Vol. 22, No. 2 June 2022

BLOOD BULLETIN

Obstetric Hemorrhage—Are You Prepared?

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The authors disclose no conflicts.

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KEY POINTS

- Identifying those at risk for postpartum hemorrhage.
- Communication and early intervention using standardized assessment tools and protocols with a coordinated team-based approach reducesmaternal mortality and morbidity.
- Hospitals should develop and drill using multi-disciplinary protocols and policies for obstetric hemorrhage.
- Primary tools include uterotonic agents, interventional procedures, blood product transfusion, and/or hysterectomy within a coordinated plan.

INTRODUCTION

Obstetric hemorrhage (OH) is responsible for 4.6 percent of all US maternal deaths and is a leading cause of major medical and surgical morbidity, including organ failure from hypoperfusion, disseminated intravascular coagulation (DIC), and hysterectomy.[1] Worldwide, OH is responsible for about 100,000 deaths annually. Most deaths occur soon after giving birth and almost all (99 percent) occur in low-income and middle-income countries.[2] Primary postpartum hemorrhage is defined by the American College of Obstetricians and Gynecologists as a cumulative blood loss of greater than or equal to 1,000 mL accompanied by signs or symptoms of hypovolemia within 24 hours after birth.[3] The Royal College of Obstetricians and Gynaecologists defines it as bleeding of ≥500 mL in the first 24 hours of childbirth.[4] It is subdivided into minor, loss of 500-1,000 mL blood and major, loss of more than 1,000 mL.4 Secondary postpartum hemorrhage is abnormal or very heavy bleeding between 24 hours and 12 weeks post-delivery.[4]

RISK FACTORS FOR OH

Most common causes of OH include uterine atony (approximately 70 percent of cases), obstetrical lacerations (~ 20 percent), retained placental tissue (~ 10 percent), and clotting factor deficiencies (<1 percent).[5] Post-delivery causes include retained products of conception, infection, and coagulation defects. Patients presenting with placental abnormalities (e.g., placenta previa or accreta spectrum) or abnormalities of coagulation (e.g., eclampsia, HELLP (hemolysis, elevated liver enzymes, low platelets syndrome)) are at elevated risk for OH. Lack of access to prenatal care place women at higher risk for maternal complications including OH.

MITIGATION OF RISK FACTORS FOR OH

Use of a standardized hemorrhage risk assessment tool and communication of identified/changing risk factors enhances early recognition and appropriate intervention. Best practice includes a hemorrhage risk assessment at prenatal visits and upon admission for delivery. Risk can increase during active labor due to prolonged labor, cesarean delivery, or use of oxytocin for more than 18 hours.[5] Despite screening, up to 20 percent of OH occur in women with no previously identified risk factors.

Ongoing clinical assessment and blood loss are key for early identification of OH. Physiologic changes during pregnancy result in a hypervolemic state. Increased blood volume may mask signs of hypovolemia (e.g., tachycardia, hypotension). Establishing early warning criteria for vital sign changes can aid clinical assessment. Quantitative blood loss (QBL) provides more objective clinical data than 'eyeball' estimates. Visual estimation consistently underestimates large volume blood loss by 33-50 percent versus quantitative measurement.[6] Use of QBL should continue throughout the immediate postpartum period until hemostasis has been achieved.

MANAGEMENT OF OH

The optimal management of OH depends on an observant nursing staff with protocols for the measurement of QBL and a competent, decisive obstetrical team. The primary tools for management of OH include uterotonic agents, followed in more severe cases with intrauterine balloon tamponade, uterine artery ligation, and/or hysterectomy depending on the availability of interventional radiology services. Blood products will be needed in the more severe cases, with specific components transfused based on the coagulation status of the patient. Uterine atony does not by itself cause coagulopathy, and most OB patients exhibit a pre-existing pro-coagulant state.

Despite some uncertainty around recommended ratios of blood product transfusion in OH, expedited ordering and delivery of emergency blood products is critical in OH protocols. Coagulopathy can either precipitate or complicate OH, and requires careful laboratory assessment.[7] If available, point-of-care coagulation testing may be performed for detection of hypofibrinogenemia and/or hyperfibrinolysis. When the placenta has been disrupted and releases tissue factor, DIC may result. DIC generates thrombin, rapidly depleting fibrinogen more rapidly than other coagulation

factors. Cryoprecipitate (or fibrinogen concentrate) is indicated when this occurs and may assist with rapid cessation of bleeding, Fibrinogen levels should be maintained above 200 mg/dL in OH.[1] Tranexamic acid administered within 3 hours of hemorrhage has become a routine part of the OH toolkit. As pregnancy is a prothrombotic state, one should use caution with off-label use of agents such as Factor VIIa. The World Health Organization guidelines do not include such agents for the management of OH; California Maternal Quality Care Collaborative (CMQCC) guidelines recommend its consideration only as a last resort.[8,9] When available, the use of blood recovery and reinfusion should also be considered to reduce exposure to allogeneic red cells.[10] Once OH is controlled, restrictive transfusion has been demonstrated to have equivalent outcomes.[7]

Unlike the trauma setting, there is limited experience with the use of low titer group O whole blood (which is typically Rh positive) for the management of OH in the hospital setting. As 55 percent of patients are not group O, the optimal use of the community blood supply entails switching the patient to ABO-type specific support as soon as possible with emphasis on providing blood components in a timely manner. There is also no proven benefit of using 1:1 ratio in patients with OH and providers need to rely on clinical judgement when to activate.[3] Fortunately, a practiced clinical team can gain control of the OH in the majority of cases before it becomes life-threatening.

PLANNING, PREPAREDNESS, AND PREVENTION

Hospitals should plan, prepare, and take steps to minimize risks of OH. Early recognition and intervention improve outcomes. A standardized approach to OH includes a clearly defined, staged checklist of appropriate actions including evaluation for risk of OH, as well as response to emergency situations to help improve patient outcomes. All clinical, laboratory, and support staff should have access and be familiar with the massive transfusion protocol for OH by conducting training and practice drills, ideally in the delivery room but also including transfusion service activity. Readiness and preparation ensure equipment, supplies, and processes are in place for use during an impending OH situation. A rigorous review process of each case can improve response and future care for women experiencing OH.[8] Key elements of patient safety bundles identified in the CMQCC Quality Improvement Toolkit for obstetric hemorrhage include:[8]

- Readiness
  - o Implementing and sustaining maternal quality safety and performance improvement for OH;
  - o OH risk factor assessment, including placenta accreta spectrum and inherited bleeding disorders;
  - o Planning for patients who may decline blood and blood products;
  - o OH carts, kits, and trays; and preparedness considerations for small and low-resource hospitals; and
  - o OH simulations and drills, and use of the electronic health record to improve management of OH.
- Recognition
  - o Active management of the third stage of labor (birth to placenta expulsion);
  - o Definition, early recognition, and rapid response for OH using triggers; and
  - o Objective QBL measurement of cumulative blood loss (not estimates).
- Response
  - o Organized treatment protocols for OH best practices, including medications, blood product replacement, procedures such as uterine tamponade for OH and uterine artery occlusion; and
  - o Support programs for patients, families, and staff for all significant hemorrhages.
- Reporting/systems learning
  - o Debriefs and multidisciplinary case review guidelines; and
  - o Use of outcome metrics for hemorrhage-related quality improvement projects.

CONCLUSION

In summary, it is imperative that hospitals have a policy or plan in place for the management of OH. OH remains a clinically significant cause of maternal complications and death. Early identification of patients who are at risk for OH, routine active management during the third stage of labor, quantitative assessment of blood loss, appropriate patient monitoring, management of OH, and heightened preparedness by having drills are key elements to optimize care and improve outcomes.

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