

# Management of Postpartum Hemorrhage: Current State of the Evidence

## Focus of This Summary

This is a summary of a systematic review evaluating the evidence regarding the potential benefits and harms of medical and/or surgical strategies used to manage postpartum hemorrhage (PPH). Strategies for preventing PPH were not addressed in the review. The systematic review included 68 unique studies published from 1990 to November 2014. The full report, listing all studies, is available at [www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage](http://www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage). This summary is provided to assist in informed clinical decisionmaking. However, reviews of evidence should not be construed to represent clinical recommendations or guidelines.

## Background

PPH is commonly defined as blood loss exceeding 1000 milliliters after vaginal birth or cesarean section.<sup>1</sup> PPH is often classified as primary/immediate/early (occurring within 24 hours of birth) or secondary/delayed/late (occurring from more than 24 hours postbirth to up to 12 weeks postpartum).

Risk factors for PPH include grand multiparous status, previous history of PPH, prolonged second-stage labor, or a large neonate. Common etiologies of PPH include lack of uterine tone (resulting from one or more of the risk factors listed above), retained placental tissue, or a coagulopathy.

PPH is estimated to occur in 6 to 11 percent of births worldwide. In the United States, one study found that the incidence of PPH has increased 26 percent, from 2.3 percent in 1994 to 2.9 percent in 2006.

Interventions to treat PPH generally proceed from less to more invasive and include: medications; compression techniques (e.g., external uterine massage, bimanual compression); uterine-sparing procedures (e.g., manual removal of clots, uterine balloon tamponade, uterine artery embolization); and surgeries (e.g., curettage, uterine or other pelvic vessel ligation, uterine compression sutures, hysterectomy). PPH management may also involve supportive therapies, such as blood and fluid replacement, to treat the blood loss and other sequelae that result from PPH. Once PPH is controlled, followup management varies and may include laboratory testing (e.g., hemoglobin and hematocrit), iron replacement therapy, transfusion, and other interventions to assess and treat PPH sequelae.

1. American College of Obstetricians and Gynecologists. reVITALize Obstetric Data Definitions. Version 1.0. <http://www.acog.org/About-ACOG/ACOG-Departments/Patient-Safety-and-Quality-Improvement/reVITALize-Obstetric-Data-Definitions>. Accessed March 1, 2016.

## Conclusions

A limited body of evidence addresses interventions for managing PPH. This does not mean that the interventions reviewed in this summary are ineffective. Diagnosis of PPH is subjective, and management of the condition is urgent, often involving simultaneous initiation of interventions. Therefore, comparing the trajectory of care across studies is challenging. We present here the available evidence regarding PPH interventions for clinicians and policymakers.

Evidence related to the effectiveness of pharmacological therapies is insufficient because only a few studies evaluating medications were conducted in developed/high-resource countries and could be included in this review. Several studies that were not included in this review evaluated medications in developing countries and generally reported positive outcomes for oxytocin and misoprostol at appropriate doses; however, adverse effects, particularly fever and shivering, were observed with misoprostol.

None of the included studies assessed the effectiveness of compression techniques. The success of uterine-sparing procedures and surgeries—such as uterine balloon tamponade, embolization, compression sutures, and pelvic vessel ligation—in controlling bleeding without the need for additional procedures or surgeries ranged from 36 to 98 percent. There was very limited evidence for the effectiveness of hysterectomy. The strength of evidence for most of these procedures and surgeries was rated insufficient, as the data come from a limited number of small studies. Harms of interventions are diverse and not well understood.

Evidence related to systems-level interventions (e.g., implementation of protocols, audit of PPH cases and feedback to health care teams, or clinical care algorithms) for reducing the incidence or severity of PPH was mixed, with some data supporting audit and feedback or clinical care algorithms. However, because the interventions were heterogeneous, the overall body of evidence does not provide clear guidance about how to use systems-level interventions.

Additional research is needed to determine the most effective treatments for PPH and the order in which they should be used. Clinicians should, therefore, follow consensus guidelines, expert opinions, and local protocols to manage PPH. It is important for clinicians to recognize PPH as it occurs and to not delay instituting guideline-based measures to control bleeding.

## Overview of Clinical Research Evidence

**Table 1: Summary of Key Findings and Strength of Evidence for the Effectiveness of Interventions for Managing Postpartum Hemorrhage (PPH)**

Finding	SOE
<b>Pharmacological and other medical interventions</b>	
Evidence is insufficient to permit conclusions related to all outcomes for each pharmacological agent studied (oxytocin and other uterotonics, misoprostol, tranexamic acid, carboprost tromethamine, thrombomodulin, and recombinant factor VIIa [rFVIIa]) for PPH management.	○○○
<b>Procedures</b>	
Uterine artery embolization may control bleeding without additional procedures.	●○○
Evidence for the success of uterine balloon tamponade in controlling bleeding is insufficient.	○○○
<b>Surgeries</b>	
Uterine or other pelvic vessel ligation may control bleeding without additional procedures.	●○○
The strength of evidence is insufficient for the success of uterine compression sutures.	○○○
The strength of evidence is insufficient for all outcomes of hysterectomy.	○○○
<b>Combined interventions</b>	
Evidence is insufficient to determine if a combination of medical interventions for PPH, when compared with surgical interventions, affects length of hospital stay.	○○○
<b>Supportive care</b>	
Evidence is insufficient to assess the benefits of transfusion in the supportive management of PPH.	○○○

PPH = postpartum hemorrhage; SOE = strength of evidence

**Table 2: Summary of Key Findings and Strength of Evidence for Effectiveness of Systems-Level Interventions for PPH**

Finding	SOE
<b>Systems-level approaches</b>	
Evidence related to the effectiveness of systems-level interventions is mixed.	●●○
<ul style="list-style-type: none"> <li>No good-quality studies evaluating the effectiveness of systems-level interventions for managing PPH were identified.</li> <li>The interventions and outcomes evaluated were heterogeneous across studies.</li> <li>Some interventions were found to be effective in reducing the incidence and severity of PPH (e.g., audit of cases and feedback to health care teams, clinical care algorithms), while others were ineffective (e.g., implementation of protocols) or had negative effects on outcomes (e.g., revising the responsibilities of clinical teams).</li> </ul>	

PPH = postpartum hemorrhage; SOE = strength of evidence

**Table 3: Summary of Key Findings and Strength of Evidence for Harms of PPH Interventions**

Finding	SOE
<b>Pharmacological and other medical interventions</b>	
Methylergonovine maleate may not be associated with acute coronary syndrome or myocardial infarction.	●○○
Evidence is insufficient to permit conclusions about the harms associated with the other pharmacological and medical interventions that were assessed (oxytocin, sulprostone, tranexamic acid, carboprost tromethamine, rFVIIa, and transfusion in the supportive management of PPH).	○○○
<b>Procedures</b>	
The infertility rate among women who had embolization may be greater than the rate among the overall female population.	●○○
No association between embolization and spontaneous abortion in a subsequent pregnancy is evident.	●○○
There may be an association between embolization and the occurrence of hematoma and subsequent menstrual changes (including heavier, lighter, or irregular menses and amenorrhea).	●○○
Evidence is insufficient to permit conclusions about harms associated with other procedures, such as uterine tamponade.	○○○
<b>Surgeries</b>	
Uterine compression sutures may not be associated with subsequent preterm birth.	●○○
Evidence is insufficient to determine if uterine or other pelvic vessel ligation is associated with surgical injury.	○○○
Hysterectomy may be associated with operative organ damage and reoperation.	●○○

PPH = postpartum hemorrhage; SOE = strength of evidence

### Strength of Evidence Scale\*

High: ●●●	High confidence that the evidence reflects the true effect. Further research is very unlikely to change our confidence in the estimate of effect.
Moderate: ●●○	Moderate confidence that the evidence reflects the true effect. Further research may change our confidence in the estimate of effect and may change the estimate.
Low: ●○○	Low confidence that the evidence reflects the true effect. Further research is likely to change our confidence in the estimate of effect and is likely to change the estimate.
Insufficient: ○○○	Evidence either is unavailable or does not permit a conclusion.

\* The overall evidence grade was assessed based on the ratings for the following domains: study limitations, directness, consistency, precision, and reporting bias. Additional domains were considered, as appropriate: dose-response association, plausible confounding, and strength of association (i.e., magnitude of effect). For additional details on the methodology used to assess strength of evidence, please refer to: Owens DK, Lohr KN, Atkins D, et al. AHRQ series paper 5: grading the strength of a body of evidence when comparing medical interventions—Agency for Healthcare Research and Quality and the Effective Health-Care Program. J Clin Epidemiol. 2010 May;63(5):513-23. PMID: 19595577.

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## Gaps in Knowledge and Limitations of the Evidence Base

- Consensus about the definitions and criteria for PPH and first-line management strategies for PPH is lacking.
- Measures currently used to estimate blood loss are imprecise.
- Data on the long-term outcomes after PPH management are very limited.
- Only a few of the studies included in the review assessed medications commonly used to treat PPH. A number of studies (not addressed in the current review) have evaluated such medications to prevent and manage PPH in countries with fewer resources.
- More clarity is needed about the order in which medications should be used and which interventions should be used as second-line treatment.
- The order and timing for using compression techniques (e.g., uterine massage, bimanual compression) and for using supportive care (e.g., transfusion) are unclear.
- The literature about systems-level interventions is limited by the lack of analyses that seek to adjust for secular trends and changes in confounders, such as the proportion of births by cesarean section and the trend in rising body mass index.

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## Ordering Information

For electronic copies of this clinician research summary and the full systematic review, visit [www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage](http://www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage).

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## Source

The information in this summary is based on *Management of Postpartum Hemorrhage, Comparative Effectiveness Review No. 151*, prepared by the Vanderbilt University Evidence-based Practice Center under Contract No. 290-2012-00009-I for the Agency for Healthcare Research and Quality, April 2015. Available at [www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage](http://www.effectivehealthcare.ahrq.gov/postpartum-hemorrhage). This summary was prepared by the John M. Eisenberg Center for Clinical Decisions and Communications Science at Baylor College of Medicine, Houston, TX.

