**Postpartum haemorrhage management, the importance of timing.**

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**Abstract**

Postpartum haemorrhage is defined as a blood loss equal to or greater than 500 ml, which can occur from 24 hours to six weeks after delivery. It is a critical event with a rapid and devastating evolution, which can quickly lead to maternal shock and death.

Many efforts have been made to create international and multisectoral guidelines that allow to face an event that represents the cause of about a quarter of the maternal deaths. It is crucial to create a team that is able to act promptly in accordance with shared protocols. The availability of shared guidelines and protocols, the organization of periodic midwifery simulations and teamwork training are part of the fundamental initiatives that can promote the safety of perinatal care.

The purpose of this document is to give clinicians the tools to minimize the risks associated with inadequate management of haemorrhagic emergency, avoiding the risk of "too little or too late" and giving patients maximum safety.

**Key words:** Postpartum Hemorrhage, Obstetric Labor Complications, Pregnancy Complications, Shock Hemorrhagic, Blood Coagulation Disorders, Uterine Atony**Introduction**

Obstetric haemorrhage remains one of the major causes of maternal mortality in both developing and industrialized countries, representing a clinically and socially significant problem. Given the critical nature of the problem it is particularly important to effectively manage the clinical risk and respond aggressively at the beginning of a potentially dramatic event. The creation of a multidisciplinary team trained to act quickly to identify and treat the causes of haemorrhage according to shared protocols remains crucial. The availability of shared guidelines and protocols, the organization of periodic midwifery simulations and teamwork training are part of the fundamental initiatives that can promote the safety of perinatal care. The purpose of this document is to give clinicians the tools to minimize the risks associated with inadequate management of haemorrhagic emergency, avoiding the risk of "too little or too late" and giving patients maximum safety. The protocol is intended to provide all the specialists involved with clear guidelines on prophylaxis and therapy, implemented in compliance with national and international literature as well as the regulations in force in our Country.

**Issue Description**

According to the World Health Organization, postpartum haemorrhage (PPH) causes about a quarter of the maternal deaths each year[[1]](#endnote-1). In most cases, deaths occur in the first 24/48 hours after delivery and despite the significant improvements in the last three years, 66% of deaths due to PPH are still due to substandard care, according to the latest report of the Center for Maternal and Child Inquiry on maternal mortality[[2]](#endnote-2). In addition, numerous studies have shown, in industrialized countries, an increase in the incidence of postpartum haemorrhage in recent years[[3]](#endnote-3), reflecting in part the changes in obstetrical practice of the last decade (for example, the increase in the rate of caesarean sections or the increased trend towards practice of spontaneous delivery after caesarean section).

**Definition**

Post-partum haemorrhage is defined as a blood loss equal to or greater than 500 ml, occurring early in the first 24 hours after delivery (Primary post-partum haemorrhage) or up to six weeks postpartum (Secondary post-haemorrhage partum), and which, if not identified and treated, can quickly lead to mother shock and death[[4]](#endnote-4). We talk about **minor PPH** if the estimated blood loss is between 500 and 1000 ml, but if the loss exceeds 1000 ml, it is defined as **major PPH**, which can be defined as **controlled** in the case of controlled blood loss, with impairment of maternal clinical conditions requiring thorough monitoring, or massive or **persistent PPH** in case of blood loss over 1,500 ml and/or signs of clinical shock and/or transfusion of 4 or more concentrated emetic units, with impairment of maternal conditions which poses an immediate threat to the woman's life[[5]](#endnote-5) [[6]](#endnote-6).

The pregnant woman undergoes a series of physiological modifications that allow her to withstand substantial blood loss effectively, and is generally a young patient with good heart reserve; this condition, associated with the difficulty of correctly and timely estimation of blood loss, can lead to an underestimation of the problem. It is always important to consider that significant blood loss, > 2000 ml, can induce a rapidly worsening condition, with an inexorable decrease in blood pressure and signs and symptoms of severe shock (paleness, agitation, oliguria, followed by mood and collapse).

**Etiology**

There are many alterations that can lead to a PPH, but the main causes of postpartum haemorrhage are: uterine atony (90%), cervical and/or perineal lacerations (5%), placental fragments retention (4%), coagulation deficiencies or alterations, uterine inversion, uterine rupture. The accreted placenta is nowadays an important cause of primary haemorrhage due to the increase in the frequency of caesarean section[[7]](#endnote-7). Attention must also be paid to the assessment of possible clotting disorders and the prevention and treatment of anaemia. According to the authors there are other important risk factors to be considered: multiple pregnancy, previous PPH, preeclampsia, birth weight above 4000 g, failure to progression of the second stage, prolongation of the third stage of labour, episiotomy 7 [[8]](#endnote-8).

 In clinical practice, the multiple causes of PPH are briefly synthesized through the formula "4T"[[9]](#endnote-9):

• Tone (uterine atony);

• Tissue (placenta-related problems: placental, placental implants, etc.);

• Trauma (uterine rupture, lacerations, uterine inversion);

• Thrombin (in relation to clotting disorders).

**PPH Management Protocol**

Crucial in postpartum haemorrhage management is prophylaxis and, eventually, therapy of anaemia or congenital clotting disorders, treated in collaboration with the haematologist.

The PPH treatment hubs are:

1. maintenance of uterine contractility, obtained through physical or pharmacological means.

2. maintaining and supporting cardio vascular parameters with appropriate rehydration and volume expansion.

3. Prevention or therapy of haemorrhagic coagulopathy established[[10]](#endnote-10).

Management in the "golden hour" is particular important to increase patient survival.

A - Blood loss between 500 and 1000 ml without signs of hemodynamic imbalance

* Ask for the collaboration of all paramedical and medical figures, alert the Transfusion Centre, the operating room and where is needed interventionist radiology.
* Estimate the amount of bleeding and monitor vital parameters every 10 minutes at least initially on pre-set graphics cards.
* Send request for availability of the hemo-component to the Transfusion Centre.
* Increase prophylactic oxytocin at therapeutic dose (20 UI in 500 ml physiological in two hours). If after 20 minutes there is no effect, go to second line uterotonic agents (ergometrine: 2 vials 0.2 mg IM, sulprostone: 1 vial 0.50 mg in 250 ml, 0.1 to 0.4 mg / H up to a maximum of 1.5 mg in 24 hours)
* Administer tranexamic acid 30 mg / kg.
* Effectuate a Type&Screen test, recurrent blood count and coagulation tests (fibrinogen by Klaus method)
* Ensure two large calibre venous accesses.
* Avoid or correct hypothermia, acidosis, and desaturation.
* Look for the origin of bleeding through the rule of the four T:
* TONO (evaluation and measures for atony / uterine inversion: bimanual uterine compression, endocavitary uterine infusion by hydrostatic balloon catheter and uterotone drug use). In the absence of the hydrostatic balloon, it is possible to use a latex glove or a condom with good results, as suggested by the FIGO 2012 guidelines. It is important to note that gauze cracking is not recommended today).
* TISSUE (exploration and evacuation of the uterus).
* TRAUMA (repairing vaginal tears, cervix and / or uterine tears).
* TROMBINE (evaluate and correct any coagulatory defect, if available with Tromboelastometric / Graphic Evaluation via POC monitoring).
* Targeted transfusion therapy: concentrate erythrocytes to maintain haematocrit between 21 and 27% and haemoglobin between 7 and 9 g / l.
* Evaluate fibrinogen infusion 30-50 mg / kg or fresh concentrate plasma 20-30 ml / kg if fibrinogen is below 200 mg/dl

B - Blood loss greater than 1000 ml, hemodynamically unstable patient

Do all the operations under point A

* Reintegrate circulating volume with crystalloids or, if necessary, colloid by evaluating sensory, diuresis, lactate and excess bases level.
* Maintain transfusion therapy and haemostatic support:
* Transfusion in the presence of PPH is performed by clinical indication and not on the basis of information derived from haematocrit examinations. Keep in mind that a concentrated red blood cell bag contains 280 ml and increases the haematocrit of 2-3%.
* it is advisable to use a plasma sachet and platelets for each blood bag administered, pending laboratory values.
* For the constitution of the package to be transfused, depending on the availability of the hemocomponents, the following alternatives are suggested: 4 concentrate erythrocytes: 4 single dose donor or industrial plasma units or 4 concentrate erythrocytes: 2 plasma units from apheresis.
* For platelet concentrates, it is recommended to use 1 unit from apheresis or from buffy coat every 8 unit of concentrate erythrocytes.

It is worth emphasizing the suggestion of the alternatives mentioned above, whose application may vary depending on the different realities present on the territory and the availability of the components and monitoring tools. It is also desirable that each hospital prepares a mass transfusion protocol to be activated in case of critical hemorrhage with signs of hemodynamic instability and hypoperfusion.

* When the result of the haemocoagulatory examinations is available, if the PTTr or INR is> 1.5, it is necessary to infuse the plasma at the initial dose of 20 ml/kg with the concentrate erythrocytes, up to 30 ml/kg in case of persistent or ingraining coagulopathy.
* Use heating and infusion devices.
* Always guarantee basic conditions: haematocrit> 21%, temperature> 34 ° C, pH> 7.20, Ca ++> 1 mmol / L.
* Cases no responder to the aforementioned therapies require a conservative surgical-intervention approach: compression sutures, uterine tamponation with hydrostatic balloon, association of devalculatory sutures of uterine, ovarian or internal ileus arteries, selective embolization of pelvic vessels.
* If no response to the therapy, use rFVIIa (60-90 μg / kg bolus repeated within 15-30 min), as an extrema ratio, before using hysterectomy. Keep in mind that rFVIIa to function requires: normal pH, temperature, adequate levels of platelets (> 50,000 / mm3) and fibrinogen (> 200 mg / dL).
* If no response occurs, proceed to subtotal or total hysterectomy.

**Conclusions**

In conclusion, we want to emphasize the importance of the rapidity of action and the management organization of the obstetric emergency. Given the dramatic nature of the haemorrhagic event in the post partum, it is important that all women with known risk of uterine bleeding should be directed to a hospital equipped with a transfusion centre and laboratory analysis. It is imperative to never overlook the assessment of blood loss in order not to delay the beginning of care procedures, which, if performed at the first hour, golden hour, ensure to the woman a better chance of survival. It should always be kept in mind that one of the main causes of death for PPH in Western countries is the delay in blood transfusion. Last but not least, it is important to emphasize the importance of creating a dedicated and well-trained team, even through simulation scenarios, who can rapidly implement the previously shared guidelines and protocols.

**Key Points**

* Given the rapid and devastating evolution of postpartum hemorrhage, it is critical to act quickly and aggressively in the first hour to avoid maternal shock.
* To create an efficient team, sharing management protocols and periodic simulation are of paramount importance
* The multiple causes of PPH are briefly synthesized through the formula "4T": Tone (uterine atony); Tissue (placenta-related problems: placental, placental implants, etc.); Trauma (uterine rupture, lacerations, uterine inversion); Thrombin (in relation to clotting disorders).
* The key points for PPH treatment are: maintenance of uterine contractility, maintaining and supporting cardio vascular parameters, prevention or therapy of haemorrhagic coagulopathy.

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