

# Postpartum Hemorrhage: A Technical Essay

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## Abstract

**Background:** Postpartum hemorrhage is one of the main causes of maternal mortality, mainly in underdeveloped countries. Deaths are mostly preventable, and are related to socioeconomic development, organization of health services and professional training. **Objective:** To systematize alerts for the prevention of postpartum hemorrhage. **Method:** This is a technical essay developed from reflections on previously produced and published texts about maternal mortality and has hemorrhage as the focus of this study. **Results:** It presents the concept, classification of hemorrhage, risk factors and their classification, prevention strategies, universal recommendations, pharmacological and non-pharmacological interventions when hemorrhage already exists, bleeding assessment techniques; clinical evaluation, by laboratory examination and by shock index. **Conclusions:** Hemorrhage is a preventable cause of maternal death through the accomplishment of multiple care. Hospital care must be conducted by qualified professionals and in adequate numbers. The risk diagnosis must be carried out during prenatal care with the recording of clinical data accessible in the health care network. All references studied are not specific to nursing, as hemorrhage prevention requires multidisciplinary action.

## Keywords

Postpartum Hemorrhage, Multiple Care, Risk Diagnosis, Prevention

## 1. Introduction

“It is difficult to understand why maternal mortality receives so little serious attention from health professionals, policy makers, and politicians” [1].

Many achievements have occurred since 1985 in relation to health in the perinatal period. Nevertheless, inequality is still present between countries and between regions of the same country, as has been documented in publications [2] [3] [4] [5].

The global data on serious maternal morbidity are insufficient to measure it, however, it is estimated that they are higher in low and medium income countries than in high income countries [6]. Complications during pregnancy and childbirth, regardless of cause, have the highest incidence of severe maternal morbidity in Africa, where estimates reach 198 female deaths per 1000 live births. The most common causes of maternal morbidity and mortality are near obstetric hemorrhage and hypertensive syndromes, with delays in treatment in all regions [6] [7] [8].

In Brazil, there are inequalities between regions, for example, in 2019, the estimated Maternal Mortality Ratio (MMR) ranged from 88.2 to 40.2 per 100,000 live births. This study also demonstrated differences in MMR between states in the context of the same region and among all Brazilian regions [9].

The study by Pinto *et al.* showed that 2017 was the year with the highest prevalence of maternal deaths in the five years studied [10]. According to the authors, there was a reduction in the number of deaths due to postpartum hemorrhage between the years of 2017 and 2020, the authors justify this fact associated with the project Zero Maternal Morte by Hemorrhage (0MMxH) raised by PAHO/WHO.

In addition to the numbers, it is necessary to identify the causes and their determinants. Here, Postpartum Hemorrhage (PPH) stands out, since it is the cause of maternal mortality around the world. It is also highlighted as the cause of 27% of deaths related to pregnancy, according to data published by the World Health Organization [2] [3]. It is estimated that PPH affects 6% of births and is the main cause of maternal mortality worldwide, including Brazil [11] [12] [13] [14].

Brazil will not reach the goal proposed by the SDGs, if the current trend is maintained [9]. Given the observed reality, it is essential to prepare multidisciplinary teams to identify women with relevant risk factors and ensure adequate care during the period prenatal, peripartum and postpartum (RANGEL 2019) Strategies to prevent the progression of postpartum hemorrhage require adequate management of labor, conservative procedures with the administration of oxytocin, elimination of unnecessary elective cesarean sections.

The existing technologies to control and treat obstetric hemorrhage have not achieved the intended results in Brazil. The results of the study demonstrate the need to modify clinical practice and the management of postpartum hemorrhage in addition to greater attention to women's health [12].

Given its magnitude and importance, hemorrhage must be prevented in advance. Therefore, it is the reason why the objective of the present study was defined: to systematize a technical essay on the prevention of postpartum he-

morrhage.

## 2. Method

This is a technical essay developed from reflections on previously produced and published texts about maternal mortality and its causes, and the focus in this publication will be on hemorrhage, due to its importance in the global context and the prospect of reducing maternal mortality [15] [16] [17] [18] [19]. In addition, this essay meets the recommendations of the World Health Organization [20] about the goals of sustainable development regarding health and well-being:

“By 2030, reduce the global maternal mortality rate to less than 70 deaths per 100,000 live births”

Reflection is understood here as “meditating on what has been read, thought and written” [21], about maternal mortality in the global context with the intention of contributing to its prevention and reduction. Essay because it is a free creation, based on the idea of the authors that integrate the included references, whose creation has the purpose of offering reminders for the prevention of hemorrhage and, consequently, maternal mortality. Always starting from the assertion that maternal mortality mostly occurs due to preventable causes and related to the quality of obstetric care [22] [23].

The term essay was used for the first time in 1580, by the Frenchman Michel de Montaigne, who is considered, with his essays, the creator of the genre: “The essay has a non-systematic and experimental character, and the term essay itself means attempt and can address literary, historical, philosophical, religious or scientific subjects, among many others” [24] [25].

Essay also because: “Nurse leaders are looking for new ways to innovate and transform, being challenged to influence quality, design new care delivery models, and create workplaces that empower nurses to advance new ideas that lead to innovation” [26].

## 3. Results and Discussion

Obstetric hemorrhage can occur before or after childbirth, but more than 80% of cases occur after childbirth, as summarized from texts published in recent years with scientific evidence about the concepts and classifications of PPH, techniques to quantify blood loss, risk factors, diagnosis, warning signs of PPH and available treatment, in addition to risk stratification, with each author referred to throughout the text.

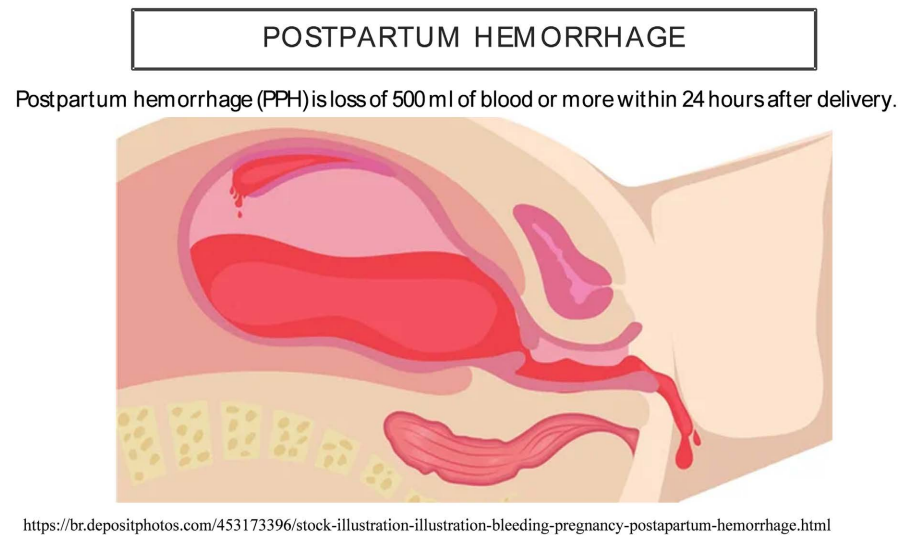
Offering qualified care is an ethical and legal commitment of each institution, of each professional, since PPH is most often preventable and/or controlled according to the quality of obstetric care.

It is also worth remembering the concept of the American College of Obstetrics and Gynecology and the World Health Organization defining PPH as bleeding of more than 500 ml from the genital tract after normal delivery and 1000 ml

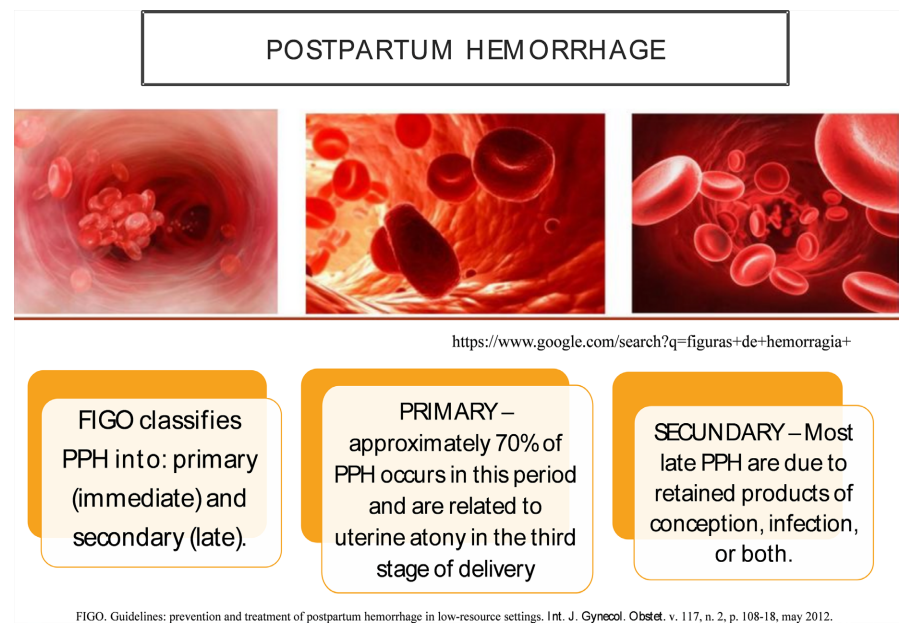
in women undergoing cesarean section [27] [28] (Figure 1).

PPH is considered primary if bleeding occurs within the first 24 hours after delivery. Secondary PPH occurs between 24 hours and 12 weeks after delivery [29] [30]. PRIMARY PPH occurs in approximately 70% of cases and is related to uterine atony in the third stage of delivery. LATE PPH is associated with retained products of conception and infection (Figure 2).

According to the authors mentioned below, a decrease of more than 10% in hematocrit was established as a marker to define PPH in relation to the condition of this examination in the prenatal period. Nonetheless, reductions in hemoglobin and hematocrit levels are delayed and do not reflect the hematologic



**Figure 1.** Postpartum hemorrhage: bleeding of more than 500 ml from the genital tract (ACGO, 2006).



**Figure 2.** PPH classification (FIGO, 2012).



status at the time of hemorrhage [27] [29] [31]. This drop in hematological parameters represents blood loss only four hours after the onset of hemorrhage; therefore, they are clinically limited [32]. Although the values described guide clinical management, risk factors that may predispose women to hemodynamic decompensation, such as prenatal anemia or low body mass index (BMI), must be evaluated [33].

Although risk factors do not identify all women who will suffer hemorrhage, OPAS (2018) [34] [35]. recommends the identification of risk factors for PPH as a necessary act in the obstetric admission, which will trigger the individualized care plan for parturient women with different risks (Figure 3). Risk stratification is an action to be carried out continuously from prenatal care to admission, since the patient's clinical condition can change throughout the pregnancy-puerperal cycle.

The identification of risk factors for PPH is the action in obstetric care, which must trigger specific care for patients with different risks. Risk factors for PPH must be recorded in the woman's medical record, accompanied by a care plan, throughout pregnancy and during hospitalization. Risk factors and the care plan must be reassessed and adjusted, according to the clinical evolution of the woman and her pregnancy (Figure 4). In addition, the woman and her family

Hemorrhage Risk Classification		
Low risk	Medium risk	High risk
Absence of uterine scar	Previous cesarean delivery or uterine surgery	Placenta previa or low placenta insertion
Single pregnancy	Uterine distension (twin, polyhydramnios, macrosomia, large myomas)	Suspected placental accretism
≤ 3 Previous vaginal deliveries	> 3 Vaginal deliveries	Premature placental abruption
Absence of coagulation disorder	Chorioamnionitis	Hematocrit < 30 + other risk factors
		platelets < 100,000
		Coagulopathies
Without history of puerperal hemorrhage	With history of puerperal hemorrhage	Active high volume bleeding
	Maternal obesity (BMI > 35)	Multiple risk factors = High risk

Figure 3. PPH risk classification (OPAS, 2018).

must be guided about risk factors, warning signs and the search for assistance.

Constantly reassessing risk factors and responding quickly to complications can prevent an initial hemorrhage from turning into serious and life-threatening bleeding. Women identified as being at high risk for PPH must have their deliveries referred to a facility with professional capacity and an on-site blood bank [34] [35] [36].

Studies highlight the value of observing family history in estimating risk for PPH, as the findings of these authors recommend that women with a sister with PPH had a 70% chance of being affected by PPH [36] [37] [38].

The best treatment for PPH is prevention! Therefore, the identification of risk factors makes it possible to create and implement warning systems for the prevention and control of hemorrhage. That is why they form the basis for planning the care of each woman (Figure 5).

Maternal deaths from PPH can be prevented by means of appropriate measures, of varying complexity, taken during pregnancy and childbirth. Oxytocin (10 UI IM) as a pharmacological agent is effective since, when administered at the appropriate dosage and time, as well as controlled by professionals with proper training, it makes it possible to reduce cases of PPH due to uterine atony by more than 50% (Figure 6, Figure 7). Other measures stand out, such as clamping the umbilical cord after the 1<sup>st</sup> minute of birth in full-term newborns and without contraindications; controlled traction of the umbilical cord; uterine massage/surveillance in the 4<sup>th</sup> stage of labor, checking the uterine tone every 15 minutes in the first 2 hours in all puerperal women; skin-to-skin contact between mother and child for at least one hour [34].

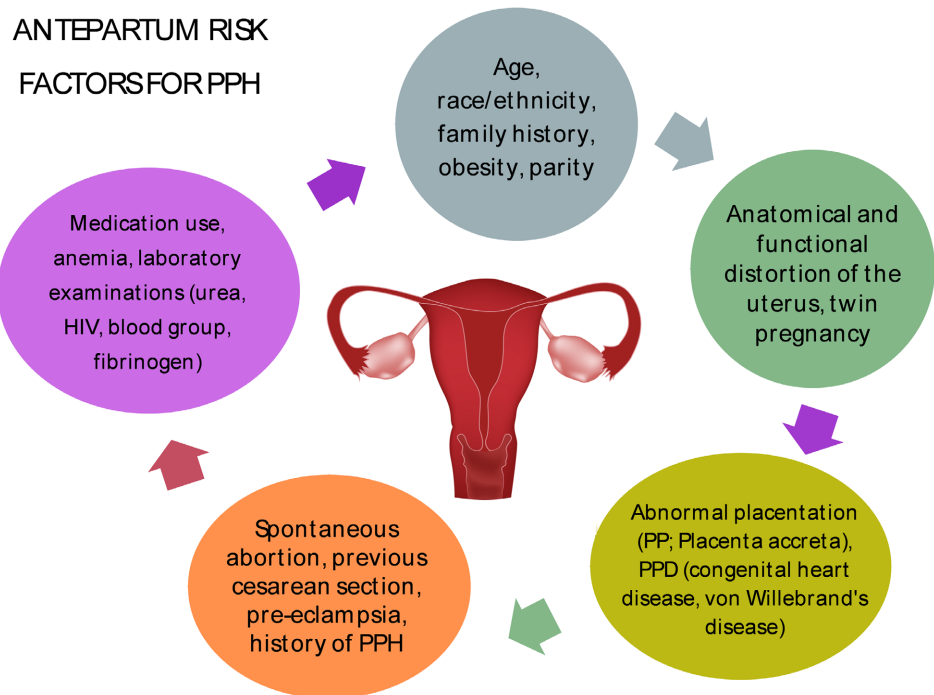
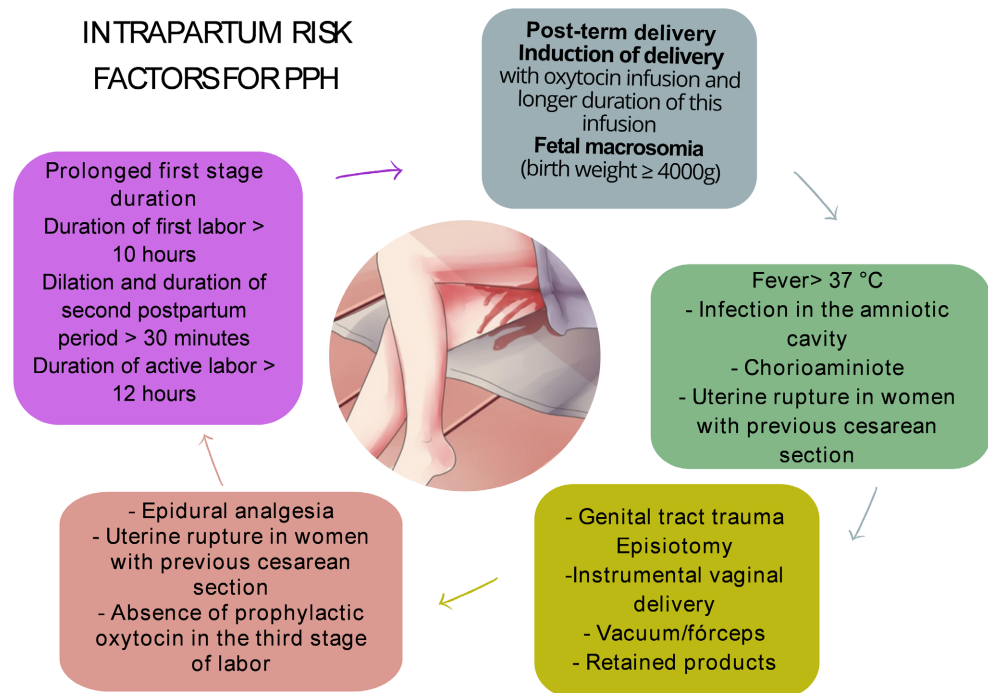
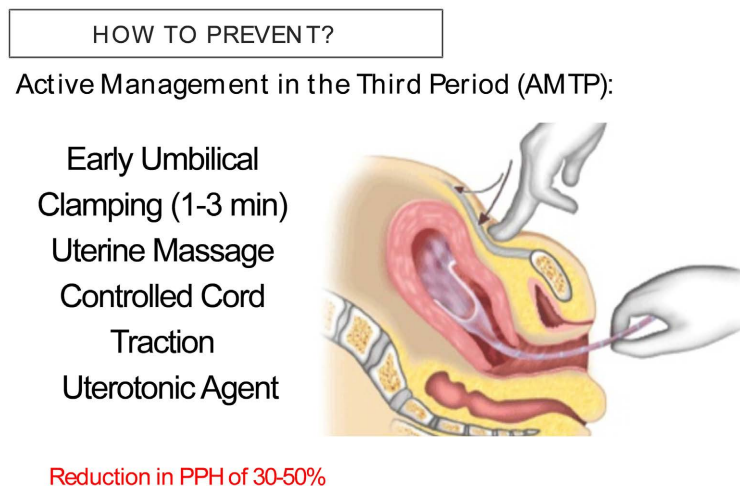


Figure 4. Antepartum risk factors for PPH (RANGEL, 2019).



**Figure 5.** Intrapartum risk factors for PPH (RANGEL, 2019).



ALSO Manual e Programa de Estudos, cap. J- Hemorragia Pó Parto: Emergência do Terceiro Tempo, 2016

**Figure 6.** How to prevent PPH (ALSO, 2016).

Another important action in the management of PPH is its timely diagnosis. Appropriate and early estimation of blood loss enables timely therapy (**Figure 7**).

In order to identify postpartum blood loss, several techniques are indicated. The criteria for selection in birth institutions will depend on the reality and training of the multidisciplinary team, all with positive and negative issues [34] [39] [40] [41] [42]:

**Visual estimation:** estimating the amount of blood in gauze/compress when soaked can mean greater blood loss. This is a good technique, but it tends to

underestimate major cases of bleeding, regardless of professional experience (Figure 8 and Figure 9).

**Weighing of compresses with blood:** the material used during labor is weighed, such as a surgical field, compresses, remembering that one ml of blood is equivalent to one gram of weight. This procedure is more reliable than the visual estimate and requires a trained team [34] [40] [41].

**Collection devices:** they can be placed on the parturient woman in the immediate postpartum period to collect the amount of blood that is being lost. Technique little or not used in Brazil [34] [40] [41] [43] [44] (Figure 10).

The ACGO (2017) [27] Practice Bulletin notes that, although visually estimated blood loss is considered imprecise, the use of an educational process on blood loss estimation for practitioners has been shown to improve the accuracy

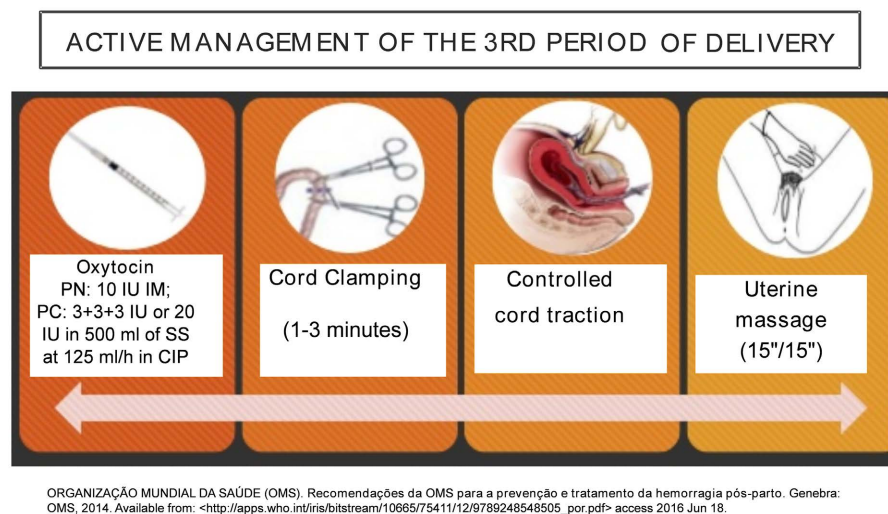
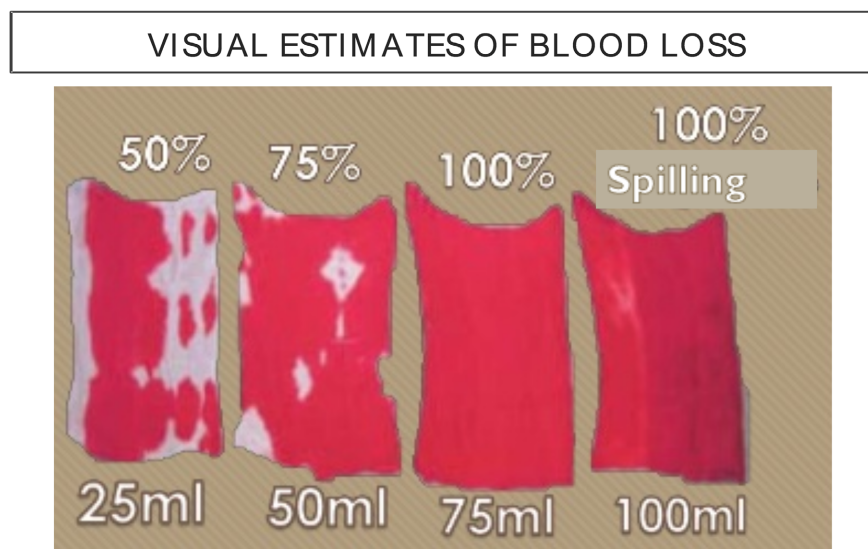
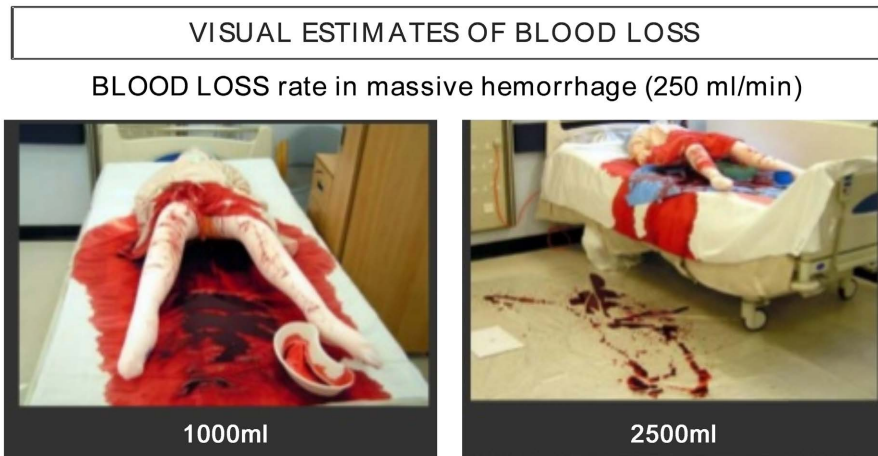


Figure 7. Active management of the third period of delivery (OMS, 2016).



Adapted de: Bose, P, Regan, ; Paterson-Brown, S. Improving the accuracy of estimated blood loss at obstetric haemorrhage using clinical reconstructions. B.D.G. An International Journal of Obstetrics & Gynaecology. Vol 113, 8, 1471-0528, 2006.

Figure 8. Visual estimates of blood loss (BOSE; REGAN, PATERSON-BROWN, 2006).



Adapted: Bose, P, Regan, J, Paterson-Brown, S Improving the accuracy of estimated blood loss at obstetric haemorrhage using clinical reconstructions. B.D.G: An International Journal of Obstetrics & Gynaecology. Vol 113, 8, 1471-0528, 2006.

**Figure 9.** Visual estimates of blood loss: massive hemorrhage (BOSE; REGAN, PATERSON-BROWN, 2006).



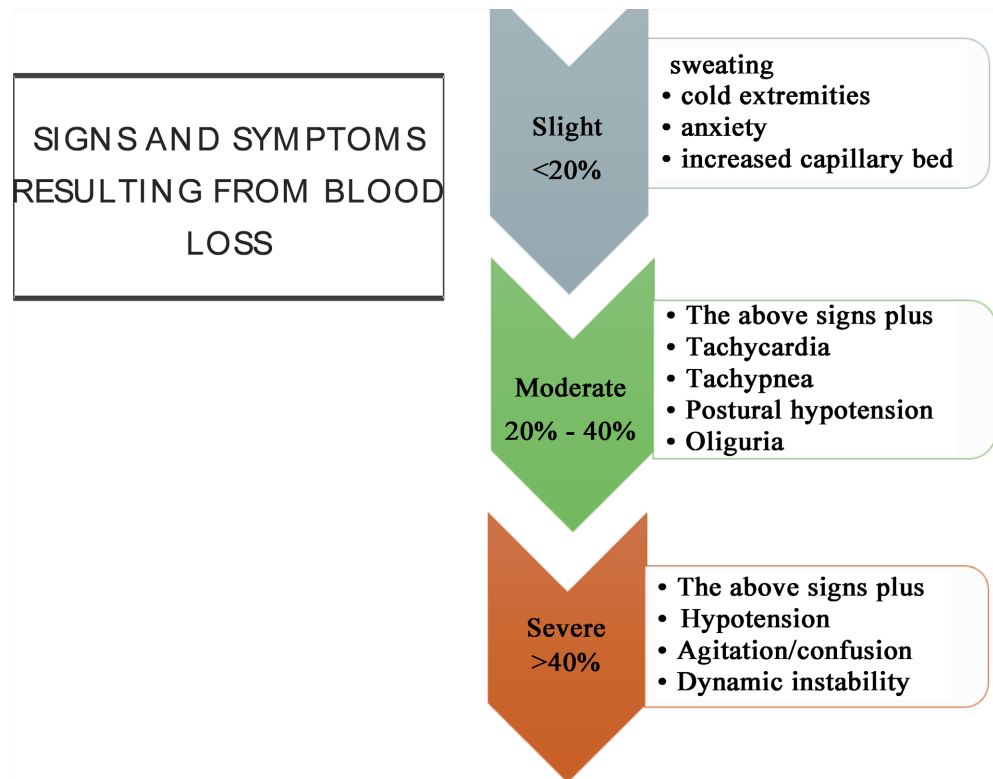
**Figure 10.** Blood loss collectors (DEGANIUS, 2016).

of such estimates. Massive PPH refers to the loss of 30%-40% of the patient's blood volume [29] [31].

In turn, the Clinical Methods are carried out through the control of vital data, important procedures for estimating volume loss, where it is noteworthy that pregnant women will present changes in vital data only after massive blood loss. This marker is a little later, but useful for the team (Figure 11).

One of the Shock Index techniques to obtain the Shock Index value is to divide the maternal heart rate (HR) by the systolic blood pressure (SBP), if the result is equal to or greater than 0.9 (or  $\geq 1$ ), it indicates risk for possible blood transfusion (Figure 12). In practice, the professional must pay attention every





**Figure 11.** Signs and symptoms resulting from blood loss (ACGO, 2017).

**CLINICAL ESTIMATION USING THE SHOCK INDEX (SI)**

**SHOCK INDEX = HEART RATE/SYSTOLIC BLOOD PRESSURE**

VALUE	INTERPRETATION	CONSIDER/SUGGEST
≥0.9	Risk of transfusion	Aggressive approach Transfer Hemotransfusion
≥1.4	Need for aggressive therapy urgently	Immediate aggressive approach Open massive transfusion protocol
≥1.7	High risk of adverse maternal outcome	Immediate aggressive approach Open massive transfusion protocol

NOTE: \*Consider positioning the NASG for all patients in hemorrhagic shock or impending shock

Source: OPAS, 2018.

**Figure 12.** Clinical estimation using the shock index (SI) (OPAS, 2018).

time he/she analyzes a heart rate greater than systolic pressure in a woman with a hemorrhagic clinical picture, as it is indicative that the bleeding condition may require transfusion [34] [40] [41]. The shock index is a simple and early marker of hemodynamic instability in cases of PPH and must be routinely included in



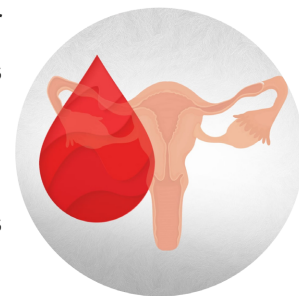
the assessment of these conditions.

Healthy mothers usually have the first signs of hypovolemic shock only after volume losses greater than 20% (Figure 13). However, anemic women with pre-eclampsia tend to tolerate such losses less and to present a more refractory hypovolemic shock; therefore, one must not wait for the traditional signs of hemodynamic instability for therapeutic management when PPH is suspected [39] [41].

The initial care of any woman with obstetric hemorrhage requires that the practitioner perform a careful physical examination and identify the source of bleeding (uterine, cervical, vaginal, periurethral, perineal, perianal, or rectal). With the identification of the anatomical site of the hemorrhage, it is possible to classify the causes of PPH, which can be simplified with the mnemonic of “4T” (Figure 14), which refers to [34] [45]:

**MASSIVE/ SEVERE OBSTETRIC HEMORRHAGE**

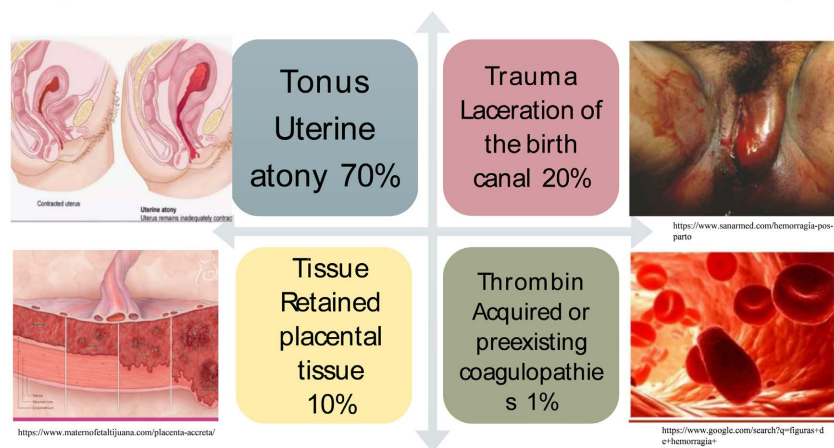
Rapid loss of 1500, 2000 ml or more when a woman becomes pale, excessive sweating; tachycardia and hypotension, and the blood she is losing is watery and does not clot.



C. MCLINTOCK and A. H. JAMES. Obstetric hemorrhage. *Journal of Thrombosis and Haemostasis*, 9: 1441–1451. 2011. DOI: 10.1111/j.1538-7836.2011.04398.x

**Figure 13.** Massive/severe obstetric hemorrhage (MCLINTOCK; JAMES, 2011).

**THE 4 TS OF THE ETIOLOGY OF PPH**



FIGO. Guidelines: prevention and treatment of postpartum hemorrhage in low-resource settings. *Int. J. Gynecol. Obstet.* v. 117, n. 2, p. 108-18, may 2012.

**Figure 14.** The 4 TS of the etiology of PPH (FIGO, 2012).

Tone, with 70% of events arising from uterine atony or inertia; Traumas in 20% of occurrences are due to uterine trauma caused by rupture, uterine inversion, lacerations in the uterine cervix and vagina; Tissues, in 10% of PPH are caused by retention of placental remains (abnormal placentation) and clots; and Thrombin in 1% of outcomes, due to congenital or acquired coagulopathies [34] [45] [46] [47].

Early diagnosis of the cause of bleeding is the most effective strategy to control hypovolemic shock; therefore, intervention must be aimed at dealing with the cause of bleeding.

Drug therapy is fundamental in the care of hemorrhage due to uterine atony, the main cause of PPH. According to the proposed protocol for the Zero Death Strategy due to PPH, treatment with Oxytocin 5 IU, slow EV (3 min) + 20 IU to 40 IU in 500 mL 0.9% SS at 250 mL/h Infusion must be started. Maintenance of 125 mL/h for 4 hours. In cases of more severe atony, evaluate maintenance of oxytocin for up to 24 hours (at a rate of 67.5 mL/h or 3 IU/hour); if there is no response, the PAHO protocol (2018) indicates using methylergometrine 0.2 mg IM, repeat in 20 minutes if necessary; in case of severe bleeding, carry out three more doses of 0.2 mg IM, every four hours, with a maximum dose of 1.0 mg in 24 hours; moreover, if there is no control response of uterine atony with the previous medications, the protocol follows with guidelines for the use of Misoprostol 800 mcg, rectally or orally [34] [45].

Start tranexamic acid as soon as the hemorrhage is diagnosed and together with uterotonics in cases of uterine atony; it is no longer recommended to wait for the failure of all uterotonic agents to start tranexamic acid within the first three hours of treatment. Repeat the application of tranexamic acid in case of maintenance of hemorrhage 30 min after the first dose or resumption of bleeding within 24 hours after the first dose [34] [45].

As non-surgical treatment for PPH due to uterine atony, bimanual uterine massage, also known as Hamilton's Maneuver, is indicated while performing the uterotonic and waiting for its effect; intrauterine tamponade balloons (IABT) are suitable to reduce the need for surgery, especially hysterectomy. In addition, they are indicated both after vaginal delivery and after cesarean section; the Non-pneumatic Anti-Shock Garment (NASG) is a neoprene garment, recommended in cases of hemodynamic instability and/or abundant bleeding with foreshadowing of hypovolemic shock [34] [40].

Surgical intervention to resolve postpartum hemorrhage will be indicated when clinical management, with the use of drugs, as well as other strategies are not effective. Compressive sutures, vascular ligatures, hysterectomy, and damage control surgery stand out; in this case, it is recommended to perform a temporary hemostasis in order to allow the recovery of hemodynamic stability, rectification of coagulation disorders and/or treatment of organ dysfunction. Each and every intervention must be carried out correctly and in due time [34] [45].

For traumatic causes such as lacerations, perform inspection and then suture.

In addition, drain bruises when necessary. Moreover, investigate the existence of uterine rupture and inversion, broad ligament or retroperitoneal bruises, especially in cases of severe trauma to the birth canal [30] [40].

The diagnosis of placental accretism must be carried out during the prenatal period, as well as the planning of its approach, since these are measures to reduce maternal morbidity and mortality due to PPH secondary to abnormal placentation. Patients with placenta previa or suspected accreta, who are admitted to maternity wards for delivery, need to have a blood reserve to deal with a possible severe puerperal hemorrhage [34] [45].

Thrombin/coagulation disorders are related to congenital or acquired coagulopathies such as Disseminated Intravascular Coagulation (DIC) and use of anticoagulants, where therapy needs to focus on the specific source of the disorder. Coagulopathies require replacement for the identified deficiency [34] [45].

#### **4. Conclusion**

Hemorrhage is a cause of maternal death that many scholars recognize as preventable. Nevertheless, as it was stated in the content of this technical essay, multiple precautions are essential. The hospital care service must have professionals in adequate number and quality for the diagnosis and intervention to occur in due time, as well as a Surgical Center and a Blood Bank. Hemorrhage prevention must occur from the prenatal period, with the recording of information on the clinical evolution of the pregnancy, all the risk factors and the degree of risk, so that there is network communication, interconnecting through a computerized system, the information of each woman. Communication and information technologies provide support for health care professionals to gain access to women's data and thus intervene as required by clinical conditions.

#### **5. Study Limitations**

This essay is based on several studies, but it is not intended for a single professional practice, because PPH requires the action of several professionals in the prevention and treatment process. In addition, as it was held in the "Test" methodology, which is not very common for health professionals, it is possible that they identify it as a limited study, when it is not, since it required an extensive technical reading.

#### **Acknowledgements**

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#### **Conflicts of Interest**

The authors declare no conflicts of interest regarding the publication of this paper.

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