

Actionable Patient Safety Solutions™ (APSS™): Postpartum Hemorrhage (PPH)

How to use this guide

This APSS provides evidence-based actions and resources for executives, leaders, clinicians, and performance improvement specialists. This document is intended to be used as a guide for healthcare organizations to examine their own workflows, identify practice gaps, and implement improvements. In it, you'll find:

Best Practice Summary: A high level summary of evidence-based, clinical best practices. (page 2)

Executive Summary: Executives should understand the breadth of the problem and its clinical and financial implications. (page 3)

Leadership Checklist: This section is for senior leaders to understand common patient safety problems and their implications related to postpartum hemorrhage (PPH). Most preventable medical harm occurs due to system defects rather than individual mistakes. Leaders can use this checklist to assess whether best practices are being followed and whether action is needed in their organization around PPH. (page 3)

Clinical Workflow: This section includes more specific information about PPH across the continuum of care. Leaders should include the people doing the work in improving the work. This section outlines what should be happening on the frontline. Clinicians can use this section to inform leaders whether there are gaps and variations in current processes. This is presented as an infographic that can be used for display in a clinical area. (page 4)

Education for Patients and Family Members: This section outlines what frontline healthcare professionals should be teaching patients and family members about PPH. Clinicians can inform leaders whether there are gaps and variations in the current educational processes. (page 8)

Performance Improvement Plan: If it has been determined that there are gaps in current practice, this section can be used by organizational teams to guide them through an improvement project. (page 10)

What We Know about PPH: This section provides additional detailed information about PPH. (page 12)

Resources: This section includes helpful links to free resources from other groups working to improve patient safety. (page 14)

Endnotes: This section includes the conflict of interest statement, workgroup member list, and references. (page 15)

Citation: Patient Safety Movement Foundation. (2022). Postpartum Hemorrhage (PPH) Actionable Patient Safety Solutions. Retrieved from <https://patientsafetymovement.org/community/apss/>



Best Practice Summary

Recognition and Prevention in the Outpatient Setting

- Screen for anemia and sickle cell disease and treat any underlying causes throughout prenatal care.
- Determine patient-specific PPH risk factors.
- Discuss patient preference regarding the use of blood products.
- If the patient is diagnosed with PPH risk factors, document and communicate appropriately to all involved team members.

Recognition and Prevention in the Inpatient Setting

- Screen the patient for anemia, sickle cell disease, and any other PPH risk factors.
- Monitor the patient's vitals closely including the blood count and coagulation profile for patients at risk for coagulopathy or symptomatic anemia from blood loss.
- During the third stage of labor, use uterotonics.
- For cesarean sections, use oxytocin as the drug of choice.
- Be sure to remove the placenta with controlled cord traction in both cesarean and vaginal birth and avoid routine episiotomy unless an immediate delivery is required.
- In the event of PPH, use the "4 T's" to identify the cause. The "4 T's" include "Tone, Trauma, Tissue, Thombin", corresponding to uterine atony, laceration or uterine rupture, retained tissue or invasive placenta, and coagulopathy, respectively.

Treatment Plan

- In the event of PPH or if the patient is showing signs or symptoms, determine the cause of the hemorrhage by inspecting the cervix and vagina for lacerations.
- Perform a bedside ultrasound or manual evacuation of the uterus to evaluate for retained placenta or uterine rupture and use bimanual massage to evaluate the uterine tone.
- Send labs to evaluate for coagulopathy.
- Use a foley catheter to decompress the bladder.
- If bleeding persists beyond use of oxycontin, employ intravenous ergometrine, oxytocin-ergometrine fixed dose, or prostaglandin drug.
- Conduct initial fluid resuscitation with isotonic crystalloids and use tranexamic acid in cases of persistent trauma-related bleeding.
- Massage the uterus with squeezing motions on the lower abdomen through bimanual massage.
- Track postpartum vitals.

Discharge

- Ensure that all information and next steps are explained to the patient and the patient's family in ways they can understand.
- Assist the patient in understanding what PPH means for future pregnancies.
- Provide guidance for care and health after discharge.
- Provide patients and family members with information about hazardous signs and symptoms and what to do should these signs and symptoms present.

Executive Summary

The Problem

Postpartum hemorrhage (PPH) is the most common problem in pregnancy, and is the leading cause of severe maternal morbidity and preventable mortality. However, estimates show that 54% to 93% of these hemorrhage-related deaths are preventable (Bingham & Jones, 2012). This prevention is only possible through constant readiness, clear guidelines, and effective emergency response, as 20% of hemorrhages occur in women with no risk factors at all (The Joint Commission, 2019).

The Cost

Globally, PPH is the leading cause of maternal deaths, responsible for 25% of maternal deaths worldwide and 11.2% of US maternal deaths (Ngwenya, 2016; The Joint Commission, 2019). This widespread prevalence contributes significantly to the cost of care. For example, the Egyptian Ministry of Health and Population dedicated 0.7% of its total budget to the treatment of PPH, while in the US, failure to adopt and thoroughly integrate PPH prevention protocols suggests an increased cost of around \$106.7 million annually due to the increased length of stay as a result of PPH complications (Vlassof, Abdalla, & Gor, 2016; Marshall et al., 2017).

The Solution

Many healthcare organizations have successfully implemented and sustained improvements and reduced death from PPH. This document provides a blueprint that outlines the actionable steps organizations should take to successfully improve early PPH recognition and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website.

Leadership Checklist

On a monthly basis, or more frequently if a problem exists, the executive team should review the outcomes of patients screened as at risk for PPH. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

- Measure and report serious hemorrhages monthly (severe maternal morbidity/all expecting mothers admitted). Note trends in areas with low compliance and high hemorrhage incidence. Routinely reassess outcomes. Expect that when your organization starts tracking serious safety events, the organization will see an increase in adverse events reported. Recognize that these metrics are ultimately serving as an objective baseline for impactful tracking and improvement in the future.
- If hemorrhage rates indicate room for improvement, initiate a PI (performance improvement) project. If a problem is not indicated, routinely reassess to identify gaps, and ensure integrity of the data collected.
- Ensure frontline involvement in PPH improvement activities. Maintain their engagement and remove barriers to progress.
- Ensure that PPH protocols are embedded into [clinical workflows](#), whether electronic or paper.
- Ensure there are enough staff to effectively manage necessary care.

- Establish communication processes with outpatient providers for communication of primary and secondary postpartum hemorrhage information.
- Conduct interdisciplinary and multimodal educational activities, including the use of [simulation](#).
- Ensure adequate training and documentation of PPH recognition, management, and treatment competencies and skills. Provide multifaceted, routine PPH educational activities.
- Establish readiness for PPH in every unit. See [Appendix A](#) for further details.
- Have a plan for Jehovah's Witnesses and those who decline blood products. See [here](#) for more information.
- Establish a unit-standard, stage-based, [obstetric hemorrhage emergency management plan with checklists](#) and obstetric rapid response team components. See AHRQ's TeamSTEPPS. Include guidance on how to communicate with patients and loved ones during and post-event. Ensure ongoing staff training around the standardized emergency management plan and use of checklists.
- Implement a [massive transfusion protocol](#) to ensure sustained and immediate availability of blood products to the labor and delivery unit. Standardize this protocol with involvement from outpatient providers, blood bank staff members, emergency department staff, nurses and obstetricians to eliminate unnecessary delays from confusion.
- Ensure that a [hemorrhage toolkit/cart](#) is maintained and that staff are knowledgeable about the contents and usage.
- Adopt standardized criteria and associated treatment steps for each stage of risk. See [here](#) for more information.
- Eliminate barriers to making rapid changes to documentation templates and order sets.
- Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed. Establish a culture of huddles for high-risk patients and post-event debriefs to identify successful strategies and opportunities for improvement. See [here](#) for a debriefing tool.
- Hold staff accountable for providing the standard of care and reward success.
- Ensure that leaders have a simple process to oversee PPH improvement work while also considering how it aligns with other initiatives across the organization.

Clinical Workflow

1. OUTPATIENT RECOGNITION AND PREVENTION

- During prenatal care, screen for anemia and treat the underlying cause. Consult with a hematologist for further management, if indicated. Note that a hemoglobin determination will be necessary when labor starts and document this information. Recommend that patients with prepartum anemia deliver in the hospital.
- Screen for sickle cell disease at the initial prenatal visit.
- Obtain sonograms for women at high risk for invasive placentation.
- Identify Jehovah's Witnesses or other patients who decline the use of blood

products. Discuss products they may receive and ensure counseling early in prenatal care along with early recognition of anemia.

- Ensure the informed consent process is followed.
- Transport to emergency care immediately if deemed hemodynamically unstable.
- [Understand patient risk factors](#)
- Look for signs and symptoms of hypovolemia, including tachycardia, hypotension, tachypnea, weak peripheral pulses, slow capillary refill, pallor, and altered mental status. Assess for coagulopathy.
- Use pelvic ultrasound and laboratory data to diagnose.
- If diagnosed, consult with an obstetrician immediately to understand the need for escalation of care. Arrange for hospital admission.
- Communicate with the hospital the patient status and, if the suspected blood loss is greater than 1,500 mL and the vital signs are unstable, prepare the hospital that a transfusion will be necessary.



2. INPATIENT RECOGNITION AND PREVENTION

- Assess all PPH risk factors.
- Initiate appropriate protocols based on stage of risk. See [here](#) for more information.
- Screen for and type blood for all women deemed medium or high risk. See [here](#) for stratification of risk.
- Understand inherited bleeding disorders.
- Monitor vitals closely.
- Monitor blood count and coagulation profile in all women at risk for coagulopathy or symptomatic anemia from blood loss.
- Screen for and treat anemia.
- Identify Jehovah's Witnesses or other patients who decline the use of blood products.
- [Be vigilant for and identify abnormal blood loss early.](#)
- Use uterotonics during the third stage of labor. Oxytocin is recommended as the drug of choice, followed by either methylergonovine, misoprostol, or carboprost.
- Actively monitor uterine tonus via palpation to identify postpartum uterine atony.
- Measure cumulative blood loss.
 - Weigh the pads for quantitative measurement.
- Clamp the cord 1 to 3 minutes after birth while initiating newborn care.
- Avoid clamping the cord less than one minute after birth unless the newborn is asphyxiated and requires resuscitation.
- Use oxytocin as the uterotonic drug for Cesarean sections.

- Remove placenta with controlled cord traction in both vaginal and cesarean deliveries ([Brandt-Andrews maneuver](#)).
- Avoid routine episiotomy unless immediate delivery is required and the perineum is suspected for the delay or complication.
- Perform active management of third stage labor for all women as appropriate. See [here](#) for more information.
- Escalate care based on increased risk according to your hospital's guidelines. See [here](#) for an example.
- In the event of PPH, use the “4 T’s” to identify the cause. The “4 T’s” include “Tone, Trauma, Tissue, Thombin”, corresponding to uterine atony, laceration or uterine rupture, retained tissue or invasive placenta, and coagulopathy, respectively.
- Follow the “[Medications Used for Prevention and Treatment of PPH](#)”



3. TREATMENT

If the patient shows signs of PPH or complications:

- Determine the cause of the hemorrhage by:
 - Thoroughly inspecting the cervix and vagina for lacerations
 - Performing a bedside ultrasound or manual evacuation of the uterus to evaluate for retained placenta or uterine rupture
 - Evaluating uterine tone with bimanual massage, and
 - Sending labs to evaluate for a coagulopathy.
- A foley catheter should be placed to decompress the bladder which can contribute to uterine atony, and can aid in monitoring urine output as a sign of hemorrhagic shock.
- Follow the “[Medications Used for Prevention and Treatment of PPH](#)”.
- Use [uterotonic medications](#) for the prevention and treatment of PPH.
- Use intravenous or intramuscular (if IV access has not been established) oxytocin alone as the initial uterotonic drug in treatment for uterine atony.
- If the bleeding does not respond to oxytocin, use intravenous ergometrine, oxytocin-ergometrine fixed dose, or prostaglandin drug.
- Conduct initial fluid resuscitation with isotonic crystalloids.
- Use tranexamic acid in cases of persistent trauma-related bleeding or if the uterotonics failed to maintain bleeding.
- Massage the uterus with squeezing motions on the lower abdomen through bimanual massage..
- Use an [intrauterine balloon tamponade](#) for refractory bleeding or when uterotonics are not available or persistent lower uterine segment atony is noted.

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- Use an [intrauterine balloon tamponade](#) for refractory bleeding or when uterotonics are not available or persistent lower uterine segment atony is noted.
- Consider [uterine artery embolization](#) if there is persistent bleeding but the patient is hemodynamically stable, and resources are available to perform.
- Consider surgery if bleeding persists despite initiation of all above measures.
- Use bimanual uterine compression and external aortic compression for the treatment of PPH due to uterine atony after vaginal birth until appropriate care is available.
- Use non-pneumatic anti-shock garments until appropriate care is available.
- Use single dose antibiotics if placenta is manually removed.
- Track postpartum vitals.



4. DISCHARGE

- Anticipate the woman's [informational, emotional, and physical needs](#) post-delivery. Spend time with the woman and family to explain next steps thoroughly.

- Educate the mother about what PPH means and how to be aware of potential complications using “plain” language and appropriate visuals. See “[Education for Patients and Family Members](#)” section.
- Instruct patients to watch for signs of hemorrhage such as large clots of blood being passed or bleeding that doesn’t slow or stop.
- Help the patient understand the signs and symptoms of secondary postpartum hemorrhage and what to do if these signs and symptoms arise.
- Encourage patients to eat an iron-rich diet and take any iron supplements as directed.
- Stay hydrated by drinking plenty of fluids.
- Instruct patients to get immediate help for signs or symptoms of hemorrhage/shock such as tachycardia, low BP, dizziness, weakness, fatigue, nausea, as well as accompanying swelling and pain around the vagina or perineum.
- Discuss ‘normal’ expectations for breastfeeding trajectory after PPH.
- Explain likelihood of experiencing PPH with future deliveries.

Education for Patients and Family Members

The outline below illustrates all of the information that should be conveyed to the patient and family members by someone on the care team in a consistent and understandable manner.

Explain why PPH prevention and early recognition is important. Ensure the expecting mother understands that bleeding is normal after giving birth but articulate the distinction between normal and expected bleeding and bleeding that may be problematic. Explain the risk factors as they may relate to the patient’s individual circumstance and what treatment can be expected if PPH is detected.

Indicate what to look out for. The concept of PPH should be introduced to patients well in advance of their delivery during their routine antenatal visits. Describe the signs and symptoms that may indicate PPH risk throughout the pregnancy journey. Explain the risk factors and causes of PPH, such as uterine atony, uterine inversion, uterine rupture, placental abruption, placenta accreta, placenta previa, retained placenta, having a c-section, taking medications to induce labor, tearing, blood conditions, infections, obesity, and preeclampsia. Be sure to thoroughly explain these concepts in language that the general patient can understand and leave adequate time to answer questions.

It is essential that patients and family members understand that they are welcome to ask questions and voice concerns at any point. Instead of employing a directive conversation style, an active, engaging conversation should take place, leaving capacity for questions and repeat-back strategies. When patients and family members understand the signs and symptoms that could be indicative of a problem, they are able to serve as an extra set of eyes in order to elevate this concern as early as possible.

Describe what can be anticipated if PPH is detected. Again, the concept of PPH and its treatment should be introduced to patients well in advance of their delivery during their routine antenatal visits. Patients should understand that blood tests, hematocrit blood tests,

blood loss measurements, pelvic exams, ultrasounds, and physical exams are often necessary to detect PPH. In addition to explaining the possible methods for detection, be sure to explain the treatment that can be anticipated, including fluid administration, surgery, like hysterectomy or laparotomy, uterine massage, supplemental oxygen, placenta removal, and iron supplementation.

Explain what is expected of them during their care and upon recovery. By giving patients and family members a “job” while they are in the hospital, they can be immersed fully in the routine care, can hold other team members accountable, can feel more confident voicing their concerns or opinions, and can serve as an extra set of informed and vigilant eyes to optimize safety and early intervention. This team involvement can also reduce their anxiety by transforming concern into proactive action. Patients and family members can:

- Watch for changes in vital signs.
- Watch for altered mental status.
- Be vigilant about changes in blood tests or medications.
- Keep a log of medication changes.
- Understand when and how to call for help.

As it relates to PPH, explain the realistic timeline for recovery based on the severity of the individual patient’s circumstance. Explain the difference between primary and secondary PPH and articulate what the patient should watch out for that may indicate secondary PPH. Explain that additional blood tests may be necessary. Help the new mother understand what to expect as it relates to breastfeeding and emotional recovery and listen to their concerns. Provide coping resources and tools for emotional recovery. Consider spirituality and other patient-specific circumstances that may be leveraged for emotional recovery. Enforce and reinforce that the incidence of PPH does not reflect on their capability or competence as a new parent.

Explore next steps. Planning for life after the hospital, especially after delivery, should begin as early as possible between the healthcare providers and the patient and family members. Patients and family members should have realistic expectations for recovery and life after discharge.

- If the patient is a smoker, the healthcare team should encourage smoking cessation and provide additional resources for further information, groups, or strategies for smoking cessation.
 - Try to understand what specific barriers that patient as an individual faces in cessation.
- Describe the organization’s PPH protocols that were followed.
 - If any of the protocols were changed due to this specific patient’s circumstance, articulate why these changes were made and how they may impact the mother and baby.
- Ensure thorough explanation of necessary post-discharge appointments, therapies, medications, and potential complications.
 - Assess for patient preference in time and location of follow-up appointments, if possible.
- Provide patients and family members resources, including direct contact phone numbers, to the hospital for post-discharge questions.
 - Make sure the resources are in their own language.
- Help the patient and family members set realistic expectations and goals for recovery.

Performance Improvement Plan

Follow this checklist if the leadership team has determined that a performance improvement project is necessary:

- Gather the right project team.** Be sure to involve the right people on the team. You'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

Complete this Lean Improvement Activity:



Conduct a [SIPOC](#) analysis to understand the current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.

RECOMMENDED PPH IMPROVEMENT TEAM

- | | |
|---|---|
| <ul style="list-style-type: none">• Admitting and registration staff• Quality and safety specialists• Nurses• Nursing assistants | <ul style="list-style-type: none">• Physicians• Pharmacists• Rapid response team• Blood bank members |
|---|---|

Table 1: Understanding the necessary disciplines for a PPH improvement team

- Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources needed to improve patient outcomes.

Create a [process map](#) once the workflows are well understood that illustrates each step and the best practice gaps the team has identified ([IHI, 2015](#)). Brainstorm with the advisory team to understand why the gaps exist, using whichever [root cause analysis tool](#) your organization is accustomed to ([IHI, 2019](#)). Review the map with the advisory team and invite the frontline to validate accuracy.



PPH PROCESSES TO CONSIDER ASSESSING

- How blood loss is measured
- Availability of uterotonic medications
- Emergency communication systems
- Time to decision to elevate care
- Massive emergency transfusion protocol
- Out patient communication to in patient care team
- Screening upon admission
- Unit-based drills

Table 2: Consider assessing these processes to understand where the barriers contributing to PPH may be in your organization

- **Prioritize the gaps to be addressed and develop an action plan.** Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are a priority for the organization to focus on. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

The action plan should include the following:



- Assess the ability of the culture to change and adopt appropriate strategies
- Revise policies and procedures
- Redesign forms and electronic record pages
- Clarify patient and family education sources and content
- Create a plan for changing documentation forms and systems
- Develop the communication plan
- Design the education plan
- Clarify how and when people will be held accountable

TYPICAL GAPS IDENTIFIED IN PREVENTION AND TREATMENT OF PPH

- Lack of PPH definition (quantity versus time frame)
- Lack of standardization for blood collection and measurement
- Blood may be concealed due to abruption or retroperitoneal hemorrhage
- Lack of treatment algorithm
- PPH presentation in many who do not have risk factors
- Lack of standardized screening protocols upon admission
- Poor communication from outpatient provider to inpatient care team
- Conflicting protocols and policies

Table 3: By identifying the gaps in PPH prevention and treatment, organizations can tailor their project improvement efforts more effectively

- **Evaluate outcomes, celebrate wins, and adjust the plan when necessary.** Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking.
Routinely review all metrics and trends with both the advisory and project teams and discuss what is going

[Read this paper](#) from the Institute for Healthcare Improvement to understand how small local steps



well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas ([IHI, 2006](#)).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don't move so quickly that you don't consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

PPH METRICS TO CONSIDER ASSESSING

- | | |
|---|---|
| <ul style="list-style-type: none">• Surgical interventions• Length of stay• Use of anesthesia | <ul style="list-style-type: none">• Postpartum depression• Severe Maternal Morbidity• Number of patients with massive transfusion (4 or more units of blood products) |
|---|---|

Table 4: Consider evaluating related metrics to better understand PPH presence and contributing factors. Consider including demographic variables, such as race, in the analysis to identify areas for improvement for vulnerable populations.

What We Know About PPH

PPH is excessive bleeding by the mother following the birth of a baby. It is among the leading global causes of maternal morbidity and mortality ([Callaghan et al., 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 US ([Berg, Atrash, H., Koonin, L., 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 results in 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 cause of PPH is uterine atony. A 50% increase in the incidence of uterine atony may explain the increased incidence of PPH in the US.

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 (>4000 gm)
- Hypertensive disorders
- Induced labor

- Augmentation of labor with oxytocin
- Multiple gestation pregnancy
- Intraamniotic infection
- Instrumental delivery
- Prolonged 1st or 2nd stage of labor
- Chorioamnionitis
- Higher parity
- General anesthesia
- Polyhydramnios
- Uterine fibroids
- Prior cesarean delivery or uterine surgery
- Magnesium sulfate use

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 ([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 (the premature separation of the placenta from the wall of the uterus, with blood trapped inside the uterus) or retroperitoneal hemorrhage (when blood is 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.
- The lack of clear guidelines for measuring blood loss during childbirth often leads to underestimation and a clinician may not diagnose primary PPH.

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 US

Within the US, it is estimated that approximately 600 women die each year; 14 per 100,000 live births ([WHO, 2015](#)). While that number seems to small in comparison on the global scale, the US ranks 46th in the world for maternal mortality ([Agrawal, 2015](#)). Of all industrialized countries, the US 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.

The reasons for the overall increase in maternal mortality within the US 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 ([Jolly 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 problems during pregnancy ([Kuklina et al., 2009](#); [Albrecht et al., 2010](#); [Kuklina et al., 2012](#)).

Notably, black women have a 3- to 4-fold increased risk of death due to pregnancy compared to any other race or ethnicity ([Creanga, 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., 2008](#)).

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

Complications of PPH

Complications can range from fatigue to death due to cardiovascular failure. These complications include:

- Anemia
- Blood transfusion
- Dilutional coagulopathy
- Fatigue
- Myocardial ischemia
- Orthostatic hypotension
- Postpartum depression
- Death

Resources



For PPH Improvement:

- [Council on Patient Safety in Women's Healthcare: Obstetric Hemorrhage Patient Safety Bundle](#)
- [WHO: Recommendations for the Prevention and Treatment of Postpartum Haemorrhage](#)
- [Royal College of Obstetrics and Gynecologists: Patient Information on Postpartum Hemorrhage](#)
- [March of Dimes: Postpartum Hemorrhage](#)
- [Life After Postpartum Hemorrhage: Recovering from the Unexpected](#)
- [Influencing factors for high quality care on postpartum haemorrhage in the Netherlands: patient and professional perspectives](#)
- [Quality Improvement Initiative for Obstetric Hemorrhage Management \(OHI\): Hospital Level Implementation Guide](#)
- [How to improve the quality of care for women with postpartum haemorrhage at Onandjokwe Hospital, Namibia: quality improvement study](#)
- [The Joint Commission: Proactively Preventing Maternal Hemorrhage-Related Deaths](#)
- [The Joint Commission: Proactive Prevention of Maternal Death from Maternal Hemorrhage](#)

For General Improvement:

- [CMS: Hospital Improvement Innovation Networks](#)
- [IHI: A Framework for the Spread of Innovation](#)
- [The Joint Commission: Leaders Facilitating Change Workshop](#)
- [IHI: Quality Improvement Essentials Toolkit](#)
- [SIPOC Example and Template for Download](#)
- [SIPOC Description and Example](#)

Endnotes

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. Workgroup members are required to disclose any potential conflicts of interest.

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Appendices

Appendix A: Establish Readiness for PPH in Every Unit

- Create a hemorrhage cart with supplies, checklists, and instruction cards for intrauterine balloons and compression sutures ([Alliance for Innovation on Maternal Health](#)).
- Ensure teams have immediate access to hemorrhage medications such as a uterotonic medication kit (drugs that induce contraction in the uterus as a treatment for uterine atony) or equivalent.
- Create an obstetric rapid response team. Among others, this rapid response team should include blood management and blood bank specialists and those experienced in advanced gynecologic surgery. Ensure this team meets regularly, specifically for new employee trainings and whenever policies are modified.
- Establish transfusion protocols for massive rapid deployment in an emergency.
- Facilitate ongoing education with unit-based drills.