical examination of postpartum hemorrhage (PPH)

Magann and his college (2005) mentioned that the doctors need to carefully but quickly make an assessment on the amount of blood lost and to monitor vital
signs including temperature, pulse, breathing and blood pressure until the bleeding is controlled. Questions regarding the pregnancy, labor and delivery may be asked to assess for risk factors which may help to identify the cause of bleeding.

**Key examinations need to be performed in an attempt to identify the cause and control the hemorrhage. These include:**

- Examination of uterine size;
- Examination of the placenta for completeness; and
- Examination of the birth canal for trauma.

**8)-Diagnoses of Postpartum Hemorrhage (PPH)**

PPH is diagnosed clinically when significant blood loss (>500mL) is observed. The clinical history should begin with consideration of signs and symptoms that are most crucial in managing potential circulatory collapse, identifying the cause of PPH, and selecting therapies, as follows.

- Is the placenta delivered?
- What has been the duration of the third stage of labor?
- How long has the bleeding been heavy?
- Was initial post-delivery bleeding light, medium, or heavy?
- Are symptoms of hypovolemia present?
- In delayed PPH, what is the bleeding pattern since delivery

**9)-Prognosis of Postpartum Hemorrhage (PPH)**

The consequences of postpartum hemorrhage vary depending on several factors including:

- Amount of blood loss;
- Health of the mother prior to the event; and
• Treatment availability including blood transfusions.

Significant postpartum hemorrhage may be associated with the development of Sheehan’s syndrome, severe anemia and maternal mortality (CEMACH, 2004).

10)-Complication and adverse outcomes from PPH

• According to World Health Organization (2012), PPH is one of the leading causes of maternal mortality and morbidity worldwide and accounts for nearly one-quarter of all maternal deaths. Several studies have suggested that deaths associated with PPH could be prevented with prompt recognition and more timely and adequate treatment (Torre et al., 2011; Kilpatrick et al., 2012). Sever PPH can be associated with organ failures as; shock, edema, compartment syndrome, transfusion complications, thrombosis, acute respiratory distress syndrome, sepsis, anemia, intensive care, and prolonged hospitalization, hypovolaemic shock, disseminated intravascular coagulation, acute kidney injury, liver failure, acute (adult) respiratory distress syndrome, death (McLintock & James, 2011; Zelop, 2011).

11)-Management of PPH

Early assessment and aggressive treatment of PPH are important for reducing morbidity and mortality rates. A critical first step in managing persistent PPH is rapid recognition that clinically significant bleeding (unresponsive to initial measures) has occurred, with effective communication of the situation to the appropriate team members, both clinical and laboratory staff. Subsequent measures include immediate resuscitation with definitive action to arrest the bleeding (obstetric, surgical, and/or hematologic) and ongoing assessment and monitoring of
the response to treatment. Persistent severe PPH requires early involvement of the most experienced members of the team.

**Assessment of PPH severity: estimation of blood loss and clinical assessment**

The accurate assessment of blood loss during PPH facilitates timely transfusion and reduces the severity of hemorrhagic shock.

**Measurement of blood loss**

Training regarding the measurement or estimation of blood loss is given to anyone undertaking midwifery or obstetric practice. Accurate monitoring of blood loss volume is recommended using widely available pictorial guidelines (Bose et al., 2010) or physical collection where possible.

**Clinical assessments of the severity of PPH**

In otherwise fit and healthy women, development of tachycardia and hypotension are relatively late events in PPH, only occurring after loss of significant blood volume. Regular clinical assessment (every 30 min) of pulse, blood pressure, and respiratory rate can provide an indication of clinical compromise especially if recorded on a modified obstetric early warning chart (Singh et al., 2012).

**Treatment of PPH**

The immediate resuscitation of women with PPH includes assessment of the airway and breathing and the administration of oxygen by mask at 10 to 15 L/min. The woman should be kept flat and kept warm using appropriate available measures. Intravenous (IV) access with two 14-gauge cannulas should be obtained and an infusion of warmed crystalloid should be commenced until blood is...
available. The maximum volume of infused clear fluids should, ideally, not exceed a total of 3.5 L (up to 2 L of warmed crystalloid solution as rapidly as possible, followed by up to an additional 1.5 L if blood is still not available) while awaiting compatible blood.

**First-line management**

First-line measures should be directed to the treatment of atony, which is the most common cause of PPH: primarily, uterine massage to stimulate uterine muscle contractions and a trial of therapy with uterotonic agent. The choice and dosing of uterotonic agents as a first-line therapy should be administered according to local guidelines. The bladder should be emptied and an indwelling catheter should be inserted. An obstetric review to identify and manage other causes for PPH that is, retained placenta or genital tract trauma, should be performed.

**Second-line management**

If initial measures fail to stop bleeding and uterine atony persists, other pharmacologic (uterotonics and hemostatic agents) and mechanical or surgical measures should be instituted. Progression to secondary measures should ideally trigger the initiation of a predefined management algorithm for the aggressive treatment of persistent PPH. Escalation of mechanical or conservative surgical interventions in cases of ongoing uterine atony will depend on the availability of expertise. Options include intrauterine balloon tamponade or hemostatic brace sutures (such as B-Lynch or modified B-Lynch suture) surgical ligation of the uterine arteries and radiologic uterine artery embolization (Fig. 1).
Fig. 1. Recommended treatment algorithm for the treatment of PPH. *Declaration of PPH. The loss of more than a normal volume of blood in the immediate postpartum period should lead to prompt response to control the bleeding. †Uterotonics used may vary between institutions and should be patient specific; typical uterotonic administration will include IV infusion of Syntocinon, intramuscular Syntometrine, or prostaglandin analogs, for example, misoprostol, carboprost, or sulprostone. ‡Surgical and obstetric measures used to manage PPH will depend initially on the mode of delivery. Early recourse to B-Lynch or other compression suture may be more appropriate after cesarean section than after vaginal delivery. §The use of rFVIIa is off-label and must be considered carefully. Published case series have reported efficacy in this setting with some authors suggesting that in selected cases it may be appropriate to consider before hysterectomy. Hysterectomy should be a last resort. aPTT = activated partial thromboplastin time; CBC = complete blood count; PT = prothrombin time; ROTEM = rotational thromboelastometry; TEG = thrombelastography
**Third line of management**

**Surgical therapies:** Surgical interventions should be performed by the most experienced obstetrician available.

- **B-lynch suture** – this method aims to exert continuous vertical compression by way of a suture that runs the full thickness of both the anterior and posterior uterine walls.

- **Uterine artery ligation** – the uterine arteries are the major source of blood to the uterus and hence the ligation (tying off) of these arteries is a method of controlling PPH. The uterus remains viable due to blood feeding into it from smaller vessels. Subsequent menstruation and pregnancies are unaffected by this procedure.

- **Internal iliac artery ligation** – this can also be performed in an attempt to control PPH or in any situation associated with uncontrolled pelvic bleeding. Care must be taken to positively identify both the external and internal branches of the iliac artery as ligation of the external iliac artery may result in loss of the lower limb. Care must also be taken to avoid the ureter, which lies close by.

- **Hysterectomy** – is an effective and often lifesaving procedure where the bleeding cannot be controlled by other methods. However, deaths do occur following and during hysterectomy in cases of massive haemorrhage and where the procedure is delayed until the patient is nearly moribund (*B-Lynch et al.*, 1997; *Elhassan et al.*, 2010).

Guidelines for the prevention of PPH, such as the joint statement of the International Confederation of Midwives and the International Federation of Gynecology and Obstetrics (2004), recommend routine massage of the uterus after delivery of the placenta. Massage is thought to stimulate uterine contraction, possibly through stimulation of local prostaglandin release, and thus reduce hemorrhage. Procedure of uterine massage as following; 1) Explain the procedure
and its purpose to the mother; 2) Prepare equipment’s and take to bed side ;3) Screen the mother’s bed to keep privacy; 4) Close the windows ,if open anddrafty;5)Wash hands to prevent infection; 6) Ask the mother to empty her bladder if she has not voided recently to obtain accurate information’s;7) Place the mother in a spine position with her knee slightly flexed to tolerate abdominal muscles; 8) Put on the clean gloves and lower the perineal pad to observe amount of saturation and characteristics of lochia; 9) Place the non-dominant and above the symphysis pubis; 10) Use the flat part of the fingers “not the fingers tip” for palpation; 11) begin palpation at the umbilicus and palpate gently until the funds is located; 12) Note the firmness and location of the funds “the funds should be firm in mid line” and approximately at the level of umbilicus; 13) If the funds is difficult to locate or is soft or “boggy” atomic ,keep the non-dominant round above the symphysis pubis and massage the funds with the dominant hand until the funds is firm; 14) Observe the vulva for passage of the blood clots and for development of hematoma or bleeding from lacerations; 15) Remove bloody pads ,clean perineum and apply sterile perineal pad; 16) Help the client to find a comfortable – position; 17) Record consistency and of the funds, bleeding and perineum; 18) Report a funds that does not stay firm and 19) Wash hands after care away of equipment.

Figure 2. Uterine massage
If women conscious, inform her of procedure and provide analgesia, then:

- **Using non-dominant hand:**
  
  ✓ Keeping fingers straight and thumb tucked in palmar side of index finger insert hand into vagina with palm facing the woman’s thigh
  ✓ Once fingers meet resistance roll the hand so that palm is upward and curl fingers into a fist placing thumb on top of index finger
  ✓ Place the fist into the anterior fornix of the vagina and apply upward pressure.

- **Using other (dominant) hand:**
  
  ✓ Identify the uterine fundus
  ✓ Deeply palpate to situate fingers behind the fundus
  ✓ Cupping the fundus compress it firmly around the intravaginal fist
  ✓ Maintain compression and evaluate effec
If conscious, inform woman of procedure and provide analgesia, then:

- Situate non-dominant hand using same techniques as above
- The dominant hand is used to administer intramyometrial PGF2α via an injection in multiple sites of the uterine funds.
- Stabilization of the funds can be achieved by having an assistant situate their fingers behind the funds.

The process for using the intra-uterine balloon is as follows:

- Empty uterine cavity of clots
- Insert the end of the balloon through the cervix into the uterine cavity, ensuring the balloon is completely inside the uterus
- Inflate the balloon with sufficient volume of warm sterile saline (approx 250-500 mL); the uterus should now be firm with minimal blood loss
- Assess blood loss through drainage portal for tamponade effect. If bleeding continues tamponade ineffective and surgical intervention required
- Commence broad spectrum antibiotic cover
- Continue or commence oxytocic infusion.
The technique is performed at laparotomy or CS:

Test: bleeding controlled by bimanual compression  
Technique: #2 chromic on a 75 mm heavy round bodied needle

- (Re) open the abdomen and (re) open the uterus
- Check the uterine cavity for bleeding sites that might be oversewn
- Test for homeostasis before using the B-Lynch suture using bimanual compression and swabbing the vagina – if bleeding is controlled temporarily in this fashion the B-Lynch suture is likely to be effective
- Placement of the suture, as demonstrated, requires surgical expertise

This technique is performed at laparotomy or CS:

- The goal of arterial ligation is to decrease uterine profusion and subsequent bleeding
- It is considered less technically challenging and time consuming than ligation of other arteries e.g. internal iliac

12-Nursing Responsibility for Women Anticipating PPH

According to the American Journal of Maternal / Child Nursing, (2003), nursing care during postpartum period is multifaceted requiring knowledge of normal physiologic process as well as potential risks. Anticipatory guidance during postpartum period can have a significant impact on postnatal outcomes. So, the nurse must work toward providing care and education that facilitate holistic family wellness. As well as complete assessment and obstetric history are very important, this might include: 1) medical history as; history of medical disease, routine medications and allergies. 2) Obstetric history as; gravid, parity, history of postpartum hemorrhage, history of complications during pregnancy, time and mode of delivery, presence of tears or lacerations during delivery, and anesthesia or medications, 3) infant status as; breast or bottle feeding.

Lynna, and Joan (2005) stated that, to outline the nursing care and management of the postpartum mother who hemorrhages, all patients will receive rapid interventions to prevent developing symptoms of potential, impending shock as it can progress rapidly. Therefore, Lynna, and Joan listed what the nurse must assess for the woman carefully and thoroughly as, immediate, and ongoing physical assessment of the mother is guided by her unique history and situation. It includes an assessment of; vital signs; uterine tone; lochia; fundal height; condition of perineum; bladder function; bowel function, and physical comfort. Finding of this assessment should be documented and reported immediately. also mother`s history should be reviewed for factors that would predispose to PPH, as prior history before the present pregnancy or related to the present of pregnancy and delivery.
Pilliteri (2006), reported that, nurses have crucial roles in giving immediate care for women experiencing postpartum hemorrhage which includes; notify the on duty physician immediately, keep patient with nothing per month; keep patient on bed rest in a flat position with head on bed slightly elevated. The nurse should assess fundal height, firmness, position and lochia for color, odor, amount, and clots with blood pressure, pulse and respirations every 5-10 minutes until stable, then every 30 minutes for 2 hrs, then 60 minutes for 4 hrs, followed by 2 hrs for 6 hrs. Monitoring temperature every 4 hours with vital signs are also nurse`s duties. According to John and Barbara (2004) if the uterus is soft and boggy massaging the Findus firmly while supporting the lower uterine segment until being firm is recommended.

The nurses also have role in assessing episiotomy through REEDA (redness, edema, ecchymosis, discharge, and approximation of edges of episiotomy) method as a possible cause of hemorrhage. Nurses should carefully inspect the surrounding area of the episiotomy sutures and assess general perineal healing at least three times daily. Pain, a gaping suture line, and a reddened, edematous episiotomy (Bobak et al , 2009). Pillitteri (2006) added that, when the nurse turns the mother to inspect her perineum, she has to be sure to check under her buttocks to avoid missing any bleeding that may be pooling below her. If uterus remains a tonic with moderate or excessive flow the nurse has to massage the uterus to express clots and make it hard as follows; the fundus is first gently felt with the fingers- tips to assess its consistency. If it is soft and relaxed the fundus is massaged with a smooth circular motion, applying no undue pressure. When contraction occurs the hand is held still, the nurse should start IV infusion and oxytocin drips.
The Egyptian Nursing Faculties (2001) stated that, breast feeding is a method which helps the uterus to contract. If the mother is unable to control breast feeding, manual stimulation of the nipples is effective. They also added that encouraging the mother to evacuate the bladder, and if the mother is unable to void or bladder is distended inserting a Nelton catheter for evacuation is a nurse’s responsibility because distended bladder may prevent uterus to contract effectively. The uterine consistency and tony that a firmly contracted fundus rules out uterine a tony and suggest an un repaired cervical laceration as the cause of bleeding.

However, Gabbe et al. (2002), highlighted that if symptoms and signs of shock has occurred; the nurse should elevate woman’s legs 20-30 degrees, provide oxygen by facemask at liters per minute, keep the mother warm which help her to recover from shock more quick, obtain access with 0.9% normal saline via Y – tubing in case blood transfusion is necessary, monitor blood work as ordered, the nurse should also monitor intake and output, urine output should exceed 30mL/hour. She should watch for symptoms and signs of pulmonary edema (dyspnea, cough, or increased anxiety). Finally the nurse must document all observations, findings, and interventions.
13)-Prevention of Postpartum Hemorrhage

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

2. Oxytocin (10 IU), administered intramuscularly, is the preferred medication and route for the prevention of PPH in low-risk vaginal deliveries. Care providers should administer this medication after delivery of the anterior shoulder. (I-A)

3. Intravenous infusion of oxytocin (20 to 40 IU in 1000 mL, 150 mL per hour) is an acceptable alternative for AMTSL. (I-B)

4. An IV bolus of oxytocin, 5 to 10 IU (given over 1 to 2 minutes), can be used for PPH prevention after vaginal birth but is not recommended at this time with elective Caesarean section. (II-B)

5. Ergonovine can be used for prevention of PPH but may be considered second choice to oxytocin owing to the greater risk of maternal adverse effects and of the need for manual removal of a retained placenta. Ergonovine is contraindicated in patients with hypertension. (I-A)

6. Carbetocin, 100 μg given as an IV bolus over 1 minute, should be used instead of continuous oxytocin infusion in elective Caesarean section for the prevention of PPH and to decrease the need for therapeutic uterotonics. (I-B)

7. For women delivering vaginally with risk factor for PPH, carbetocin 100 μg IM decreases the need for uterine massage to prevent PPH when compared with continuous infusion of oxytocin. (I-B)

8. Ergonovine, 0.2 mg IM, and misoprostol, 600 to 800 μg given by the oral, sublingual, or rectal route, may be offered as alternatives in vaginal deliveries when oxytocin is not available. (II-1B)

9. Whenever possible, delaying cord clamping by at least 60 seconds is preferred to clamping earlier in premature newborns (< 37 weeks’ gestation) since there is less
intraventricular hemorrhage and less need for transfusion in those with late clamping. (I-A)

10. For term newborns, the possible increased risk of neonatal jaundice requiring phototherapy must be weighed against the physiological benefit of greater hemoglobin and iron levels up to 6 months of age conferred by delayed cord clamping. (I-C)

11. There is no evidence that, in an uncomplicated delivery without bleeding, interventions to accelerate delivery of the placenta before the traditional 30 to 45 minutes will reduce the risk of PPH. (II-2C)

12. Late cord clamping (performed after 1 to 3 minutes after birth) is recommended for all births while initiating simultaneous essential newborn care. (Strong recommendation, moderate quality evidence)

13. Early cord clamping (<1 minute after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation (Strong recommendation, moderate-quality evidence).

14. Sustained uterine massage is not recommended as interventions to prevent PPH in women who have received prophylactic oxytocin (Weak recommendation, low-quality evidence).

15. Postpartum abdominal uterine tonus assessment for early identification of uterine atony is recommended for all women. (Strong recommendation, very-low-quality evidence)

16. Oxytocin (IV or IM) is the recommended uterotonic drug for the prevention of PPH in caesarean section (Strong recommendation, moderate-quality evidence).

17. Controlled cord traction is the recommended method for removal of the placenta in caesarean section (Strong recommendation, moderate-quality evidence).
Also, a Cochrane review suggests that active management (use of uterotonic drugs, cord clamping and controlled cord traction) during the third stage of labor reduces severe bleeding and anemia (Begley, 2011). However, the review also found that active management increased the mother's blood pressure, nausea, vomiting, and pain. In the active management group more women returned to hospital with bleeding after discharge, and there was also a reduction in birth weight due to infants having a lower blood volume. Another Cochrane review looking at the timing of the giving oxytocin as part of the active management found similar benefits with giving it before or after the expulsion of the placenta (Soltani, 2010).

1. Treating “Postpartum Hemorrhage” as a diagnosis (as opposed to a sign) and not identifying underlying cause(s)
2. Underestimating blood loss
3. Inattention to vital sign trends
4. Delay in laboratory assessment for developing anemia and coagulopathy
5. Delay in instituting blood component therapy
6. Delay in surgical intervention
7. Not making the mental shift from “normal delivery” to “life-threatening emergency”
8. Poor perioperative communication between the Obstetrician and Anesthesiologist regarding who will primarily manage blood loss estimation, laboratory assessment, and blood component therapy.
9. Poor postpartum communication between nurse and obstetrician regarding estimated blood loss, patient vital signs and other clinical indicators
10. Lack of preoperative preparation for massive hemorrhage (e.g. placenta previa with prior cesareans and suspected placenta accreta).

✓ In the postpartum patient who is bleeding or who recently has stopped bleeding and is oliguric, furosemide is not the answer.
✓ Any woman with placental previa and one or more cesarean deliveries should be evaluated and delivered in a tertiary care medical center.
✓ If your labor and delivery unit does not have a recently updated massive transfusion protocol based on established trauma protocols, get one today.

15. Postpartum Hemorrhage Conclusions

✓ Significant maternal morbidity and mortality
✓ Usually secondary to uterine atony
✓ Blood loss is inaccurately (under)estimated
✓ Early lab assessment and blood component Rx
✓ There are new diagnostic & therapeutic options

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