RECOGNITION

DEFINITION, EARLY RECOGNITION AND RAPID RESPONSE USING TRIGGERS

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EXECUTIVE SUMMARY

- Early recognition is critical for early intervention and prevention of progression to severe hemorrhage.
- Initial signs and symptoms of blood loss can be difficult to detect due to compensatory responses, increased circulating volume in pregnant women, and circulatory changes that occur with delivery of the placenta.
- Changes in laboratory values such as hemoglobin and hematocrit take too long to be useful in real-time determination of severity of blood loss.
- Cumulative blood loss of 500 mL in a vaginal birth should alert the clinician to the need for increased surveillance, and rapid intervention is indicated if bleeding continues or changes in clinical signs are detected.
- The revised ACOG definition of obstetric hemorrhage is cumulative EBL > 1,000 mL for either vaginal or cesarean birth with enhanced surveillance and early interventions, as needed, for 500-1,000 mL.

BACKGROUND

The risk of obstetric hemorrhage is present in every pregnancy. Early identification of abnormal blood loss creates the potential to intervene and prevent major blood loss.[1] Early intervention requires: 1) recognition of risk factors leading to heightened surveillance; 2) appropriate preparation; 3) a standardized approach to accurately determine cumulative blood loss; and 4) recognition of clinical findings suggestive of or indicating hypovolemia. To have the best chance of preventing the progression of heavy bleeding to massive hemorrhage which carries the risk of more devastating sequelae, all four areas need to be integrated into care of the woman giving birth.

A comprehensive obstetric hemorrhage protocol should include mechanisms for risk identification, early recognition and rapid response as well as treatment. Challenges for

risk identification and early recognition are due in part to the broad range of clinical risk factors for obstetric hemorrhage, lack of standardized methods for determining blood loss and lack of a "gold standard" for defining obstetric and especially postpartum hemorrhage.[2-6] This document focuses on: 1) providing a consensus definition of significant blood loss in pregnant and postpartum women; 2) outlining clinical signs of hypovolemia to quickly identify and respond to heavy bleeding. Identification of risk factors and stratification is found elsewhere in this toolkit. (See Risk Factor Assessment article, pg. 75.)

TRIGGER: DEFINITION OF SIGNIFICANT BLOOD LOSS

Whether hemorrhage occurs prior to birth, early postpartum (within first 24 hours) or late postpartum (≥ 24 hours postpartum), no single definition of hemorrhage exists that is widely accepted or useful alone. A commonly used definition of > 500 mL for a vaginal birth and > 1,000 mL for a Cesarean birth is obviously inconsistent and not clearly related to morbidity, but may be useful as an alarm trigger. In healthy women, blood loss is generally tolerated without vital sign changes until the total loss exceeds 1,000 mL. Traditional definitions have been based on estimated blood loss, changes in measured blood values and clinical signs. Problems exist with all of these quantifiers. Estimation of blood loss has been shown to be inaccurate particularly when blood loss is excessive.[5,7] Changes in blood values such as hemoglobin level or hematocrit are often delayed following hemorrhage and therefore are not helpful with early recognition and treatment.[8] Approximately four hours after acute blood loss changes in these measured laboratory values can be seen, with the peak change occurring as late as 48-72 hours after birth.[8] Moreover, changes in vital signs can be subtle in the initial stages of hemorrhage based on a young healthy person's ability to compensate for loss of volume. This is particularly true during pregnancy when increased circulating blood volume may further conceal loss.[3,4]

Different approaches to measuring standard blood loss during birth have led to different estimates of normal. The most widely accepted values are those of Pritchard, et al. They measured blood loss following vaginal birth, repeat cesarean birth and repeat cesarean with hysterectomy using photometry. Following vaginal birth the majority of women had a blood loss less than 500 mL but 5% lost > 1000 mL. Around 60% of women lost 500-1000 mL after repeat cesarean birth and approximately 50% of women lost over 2500 mL following repeat cesarean with hysterectomy.[3,9]

In light of the above considerations, ACOG (as part of the reVITALize project) has recently endorsed a revised definition:

Cumulative blood loss of ≥ 1000 mL OR blood loss accompanied by sign/symptoms of hypovolemia within 24 hours following the birth process (Cumulative blood loss of 500-999 mL alone should trigger increased supervision and potential interventions as clinically indicated).

TRIGGER: CLINICAL SIGNS OF HYPOVOLEMIA

In response to blood loss several compensatory mechanisms work to move venous blood into the central circulation, pump blood more forcefully, and redirect blood to essential organs.[10] In a state of health, the body can successfully compensate for as much as 20-25% blood loss before prominent clinical signs of hypovolemia are present. Typical signs of blood loss or hypovolemia include elevated heart rate and respiratory rate, decrease in blood pressure, drop in urine output, dizziness, altered level of consciousness and pallor. Table 1 below correlates clinical signs with the amount of blood loss. Note that many clinical signs do not occur until the blood loss reaches very high levels.

Table 1: Clinical Signs of Hypovolemia

Amount of Blood Loss	Clinical Signs
1000 mL	Slight change in blood pressure, heart rate normal, palpitations, respiratory rate normal, dizziness, normal urine output
1500 mL	Narrowed pulse pressure*, heart rate over 100, respiratory rate 20-30, diaphoretic, weak, urine output 20-30 mL/hr
2000 mL	Hypotension, narrowed pulse pressure, heart rate over 120, respiratory rate 30-40, pale, extremities cool, restlessness, urine output 5-15 mL/hr
≥ 2500 mL	Profound hypotension, heart rate over 140, respiratory rate over 40, slight urine output or anuria

*Pulse pressure is the difference between the systolic and diastolic blood pressure. With hemorrhage a rise in the diastolic pressure reflects vasoconstriction and narrows the pulse pressure.[4,11]

When risk factors for hemorrhage are present or hemorrhage is suspected, careful and accurate assessment of the clinical parameters above is essential to detect signs of decompensation. When medical conditions exist such as anemia or preeclampsia, signs of decompensation can occur with smaller amounts of blood loss. Signs of hypovolemia

may only be clearly apparent when the body is no longer able to successfully compensate, therefore response needs to be rapid, particularly during pregnancy.

The National Health System of the United Kingdom has published a detailed "Obstetric Early Warning Chart" that assists with recognition of signs of decompensation. The chart provides a colored checklist for vital status and a guide for intervention when a patient "triggers" in one red or two yellow scores at any one time and makes use of both numeric and visual clues for care providers (See Best Practice article "Blood Loss: Clinical Techniques for Ongoing Quantitative Measurement").[12] While the overall concept is quite attractive, the exact numbers for the triggers are currently undergoing validation in a number of American centers.

RECOMMENDATIONS

Aggressive treatment of women at clinical trigger points has the potential to limit the overall blood loss and prevent hemorrhage complications such as Disseminated Intravascular Coagulation (DIC). To address this CMQCC recommends the following:

1. Use the following as **alert and action triggers** for obstetric hemorrhage: Cumulative blood loss greater than 500 mL for vaginal birth and greater than 1000 mL for cesarean birth warrants heightened surveillance for continued bleeding (these would be considered alert triggers), and in the presence of **ongoing bleeding** or any evidence of vital sign changes additional steps (Stage1) should be considered (these would be considered action triggers).

2. Use the following as a standard clinical definition of obstetric hemorrhage for **safety/quality monitoring**: Blood loss of ≥ 1000 mL **OR** blood loss accompanied by signs/symptoms of hypovolemia within 24 hours following birth processes including intrapartum blood loss.[6,8]

3. Birthing facilities adopt and maintain protocols addressing:

    a) Objective Quantification of blood loss at all births (See Best Practice article "Cumulative, Quantitative Assessment of Blood Loss", pg. 72).

    b) Management of all women with cumulative blood loss ≥ 500 mL and continued bleeding (Refer to Obstetric Hemorrhage Emergency Management Plan -Checklist Format, page 14.)

        ii. Clinical Triggers: surveillance and intervention:
            1. Heart Rate ≥ 110
            2. Blood Pressure ≤ 85/45 (> 15% drop)
            3. Oxygen Saturation < 95%

c) It is the responsibility and authority of all licensed health care team members, including RNs, to call for help and activate maternal hemorrhage response as clinically indicated.

4. Hospitals and other health care organizations debrief and review cases for all women with cumulative blood loss > 1000 mL.

5. The Joint Commission and others are now (January 2014) recommending that every obstetric hemorrhage case that requires 4 or more units of blood products have an intensive case review (Root Cause Analysis) to look for improvement opportunities.

EVIDENCE GRADING

Level of Evidence: II 2. One prospective cohort study; expert consensus opinion (WHO, NHS)

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