

# Actionable Patient Safety Solutions (APSS) #11A: **Postpartum hemorrhage (PPH)**

## How to use this guide

This guide gives actions and resources for creating and sustaining safe practices for postpartum hemorrhage (PPH). In it, you'll find:

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## APSS #11A: Postpartum hemorrhage (PPH)

# Executive summary checklist

PPH is the most common complication of pregnancy, and is the leading cause of severe maternal morbidity and (sometimes) preventable mortality.

### Prevent PPH-related maternal mortality

- Hospital governance and senior administrative leadership should commit to support of maternal safety initiatives such as for PPH in their healthcare system

### Establish readiness for PPH in every unit

- Create a hemorrhage cart with supplies, checklists, and instruction cards for intrauterine balloon placement and compression sutures based on the recommendations referenced
- Ensure teams have immediate access to hemorrhage medications such as in a uterotonic medication kit (drugs that induce contraction of the uterus as a treatment for uterine atony) or equivalent
- Establish a response team who can be called when help is needed (blood bank, advanced gynecologic surgery, other support, and tertiary services)
- Establish massive and emergency release transfusion protocols (type-O negative/uncrossmatched blood for emergency transfusion use in patients whose blood group is not known)
- Educate all units on protocols, establish unit-based drills (with post-drill debriefs)

### Recognize 'at-risk' patients and attempt to reduce the incidence of PPH

- Assess hemorrhage risk (prenatal, on admission, and at other appropriate times)
- Assess all PPH risk factors:
  - Retained placenta
  - Failure to progress during the 2nd stage of labor
  - Lacerations
  - Morbidly adherent placenta
  - Instrumental delivery
  - Large for gestational age newborn (>4000 gm)
  - Hypertensive disorders
  - Induction of labor
  - Prolonged 1st or 2nd stage of labor
- Measure cumulative blood loss (formula, as quantitative as possible)
  - Weigh the pads for quantitative measurement
- Manage the 3rd stage of labor actively (department-wide protocol)

## **Respond**

- Establish a unit-standard, stage-based, obstetric hemorrhage emergency management plan with checklists
  - Obstetric rapid response teams, AHRQ TeamStepps clinical communication framework
- Establish a support program for patients, families, and staff for all significant hemorrhages

## **Report & Learn**

- Establish a culture of huddles for high-risk patients and post-event debriefs to identify successful strategies and opportunities for improvement
- Conduct a multidisciplinary review of serious hemorrhages for systems issues
- Monitor outcomes and process metrics in perinatal quality improvement (QI) committee

## **Create a culture of safety**

- Use patient stories, in written and video form, to identify gaps and inspire change in your staff

# What we know about PPH

PPH is excessive bleeding by the mother following the birth of a baby. It is among the leading global etiologies of maternal morbidity and mortality (Callaghan, Kuklina, and Berg 2010; Calvert et al., 2012; Ross and Mullin, 2012). In developing countries with high rates of maternal mortality, nearly one-fourth of deaths are attributable to PPH (AbouZahr, 1998).

According to the most recent mortality data reported to the CDC in 2011-2012, PPH caused 11% of pregnancy-related deaths in the U.S. (Berg, Atrash, Koonin, and Tucker, 1996). Between 1994 and 2006, the number of PPH cases increased by more than 25%.

Lack of a timely and medically appropriate response to PPH is associated with poor outcomes. Early recognition of PPH and timely, coordinated interventions are essential to reduce associated morbidity and mortality.

## Causes and risk factors for PPH

The most common etiology of PPH is uterine atony (the inability of the uterus to contract and retract following childbirth). A 50% increase in the incidence of uterine atony may explain the increased incidence of PPH in the U.S.

Population-based studies have identified some significant risk factors that may result in PPH:

- PPH in a previous pregnancy
- Retained placenta
- Failure to progress during the 2nd stage of labor
- Placenta accreta, increta, or percreta (when the placenta attaches itself too deeply into the wall of the uterus)
- Lacerations
- Operative vaginal delivery
- Large gestational age newborns
- Hypertensive disorders
- Induced labor
- Augmentation of labor with oxytocin (Scheiner *et al.*, 2005)
- Multiple gestation pregnancy
- Intraamniotic infection

## Barriers to prioritizing PPH

There is a consistent global recognition that the lack of communication, patient engagement, and clinical intervention strategies for managing acute hemorrhage in the postpartum period lead to an increase in maternal morbidity and mortality. Despite this, attention to the implementation of coordinated approaches remains limited (Lewis *et al.*, 2007; CAPH, 2011) for a variety of reasons:

- PPH is a “low-volume, high-risk” event for birth facilities (i.e. it may happen infrequently, however it can lead to significant morbidity and mortality). This has led to the down-prioritization for the development of standardized intervention protocols (Lyndon *et al.*, 2015).
- There is no precise definition for the condition. The medical literature commonly defines PPH as blood loss of more than 500 mL following a vaginal delivery or more than 1,000 mL following a cesarean section delivery (Baskett, 1999). PPH is also classified by time

frame, with primary PPH occurring in the first 24 hours and secondary or late-term PPH occurring in the subsequent period.

- Blood loss during delivery can be difficult to measure, which is attributable to lack of standardization on how to manage blood collected during childbirth as well as improvements in medical products that can absorb a deceptively high volume of fluid
- Bleeding may be concealed due to conditions such as abruption (premature separation of the placenta from the wall of the uterus, with blood trapped inside the uterus) or retroperitoneal hemorrhage (blood trapped in the abdominal cavity)
- The physiological changes of pregnancy can mask the underlying decrease in blood volume as a result of the hemorrhage. On average, mothers of singleton pregnancies have 30% higher blood volume than non-pregnant women (70 mL/kg vs. 100 mL/kg).
- Within the pregnant population, other blood-related physiological traits such as anemia, underlying cardiac conditions, or preeclampsia will also impact a mother's ability to tolerate blood loss
- Lack of clear guidelines for measuring blood loss during childbirth often leads to underestimation and a clinician may not diagnose primary PPH

## **Maternal Morbidity and Mortality in the US and Globally**

### **Global maternal mortality**

Global maternal deaths have fallen 44% since 1990, but there are still more than 303,000 women who die each year from complications related to pregnancy, delivery, or within the first 6 weeks after delivery (WHO, 2015). The majority of deaths (64%) occur from the day of delivery through 41 days postpartum (Creanga *et al.*, 2015). This equates to approximately 830 women dying every day, with 550 occurring in sub-Saharan Africa, 180 in Southern Asia, and 5 in developed countries (WHO, 2015). In some developing countries, the maternal mortality rate is as high as 1% of live births (AbouZahr, 1998).

### **Maternal mortality in the U.S.**

Within the U.S., it is estimated that approximately 600 women die each year; 14 per 100,000 live births (CDC, 2015; WHO and UNICEF, 2015). While that number seems to pale in comparison to the global scale, the U.S. ranks 46th in the world for maternal mortality (Agrawal, 2015). Of all industrialized countries, the U.S. lags behind Kazakhstan, Libya, and Qatar, and is 1 of only 13 countries whose maternal mortality rates have continued to increase instead of improve (by declining) over the last 25 years (Kempner, 2015).

The reasons for the overall increase in maternal mortality within the U.S. are unclear. Delaying childbearing and assisted reproductive technology (e.g., in-vitro fertilization) have given rise to older mothers with an increased risk of complications than younger women (Joy *et al.*, 2000; Bewley *et al.*, 2005). Additionally, the obesity epidemic gives rise to chronic conditions such as hypertension, diabetes, and chronic heart disease which increase the risk of complications during pregnancy (CDC, 2015; Kuklina *et al.*, 2009; Albrecht *et al.*, 2010; Kuklina *et al.*, 2012).

More than one-third of maternal deaths in the U.S. are preventable; 40% could be avoided if women had access to quality care (Berg *et al.*, 2005). Most notably, black women have a 3- to 4-fold increased risk of death due to pregnancy compared to any other race or ethnicity (Creanga *et al.*, 2014; Callaghan *et al.*, 2008). The reasons are extremely complex and are not well-documented.

Moreover, severe maternal morbidity is much more prevalent and preventable, affecting tens of thousands of women each year (Callaghan *et al.*, 2012; Callaghan *et al.*, 2008).

# Leadership plan

Hospital governance, senior administrative leadership, clinical leadership, and safety/risk management leadership need to work collaboratively to reduce PPH.

- Individual practices, hospitals, and hospital systems should develop systems of care that deliver risk-appropriate care to women pre- and post-delivery
- Medical and administrative leaders should commit to comprehensive and interdisciplinary PPH management
- Engage expectant mothers and the people who support them in holistic improvement of obstetric safety, including PPH
- Identify and counsel women with risk factors for PPH as appropriate for their level of risk and gestational age
- Ensure availability of resources such as personnel, equipment, blood products, and trained personnel
- Establish PPH protocols, create PPH kits, and conduct appropriate training and simulation drills to reduce the incidence of morbidity and mortality from PPH
- Participate actively in regional and state perinatal collaboratives
- Use patient stories, in written and video form, to identify gaps and inspire change in your staff

# Action plan

The Council on Patient Safety in Women's Health Care at the American College of Obstetricians and Gynecologists (ACOG) has developed comprehensive bundles and lists of resources that apply to the prevention of harm from PPH and other maternal safety issues. The bundles are a roadmap for hospitals to use in the prevention of harm from pregnancy-related conditions:

<https://safehealthcareforeverywoman.org/patient-safety-bundles/obstetric-hemorrhage/>

The approach to PPH management depends on the etiology in a patient who has had a vaginal delivery or a cesarean section. For example:

- Surgical treatment of atony depends on the route of delivery
- Coagulopathies (impaired ability of the blood to coagulate) are managed medically, while trauma-related PPH is managed surgically

# Technology plan

These suggested practices and technologies have shown proven benefit or, in some cases, are the only known technologies for certain tasks. If you know of other options not listed here, please complete the form for the PSMF Technology Vetting Workgroup to consider: [patientsafetymovement.org/actionable-solutions/apss-workgroups/technology-vetting/](https://patientsafetymovement.org/actionable-solutions/apss-workgroups/technology-vetting/)

System or practice
ONC Meaningful Use Certified Electronic Health Record (EHR) System with the following capabilities: <ul style="list-style-type: none"><li>• Computerized Physician Order Entry (CPOE)</li><li>• Drug-drug interaction check</li><li>• Drug-allergy interaction check</li><li>• Clinical Decision Support tools (CDS)</li></ul>
Close monitoring of hemodynamics such as heart rate and blood pressure
Ultrasound technology for assessment of retained products, retained placenta, or abruption
Colorimetric Blood Loss Measurement Technology

## Measuring outcomes

### Topic: Severe Maternal Morbidity (SMM) among hemorrhage cases

#### Outcome measure formula

**Numerator:** Among the denominator, all cases with any SMM code

**Denominator:** All mothers during their birth admission, excluding ectopics and miscarriages, meeting 1 of the following criteria:

- Presence of an abruption, previa, or antepartum hemorrhage diagnosis code
- Presence of transfusion procedure code without a sickle cell crisis diagnosis code
- Presence of a postpartum hemorrhage diagnosis code

The rate is typically displayed as:

All cases with any SMM code / All mothers meeting denominator criteria

#### Metric recommendations

**Direct Impact:** All pregnant patients

#### Lives Spared Harm:

$Live\ Spared\ Harm = (SMM\ Rate_{baseline} - SMM\ Rate_{measurement}) \times Denominator\ Procedures_{measurement}$

**Note:** Since this is a morbidity measure, the lives saved calculation is not applicable.

#### Data Collection

HDD File (ICD9/ICD10)

# Conflicts of interest disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Some of the APSSs recommend technologies offered by companies involved in the Patient Safety Movement Foundation. The workgroups have concluded, based on available evidence, that these technologies work to address APSS patient safety issues. Workgroup members are required to disclose any potential conflicts of interest.

## Workgroup

### Co-Chairs

**David Lagrew**

Providence St. Joseph Health

**Jill Arnold**

Maternal Safety Foundation

### Members

This list represents all contributors to this document since inception of the Actionable Patient Safety Solutions.

**Gillian Abir**

Stanford University

**Hania Alim**

Patient Safety Movement Foundation

**Ari Babaknia**

Chapman University

**Steve Barker**

Patient Safety Movement Foundation, Masimo

**Michel Bennett**

Patient Safety Movement Foundation (formerly)

**Lilly Filler**

Patient Safety Movement Foundation

**Afshan Hameed**

University of Irvine

**Ariana Longley**

Patient Safety Movement Foundation

**Jacob Lopez**

Patient Safety Movement Foundation (formerly)

**Olivia Lounsbury**

Patient Safety Movement Foundation

**Jeanne Mahoney**

The American College of Obstetricians and Gynecologists

**Elliot Main**

California Maternal Quality Care Collaborative

**Claire Manneh**

California Hospital Association

**Ross McQuivey**

Clinical Innovations, LLC

**Charles Micheli**

The University of Vermont Health Network

**Donna Prosser**

Patient Safety Movement Foundation

**Rachael Raynes**

University of Vermont

**Claire Roy**

Patient Safety Movement Foundation

**Brittany Sanford**

George Washington University Hospital

**Sunday Sankaran**

Kaiser Permanente

**Kisha Semenuk**

Maternal Safety Foundation

**Abbas Shobeiri**

Virginia Commonwealth University School of  
Medicine Inova Fairfax Medical Campus

**Seyed Shobeiri**  
**Kristen Terlizzi**  
**Josef Wichilewski**

Inova Health System  
National Accreta Foundation  
Clalit

## **Metrics integrity**

**Robin Betts**  
**Jan Orton**

Kaiser Permanente, Northern California Region  
Intermountain Healthcare

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