Safety Action Series

Quantifying Blood Loss
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Maternal Fetal Medicine Specialist and Physician Informaticist
Disclosures

- Renée Byfield, MS, RN, FNP, C-EFM, has no conflicts of interest or relevant financial relationships.

- David Lagrew, MD, FACOG, has no conflicts of interest or relevant financial relationships.
Objectives

• Discuss quantification of blood loss (QBL) for EVERY woman who gives birth.
• Explore the evidence related to QBL versus visual estimation of blood loss (EBL).
• Identify the benefits of successful QBL including early recognition of potentially life-threatening hemorrhage.
• Discuss methods used to perform, calculate and document QBL.
Magnitude of the Problem

• Failure to recognize excessive blood loss during childbirth is a leading cause of maternal morbidity and mortality. The Joint Commission. (2010)

• Women die from obstetric hemorrhage because of a lack of early and effective interventions. Berg et al. (2005); Della Torre et al. (2011)


“Obstetrics is a bloody business...”
Cunningham et al. (2001). Williams Obstetrics, 21st Ed
Hemorrhage Guidelines: Staged Responses

**Pre-Admission:** All patients - Assess Risk

**Stage 0:** All births - Routine Measures

**Stage 1:** QBL > 500 ml Vag or 1000 ml CS or VS unstable with continued bleeding

**Stage 2:** QBL 1000-1500 ml with continued bleeding

**Stage 3:** QBL exceeds 1500 ml
Recommendations for QBL

• AWHONN Standard Recommendation
  – All births

• CMQCC Standard Recommendation
  – All births

• National Maternal Health Initiative 2013
  – One of 7 safety objectives
Quantification of Maternal Blood Loss

For **EVERY** birth, begin QBL immediately after infant’s birth and continue ongoing measurement until bleeding is stable. Usually about 2 – 4 hours postpartum.

Continue QBL for PPH Stages 2 & 3.

Establish blood loss thresholds to facilitate early recognition and guide life saving interventions.
Inaccuracy of Visual Estimation

EBL is common practice in obstetrics, however its inaccuracy has been well established:

- Research from the 1960s have shown errors of both underestimation and overestimation Pritchard, J. (1965); Brant, H. A. (1967)
- With training, clinicians initially improved accuracy with visual estimation but experienced skill decay Dildy et al., (2004) within 9 months of training completion Toledo et al., (2007)
- Provider specialty, age, or years of experience are all unrelated to accuracy of visual EBL Al Kadri et al., (2011); Toledo et al., (2007)

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Implications of Inaccurate Evaluation

• Many clinicians rely on the flawed, imprecise method of visual estimation.

• Accurate and timely clinician recognition of excessive blood loss is crucial because it leads to the decision of when to initiate blood transfusions and other maternal resuscitative efforts.

• Inaccurate postpartum blood loss volume measurement has the following implications:
  – **Overestimation** can lead to costly, unnecessary treatments like transfusions
  – **Underestimation** can lead to the delay of life saving hemorrhage interventions
Quantification of Blood Loss (QBL) Methods

- Methods to quantify blood loss, such as weighing, are significantly more accurate than EBL.
  - AI Kadri et al., (2011)

- The use of a calibrated drape had an error rate of less than 15%.
  - Toledo et al., (2007)
Benefits of QBL

• QBL reduces the likelihood that clinicians will underestimate the volume of blood loss and delay early recognition and treatment.

• Improves maternal outcomes
  – Improves prompt recognition and response to hemorrhage
  – Decreases *denial* of blood loss and *delay* of live saving interventions
Transitioning from EBL to QBL

Estimation
Subjective assessment

- Subjective statements
  - “She’s bleeding a lot.”
  - “She saturated 2 pads in 1 hr.”
- How do you interpret this information?
- Lack of clarity affects the team response.
- Terms like scant, small, minimal, moderate, heavy, or excessive for peripad assessment are subjective and vary from clinician to clinician.

Quantification
Objective assessment

- Objective statements
  - “She has a 1200 ml QBL.”
  - “She has a Stage 2 PPH.”
- Reporting the QBL gives the team a more accurate sense of how the patient is doing.
- Basing care on objective information will likely improve communication, team situation awareness and prompt an early team response.


“We’ve always estimated blood loss . . .”
Time to Change “Strong But Wrong” Routines

A clinician’s decisions of when and if resuscitative efforts should begin and to notify other team members of hemorrhage are based on the flawed, imprecise, unreliable method of visual estimation.

Food for Thought

• As health care professionals, we rely on scientific, objective data for other important practice issues.

• Why is the objective data that quantifying blood loss provides less important when a woman’s life is at stake?
Methods To Quantify Blood Loss

- Weight
- Direct measurement
Methods of QBL: Weight

- Use scales to weight all blood-saturated items (e.g., laps, chux, cloth pads, peripads) and clots.
- Standardize products used for deliveries and determine their dry weights.
- Create a laminated list of dry weights of items used during birth that may become blood soaked. Attach to every scale.

**TIP:**
A practical way of measuring blood in laps is to weigh them in groups of 5.

Converting Grams to Milliliters

Calculate the gram weight and convert to milliliters.

Grams (a unit of mass) converted to Milliliters (a unit of volume):

One gram = One milliliter
Methods of QBL: Direct Measurement

Directly measure blood loss by using:

- Graduated suction canisters (Figure 1)
- Under-buttocks and OR drapes with calibrated pouches (Figure 2)

Used with permission: Beverly VanderWal, RNC-OB, MN, Long Beach, Memorial Medical Center.

How to Calculate Total QBL

**Weight**

\[
\text{Weight} = (\text{Weight of Wet items (grams)}) - (\text{Weight of Dry items (grams)}) + (\text{Weight of Blood clots (grams)}) = \text{Blood loss amount via weighing (ml)}
\]

**Direct Measurement**

\[
\text{Total Fluid volume (ml) (canister or under-buttocks drape)} - \text{Total non-blood Fluid volume (ml) (e.g., urine, feces, irrigants)} = \text{Blood loss amount via measurement (ml)}
\]

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Calculating QBL at Surgery

Routine Two Step Quantification of Blood Loss at CS

1. Suctioned blood
   a. Between delivery of infant and placenta;
      i. OB suctions drape of amniotic fluid
      ii. Scrub staff directs Circulator to change suction tubing to second canister
      iii. May omit switch to new canister if minimal amniotic fluid (patient is post AROM/SROM, in labor)
   b. Circulator records volume in second canister in spreadsheet calculator/EPIC calculator
      i. Record before irrigation used OR
      ii. If irrigation used and suctioned, Scrub staff communicates amount to Circulator to be subtracted from canister
      iii. Consider omitting irrigation use during routine cesarean section

2. Lap sponges
   a. During case, bloody lap sponges passed off scrub table by Scrub staff
   b. Circulator places in hanging lap sleeve bags (5 sponges/sleeve)
   c. Circulator weighs bloody sponges and lap sleeve bags all together near end of case (sponges left in sleeves)
   d. Total weight, # sponges weighed, # hanging sleeves weighed, entered in spreadsheet calculator/EPIC calculator

Spreadsheet App
Built into EMR
## QBL Calculator in MC*21 Delivery Summary

### Cesarean Section Blood Loss
- Cannister Volume (blood volume only) [Input Field]
- Total Weight: Laps + sleeves [Input Field]
- Lap sleeves used [Input Field]
- # of Laps used [Input Field]
- # of Chux used [Input Field]
- Additional source of blood loss volume [Input Field]

Add "Total Blood Loss Calculated" below to "Total Delivery Blood Loss" section (for I&O) [Input Field]

**Total Blood Loss Calculated** [Input Field]

### Vaginal Delivery Blood Loss

Method of quantification:
- EBL - Visual estimate only
- QBL - Direct measure
- OBL - Weight of blood soaked items

### Total Delivery Blood Loss (Vaginal or C/S)

EBL/CBL during delivery (mL) [Input Field]
QBL is More Accurate

• The goal is not a “perfect, precise” number.
• There may be some discrepancies from mixing with amniotic fluid, urine, irrigant, etc.
• However it is more accurate to do some measurements than to rely solely on visual estimates.
Vaginal and Cesarean Births: Keep it Simple

**For Vaginal Births**

Begin right after the infant’s birth:

- Note amniotic fluid, urine, etc. in the under-buttocks bag prior to birth. (Applicable if SROM occurs close to birth or amnioinfusion performed.)

- RN looks at the bag as soon as MD/CNM has completed the delivery to communicate the amount of blood in the calibrated drape as QBL.

**For Cesarean Births**

Begin when the amniotic membranes are ruptured (unless woman is post AROM/SROM) or after the infant is born:

- Start by using two suction canisters:
  - One for amniotic fluid and second for QBL.
  - Switch suction tubing to the QBL canister prior to delivery of placenta (not applicable if ROM prior to surgery) and document the canister volume as QBL prior to irrigation.

- Weigh bloody sponges/sponge sleeves with last laps, “close” QBL and record amount after fascia closed and prior to skin closure. RN communicates and documents the total ml amount of blood as QBL.
Where Do We Begin . . .

- Start by teaching the process that is common for most cases.
- Have team meeting to determine how to manage e.g., the STAT cesarean.
- Begin with vaginal births then scheduled cesareans.
- Be willing to modify and tweak the process to meet the particular logistics of your facility.
Quantification Tips

- Measure amount of fluids after birth of the infant. The majority of the bleeding is after the placenta is delivered.
- Keep track of any extra fluids added e.g. irrigants, urine, feces.
- Pre-determine the dry weights of items regularly used and have these weights readily available.
- Adjust electronic medical records to perform the math.
- Need ready access to measuring devices such as scales, suction canisters, etc.
Documentation of QBL

- QBL is part of ongoing postpartum recovery documentation
- Maintain real time, vigilant surveillance of blood loss
- QBL is entered at each peripad or chux change but items may be grouped together e.g. laps
- Ensure that blood loss is totaled and communicated to other team members at regular intervals

- Document QBL at birth then ongoing QBL
- Adjust electronic medical records to perform the math
- Continue documentation until bleeding slows

**TIP:**
Have formulas and/or calculators inserted into the electronic medical record (EMR) that automatically deduct dry weights from wet weights of standard supplies such as chux and peri-pads
AWHONN’s QBL Practice Brief

www.pphproject.org website – Resources tab

AWHONN Resources

Association of Women’s Health, Obstetric and Neonatal Nurses

PRACTICE BRIEF
CLINICAL MANAGEMENT GUIDELINES FOR WOMEN’S HEALTH AND PERINATAL NURSES
NUMBER 1, MAY 2014

Quantification of Blood Loss

Recommendation:
AWHONN recommends that blood loss be formally measured or quantified after every birth.

Magnitude of the Problem
- A leading cause of maternal morbidity and mortality is failure to recognize excessive blood loss during childbirth (The Joint Commission, 2010).
- Women die from obstetric hemorrhage because effective interventions are not initiated early enough (Berg et al., 2005; Della Torre et al., 2011).
Clinician Issues with QBL
## Clinician Issues with QBL

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<thead>
<tr>
<th>Clinician Issues</th>
<th>Strategies</th>
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<tbody>
<tr>
<td><strong>The providers believe</strong> that their patients are unique; thus, the research does not apply to their specific group of patients.</td>
<td>Distribute key peer-reviewed literature related to the measurement of blood loss to every nurse and physician.</td>
</tr>
<tr>
<td><strong>Many physicians and nurses</strong> have only performed EBL. They are not familiar with how to QBL.</td>
<td>The lack of experience indicates that there is a need for more education tactics with QBL details.</td>
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<tr>
<td><strong>The providers are concerned</strong>, on the basis of their training and experience, that if they begin quantifying blood loss they will have higher blood loss levels which might reflect negatively on their practices. Putting their reputations in jeopardy.</td>
<td>Track the number of births quantified and their relationship to early recognition of PPH. Report facts and QBL trends to the physicians and nurses.</td>
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## Clinician Issues with QBL (continued)

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<td><strong>All:</strong> “QBL is only needed for cases where a hemorrhage is identified.”</td>
<td><strong>Measurement of cumulative blood loss is the goal.</strong> Often it is too late when we recognize that the woman has lost too much blood. Perform regular quantification in non-emergency situations to prepare the team for the actual PPH event.</td>
</tr>
<tr>
<td><strong>All:</strong> “QBL not exact and therefore it is not worth doing.”</td>
<td><strong>The goal is not a “perfect, precise” number.</strong> There may be some discrepancies from mixing with amniotic fluid, urine, irrigant, etc. However it is more accurate to do some measurements than to rely solely on visual estimates.</td>
</tr>
<tr>
<td><strong>OB MDs:</strong> “There was fluid already in the canister, just estimating, we forgot it and so it’s just an estimate.”</td>
<td>Since irrigation is usually done after the major bleeding is controlled, it may be best to connect to another canister BEFORE irrigating to capture this fluid separately.</td>
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Clinician Issues with QBL (continued)

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<td><strong>RN:</strong> “With QBL, it is now my responsibility to get it right.”</td>
<td>Shared responsibility and accountability is critical to quality patient outcomes. A shared team awareness is needed. It is one person’s responsibility. It is a TEAM responsibility.</td>
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<tr>
<td><strong>Anesthesiology:</strong> “I used to be in charge and still want the responsibility.”</td>
<td></td>
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<tr>
<td><strong>RN:</strong> “QBL takes a lot of time doesn’t it?”</td>
<td>Teams that do QBL report that it becomes routine and takes very little additional time. Have QBL nurse and physician experts showcase doability of QBL and describe how they successfully performed QBL.</td>
</tr>
<tr>
<td><strong>The OR:</strong> “It’s going to slow down OR room turnover.”</td>
<td>Have scales and dry item lists readily available in every OR. Develop quick methods for totaling/calculating in EMR.</td>
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Workflow Issues with QBL

• Remembering to check under buttocks drape before shoulder
• Checking/switching canisters, tracking laps, pads under perineum in the OR
• Scales being readily available.
• Methods for totaling/calculating (not everyone has ready access to computer or EMR.)
Equipment

• Calibrated under-buttocks drapes and OR drapes with calibrated pouches, graduated or calibrated suction canisters, etc. to measure blood loss

• Scales to weigh blood-soaked items, in every labor room, ORs, and on the postpartum unit

• Dry weight card, laminated and attached to all scales, for measurement of blood-soaked items
Clinical Practice Change: EBL to QBL

Saving Mother’s Lives: One Powerful Reason to Change

Benefits Outweigh the Challenges

“We agree that patient-centered and safe care of the mother and child enhance quality and is our primary priority...Ensure that quality obstetric care is a priority that guides individual and team decisions.”


Note: Endorsed by AAFP, AAP, ACNM, ACOG, ACOOG, AWHONN, SMFM
Testimonials:
Why do Quantification of Blood Loss in Obstetrics?

“When I was practicing in Ohio, a quality improvement project was initiated for reduction of obstetric hemorrhage. I was skeptical about some of the components and somewhat taken aback to having anesthesiologists or nurses telling me what the blood loss amount was. I had been estimating blood loss for years without any problems and did not see the value for the added time and attention that it would take. That is, until the consistent measurements indicated that estimation was not as safe for my patients as measured quantification.

Over time, I learned from the literature that estimations were often as much as 50% inaccurate, usually underestimating the true loss. I have heard from nurses, that on day two the hematocrit is sometimes low and the patient symptomatic when estimations are used and quantifications ignored. This has made a believer out of me and now, I consistently want to have quantified measurement of blood loss for vaginal and caesarean deliveries. Quantification is not a perfect measurement but is more accurate than guessing . . .

We have the evidence that early recognition of significant blood loss and early intervention is safer for our patients. We need to get over the old thinking that we are not good at our jobs if there is blood loss and move to the evidence based model that says we are best at our work if we recognize and respond appropriately.”

Judette Louis , MD, MPH
Assistant Professor, College Of Medicine Obstetrics & Gynecology
Assistant Professor,  Coph Community & Family Health College Of Medicine Obstetrics & Gynecology
Testimonial: Obstetrics

“At first it was difficult and cumbersome to quantify blood loss. But the more we practiced the better we got at it. Quantifying blood loss reduced mistakes, improved communication, and decreased response times because it was no longer a matter of someone’s opinion but rather a matter of fact that a woman was bleeding too much.”

Ann EB Borders, MD, MSc, MPH
Clinical Assistant Professor, University of Chicago Pritzker School of Medicine
Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, North Shore University Health System, Evanston Hospital
Testimonial: Anesthesia

“Obstetric bleeding is so often insidious. Without careful quantification, a tremendous amount of blood can be lost before hypotension or other obvious symptoms of hemorrhage develop. By that point women may be experiencing shock and coagulopathy, both of which make resuscitation extremely difficult.”

Jill Mhyre, MD
Associate Professor of Anesthesiology
University of Arkansas for Medical Sciences
Key Points

• For EVERY birth, begin QBL immediately after the infant’s delivery and continue ongoing QBL measurement until bleeding is stable.
• Cumulative measurement of blood loss is key to early recognition of excessive blood loss for timely initiation of life saving interventions.
• QBL for all births reduces the incidence of denial of significant blood loss and delayed recognition and initiation of treatment.
Postpartum Hemorrhage (PPH) Project

A Multi-State and Multi-Hospital Quality Improvement Initiative

Expected results are to:

- **Improve Recognition**
  - Quantification of blood loss for EVERY birth
  - Risk assessment on admission, pre-birth and post-birth

- **Improve Readiness**
  - Protocols (general PPH and massive transfusion)
  - In situ simulation drills

- **Improve Response**
  - Implement formal debriefing methods
  - Track and share lessons learned
AWHONN Postpartum Hemorrhage (PPH) Project

- Supported by a grant from Merck
- Two collaborative groups
  - Georgia (25 hospitals)
  - New Jersey/Washington, DC (32/2 hospitals)
- Hospitals use past performance as the baseline
- Data will be trended within the collaborative groups
- Interdisciplinary QI Expert Panel
- PPH Educational Modules
Women are the cornerstone of a healthy and prosperous world—we must act now to eliminate preventable deaths and injuries.

54-93%

Reducing the number of women who bleed to death during or after pregnancy and birth is the goal of the AWHONN Postpartum Hemorrhage (PPH) Project. The project is designed to improve clinicians’ recognition of, readiness for, and response to postpartum hemorrhage.

http://www.pphpproject.org/
Q&A Session

Press *1 to ask a question

You will enter the question queue
Your line will be unmuted by the operator for your turn

A recording of this presentation will be made available on our website:
www.safehealthcareforeverywoman.org
Next Safety Action Series

*Presentation of the Obstetric Hemorrhage Patient Safety Bundle*

Tuesday, September 23 | 12:00 p.m. ET

Dena Goffman, MD, FACOG
Director of Maternal Safety & Simulation
Assistant Professor Obstetrics & Gynecology and Women's Health, Albert Einstein College of Medicine/Montefiore Medical Center

Elliott Main, MD, FACOG
Chairman & Chief of Obstetrics, California Pacific Medical Center
Medical Director, California Maternal Quality Care Collaborative

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