CLINICAL PRACTICE GUIDELINE 17

Prevention and Management of
POSTPARTUM HEMORRHAGE
2024

Association of Ontario Midwives
Delivering what matters.

AUTHORS (2024)

Brittany-Lyne Carriere, RM
Elizabeth Cates, RM
Brianna Cavan, RM
Kim Cleland, RM
Abigail Corbin, RM, MHM
Vanessa Hébert (chair), RM
Cathy Kipp, RM
Tasha MacDonald, RM
Joanne Rack, RM, MSc
Maryam Rahimi-Chatri, RM
Hayley Ross, RM
Kyla Wong, RM
Sarilyn Zimmerman, RM
Anya Kortenaar, client representative
Rachel Warren, MA
Alexa Minichiello, MSc

CONTRIBUTORS (2024)

Mildri Behm, midwifery student
Cate Bester, RM
Barbara Borland, RM
Claire Carnegie, MPH
Carole Couchie, BHSc, RM
Lucia D'Amore, RM
Erin DeVeber, RM
Bounmy Inthavong, RM
Winter Kemila, midwifery student
Anna Meuser, RM
Crystal Mocan, midwifery student
Emily Roth, RM
Kaia Sloley, RM
Nicole Waithe, RM

CONTRIBUTORS (2016)

PPH CPG Work Group
Clinical Practice Guideline Committee
Quality, Insurance and Risk Management Program
AOM Staff

Suzannah Bennett, MHSc
Sara Chambers, RM
Kim Cleland, RM
Abigail Corbin, RM
Liz Darling, RM, PhD
Jenny Gilbert, MA
Stephanie Gingerich, RM
Jenni Huntly (chair), CPM, LM
Cathy Kipp, RM
Natalie Kirby, RM
Tasha MacDonald, RM, MHSc
Sarah McNiven-Scott
Anna Meuser, MPH
Linda Ngo, RM
Catherine Pestl, IBCLC
Jenna Robertson, RM, MA
Christine Sandor, RM
Dianne Smith, RM
Genia Stephen, RM, IBCLC
Dana Wilson-Li, midwifery student
Sarilyn Zimmerman, RM

ACKNOWLEDGEMENTS

The Association of Ontario Midwives respectfully acknowledges the financial support of the Ministry of Health in the development of this guideline.

The views expressed in this guideline are strictly those of the Association of Ontario Midwives. No official endorsement by the Ministry of Health is intended or should be inferred.

The AOM is committed, through our statement on Gender Inclusivity and Human Rights, to reflect and include trans, genderqueer and intersex communities in all aspects of our work.

In this document, there are references to sources that use gendered language to refer to populations of pregnant and birthing parents. To accurately represent these sources, the AOM may have maintained gendered language.

The AOM supports research and knowledge translation that engages and reflects the entire childbearing population.

AOM Clinical Practice Guideline No. 17: Prevention and Management of Postpartum Hemorrhage was approved by the AOM Board of Directors: March 26th, 2024.

This document replaces AOM Clinical Practice Guideline No. 17. 2016.

This document may be cited as: Association of Ontario Midwives. Prevention and Management of Postpartum Hemorrhage. Clinical Practice Guideline No. 17. Toronto: Association of Ontario Midwives; 2024.

ABOUT THIS CPG

This guideline reflects information consistent with the best evidence available as of the date issued and is subject to change. The information in this guideline is not intended to dictate a course of action, but to inform clinical decision-making. Local standards may cause practices to diverge from the suggestions within this guideline. If practice groups develop protocols that depart from a guideline, it is advisable to document the rationale for the departure.

Midwives recognize that client expectations, preferences and interests are an essential component in clinical decision-making. Clients may choose a course of action that differs from the recommendations in this guideline, within the context of informed choice. When clients choose a course of action that diverges from a clinical practice guideline and/or practice group protocol, this should be documented in their charts.

TABLE OF CONTENTS

AIM OF THE GUIDELINE

Statement of purpose

The goal of this document is to provide an evidence-based clinical practice guideline (CPG) for Ontario midwives and their clients that is consistent with the midwifery philosophy and model of care. Midwives are encouraged to use this CPG as a tool in clinical decision-making.

Objective

The objective of this CPG is to provide a critical review of the research literature on the prevention and management of postpartum hemorrhage (PPH) due to uterine atony. Evidence relating to the following will be discussed:

- Definition, incidence and causes
- Risk factors
- Prevention
- Assessment and blood loss measurement
- Treatment
- Recovery
- Client experiences

Literature search

A search of MEDLINE, CINAHL and the Cochrane Library from 2014 to 2023 was conducted using a defined search strategy. Literature from the original CPG was reviewed for inclusion. Reference lists of relevant systematic reviews and key papers were also reviewed. When synthesizing evidence, systematic reviews were prioritized; if no systematic reviews were found, randomized controlled trials (RCTs) and then observational studies were retrieved. Studies on surgical management of PPH were excluded, as surgical management is not within the scope of Ontario midwifery.

Outcomes of interest

The following outcomes were rated as either "critical" or "important" by the original 2016 PPH Work Group, following the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) process for each research question addressed in the guideline.

Critical outcomes:

- Birthing parent mortality
- Serious birthing parent morbidity (admission to ICU, renal or respiratory failure)
- Hysterectomy
- Blood loss > 1000 mL
- Birthing parent blood transfusion
- Manual removal of the placenta
- Admission/readmission to hospital due to bleeding

Important outcomes:

Birthing parent

- Blood loss > 500 mL
- Hemoglobin (Hb) measurement at 24 to 72 hours post-birth
- Use of additional therapeutic uterotonics
- Birthing parent dBP > 90 mmHg
- Nausea/vomiting between birth and discharge
- Administration of analgesia between birth and discharge
- Chest/breastfeeding
- Afterpains and/or analgesia secondary to afterpains between birth and 24 hours

Neonatal

- Admission to NICU/special care nursery
- Neonatal jaundice requiring phototherapy or exchange transfusion
- Apgar < 7 at five minutes

Methods

This CPG uses the GRADE methodology for guideline development. The GRADE process determines the certainty of the evidence (how certain we should be of the results) as well as the strength of the recommendation. Certainty of evidence in this CPG is rated from very low to high, according to five GRADE domains: risk of bias, inconsistency, indirectness, imprecision and publication bias. Methodological concerns about the included studies, variability across results, applicability of the evidence to the Ontario midwifery context, precision of the results and completeness of the evidence base are considered as part of these domains. The PPH Updating Task Force's judgments about the certainty of evidence reflect the task force's confidence that available evidence correctly reflects the true effect of an intervention and is sufficient to support decision-making.

Results from low certainty of evidence are described using language such as "may"; results from moderate certainty of evidence are described using language such as "probably" or "likely"; and results from high certainty of evidence are described without these qualifiers. Due to a lack of confidence in the results of very low certainty of evidence, results are not described but can be found in their corresponding GRADE table.

CERTAINTY OF EVIDENCE	How certain we ought to be about an estimate of effect or association
High	Further research is very unlikely to change confidence in the estimate of effect. • This evidence provides a very good basis for decision-making.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate. • This evidence provides a good basis for decision-making.
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate. • This evidence provides some basis for decision-making.
Very low	Any estimate of effect is very uncertain. • This evidence does not provide much of a basis for decision-making.

Based on: (1-3)

Recommendations in this CPG are based on formal ratings of the certainty of evidence and are described as either strong or weak according to the GRADE approach. The strength of recommendation reflects the extent to which the PPH Updating Task Force is confident that the benefits of a recommended intervention outweigh its harms or vice versa. The strength of recommendation is influenced by the certainty of supporting evidence, the balance between desirable and undesirable effects, perceived variability or uncertainty in clients' values and preferences, implications for health equity, and the acceptability and feasibility of a proposed intervention given the unique context in which Ontario midwives work (e.g., home and community births, rural and remote practice). (1–5) Weak recommendations within this CPG use the terminology "may," and strong recommendations use the terminology "should."

Good practice statements in this CPG represent guidance that the PPH Updating Task Force deemed important but not appropriate for formal ratings of certainty of evidence, as there was no direct evidence on the research question. Good practice statements are made when the PPH Updating Task Force is confident that the action has a net benefit to the client and no sensible alternatives exist. (6)

Complete GRADE evidence tables used to summarize research and inform the recommendations in this guideline are available on the AOM website. A full description of the AOM's approach to clinical practice guideline development using GRADE is also available on the AOM website.

TYPES OF STATEMENTS IN THIS CPG

- **Recommendations:** Action statements about an intervention based on the certainty of the evidence, clinical considerations, preferences and values, health equity considerations, and acceptability and feasibility of implementation.
- **Good practice statements:** Statements whereby the net benefit of an intervention is large and unequivocal and the PPH Updating Task Force has considered it useful to provide guidance to clinicians. The evidence for good practice statements is typically difficult to collect and summarize, and therefore no formal rating of the certainty of evidence is undertaken.
- **Summary statements:** The PPH Updating Task Force has deemed a recommendation unnecessary according to standards of care.

STRENGTH OF RECOMMENDATION	The extent to which the PPH Updating Task Force is confident that the benefits of the recommended intervention outweigh its harms (or vice versa)
Strong	Benefits clearly outweigh risks and burdens (or vice versa). *Can be interpreted as:* • Most clients should be offered the intervention, assuming that they have been informed about and understand its benefits, harms and burdens. • Most clients would want the recommended course of action, and only a small proportion would not.
Weak	Benefits, risks and burdens are closely balanced. *Can be interpreted as:* • The majority of clients would want the suggested course of action, but an appreciable proportion would not. • Values and preferences vary widely.

Based on: (1-4)

Updating the CPG

This CPG was updated in 2024 to include recent literature published from 2009 to 2023. Based on consultation with the PPH Updating Task Force and a preliminary review of emerging research, all sections of this guideline were selected for updating. Changes have been made to the current edition of this guideline to reflect the new research.

Recommendations and good practice statements in this updated CPG are labelled [new 2024] or [2024]. See the table below for an explanation. Appendix A provides a detailed list of the updated or new recommendations and good practice statements in this guideline, along with an explanation of the changes.

Key to partial update labelling for recommendations and good practice statements	
Recommendation or good practice statement label	**Meaning of label**
[new 2024]	New recommendation or good practice statement as of 2024: • Indicates that the recommendation or good practice statement is new as of 2024. New evidence has prompted a change to or the addition of a recommendation or good practice statement. • An explanation of this change is provided in the Appendix.
[2024]	Reaffirmed recommendation or good practice statement as of 2024: • Indicates that the recommendation or good practice statement is consistent with evidence as of 2024. New evidence (or lack thereof) has not prompted a change to the original statement. • Small changes may have been made to the wording of this statement but do not affect the meaning.

Review

This CPG was reviewed using a modified version of the AGREE (Appraisal of Guidelines for Research and Evaluation) instrument and the AOM Values-Based Approach to CPG Development, as well as a consensus of the PPH Updating Task Force; the Clinical Knowledge Translation Committee; the Quality, Insurance and Risk Management Committee; and the AOM Board of Directors.

INTRODUCTION

Definition of PPH

There is no standard definition of PPH; guideline groups, researchers and health-care providers use varying meanings. (7) Historically, primary PPH (in the first 24 hours postpartum) has been defined using the threshold of 500 mL of blood loss following a vaginal birth and 1000 mL following a caesarean birth. These thresholds were informed by studies conducted during the 1960s, suggesting that average postpartum blood loss is 300 to 550 mL with a vaginal birth and 500 to 1000 mL with a caesarean.

The 2022 guidance on postpartum hemorrhage from the Society of Obstetricians and Gynaecologists of Canada (SOGC) classifies PPH by stage, ranging from mild to severe, based on blood loss as well as signs and symptoms. (8) The Royal College of Obstetricians (RCOG) in the UK similarly defines PPH based on severity, describing minor and major PPH. (9) For both guideline groups, 500 mL of blood loss is the threshold for diagnosis of PPH, even if defined as "mild" or "minor." This threshold of 500 mL is reiterated by the World Health Organization (WHO). (10)

The American College of Obstetricians and Gynecologists (ACOG) takes a different approach, defining PPH as "cumulative blood loss of greater than or equal to 1000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process." This definition has been endorsed by many other organizations, including the American Academy of Family Physicians; the American College of Nurse-Midwives; the Association of Women's Health, Obstetric and Neonatal Nurses; and the Society for Maternal-Fetal Medicine. Despite these new classifications, which ACOG expects will reduce the number of individuals classified as experiencing PPH, ACOG continues to suggest that blood loss that exceeds traditional thresholds for vaginal and caesarean births be investigated. (11) See Table 1 for more details.

TABLE 1: INTERNATIONAL DEFINITIONS OF PPH

Guideline group	PPH definitions and classifications
SOGC	**Stage 1 (mild):** blood loss of 500-1000 mL in vaginal birth and 1000 mL in CS. **Stage 2 (moderate):** blood loss of 1000-1500 mL, postural hypotension, heart rate > 110 bpm with or without signs or symptoms. **Stage 3 (severe):** blood loss > 1500 mL, systolic blood pressure < 80, heart rate > 120 bpm, and signs and symptoms.
RCOG	**Minor:** blood loss of 500-1000 mL. **Major:** blood loss > 1000 mL, further divided into moderate (1001-2000 mL blood loss) and severe (> 2000 mL blood loss).
WHO	**PPH:** blood loss ≥ 500 mL within 24 hours after birth. **Severe PPH:** blood loss of 1000 mL or more within 24 hours after birth.
ACOG	Cumulative blood loss ≥ 1000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process.

The physiologic consequences of blood loss vary by individual. Due to the increase in blood volume during pregnancy, parturients can lose as much as 30% of pre-delivery blood volume without hemodynamic consequences. (12) Postpartum bleeding may occur over several hours, and blood may be diluted by urine and amniotic fluid. Some individuals may remain well despite large amounts of blood loss, while others may experience hemodynamic consequences with smaller amounts. The use of a higher threshold of blood loss to define PPH may reduce the tendency to categorize blood loss without signs or symptoms as hemorrhage. This would result in less pathologization of normal blood loss and reduce unnecessary intervention in the postpartum period. However, clinically any amount of blood loss that results in signs and symptoms of hypovolemic shock or hemodynamic instability should be considered a PPH. (13)

Other researchers have suggested defining PPH based on a percentage change in hematocrit or hemoglobin (Hb) levels. Hematocrit or Hb values may not reflect current hematologic status and can also be affected by hydration

(especially with intravenous loading for epidural analgesia). Furthermore, hematocrit or Hb concentrations may be difficult to assess in an acute clinical emergency. (14)

Secondary PPH, which refers to delayed postpartum blood loss after 24 hours postpartum, is not addressed in this CPG.

Good Practice Statement:

1. Midwives should consider a postpartum hemorrhage to be:
   - Postpartum blood loss ≥ 1000 mL;
   - Any postpartum blood loss that causes signs and symptoms of hypovolemic shock or hemodynamic instability. **[new 2024]**

   Good practice statement

   This good practice statement recognizes that blood loss and its physiologic consequences vary across individuals. Midwives use various clinical indicators and account for community standards and hospital protocols to guide timely decision-making. They are skilled at responding to emergency situations in all birthplace settings.

Incidence of PPH

Primary PPH is estimated to occur in 2% to 6% of all births worldwide. (18,19) Between 2020 and 2022, the rate of PPH was 3% in Ontario.[1] (15) Between 2010 and 2015, PPH was the second most common cause of severe birthing parent morbidity in Canada. (16)

Population-level hospital data from live births that occurred in Canadian hospitals between 2003 and 2010 shows an overall rate of primary PPH of 6.2% in 2010 (up from 5.1% in 2003). This increase in PPH rates was driven by a higher incidence of atonic PPH, which increased from 3.9% in 2003 to 5% in 2010. Rates of PPH in Ontario ranged from 3.6% to 3.8% during this time period. (17) Similar increases in rates of atonic PPH have also been observed in Australia, the United States and Sweden. (18–20) Researchers have been unable to identify a clear cause for these recent population-level increases in PPH incidence; controlling for possible risk factors (e.g., high body mass index, older age at birth, induction of labour or mode of delivery) does not appear to change temporal trends. (17,18)

Incidence of PPH by birthplace

In Janssen and colleagues' study of outcomes of births attended by midwives in British Columbia between January 2000 and December 2004, PPH (not defined) occurred in 3.8% of planned home births and 6% of planned hospital births. (21) In Hutton and colleagues' 2016 study of home births and a matched sample of hospital births attended by Ontario midwives, PPH was documented in 2.5% of home births and 3.0% of hospital births. (22) This data comes from database entries where midwives classify PPH "based on estimated blood loss greater than 1000 mL, symptoms or required level of intervention." (22)

Complications of PPH

Between 2003 and 2009, PPH was directly responsible for 20% of birthing parent deaths worldwide and 8% of birthing parent deaths in high-income countries. (23) Globally, 14 million individuals experience PPH, which results in 70 000 deaths annually (500 deaths/100 000 cases of PPH). (24) Birthing parent deaths due to PPH are rare in the Canadian context, occurring at a rate of approximately 30/100 000 cases of PPH diagnosed from 1991 to 2010. (17,25)

Potential complications of PPH include organ dysfunction, coagulopathy, sepsis, and pituitary infarction (Sheehan's syndrome). (10,13,26) Less severe clinical outcomes include iron deficiency anemia, fatigue and delayed lactogenesis, though the incidence of such outcomes is difficult to quantify. (27,28) American researchers have used administrative hospital data to assess the absolute risks and the odds of complications associated with atonic PPH after blood transfusions and found that severe adverse outcomes are relatively rare. (19)

Causes of PPH

To understand the pathophysiology of PPH, it helps to consider the Four Ts: tone, tissue, trauma and thrombin. Because an estimated 70% of PPH cases are due to uterine atony, this guideline focuses on that cause. Abnormalities of uterine contraction contribute to atonic PPH; these include exhaustion of the uterine muscles, over-distension of the uterus, chorioamnionitis, anatomic distortion of the uterus and uterine-relaxing agents. For more information on managing other causes of PPH, see the AOM's *Emergency Skills Workshop Manual*. (29)

[1] BORN data on PPH is taken from the Complications data elements in the Labour and Birth encounter (up to one hour post-birth) and the Postpartum encounter (from one hour post-birth to discharge). The Complications element does not provide a definition of PPH (based on blood loss thresholds or the presence/absence of other clinical indicators).

Implementation tip: documentation

Good documentation is an essential part of high-quality care, as it helps ensure clear communication and appropriate care planning.

Midwives are advised to document informed choice discussions with clients. If a midwifery practice group has a written protocol about what midwives should discuss clients, the protocol should be followed. Any deviation from or addition to that discussion should be documented in the client's chart. If no such protocol exists, documentation should give details of the discussion.

Immediate postpartum blood loss, as well as signs and symptoms of hypovolemic shock or hemodynamic instability, should also be documented. Documentation of blood loss permits retrospective assessment and informs immediate and ongoing client care. Accurate blood loss estimation also contributes to midwifery data collection and research.

Practical advice on documenting informed discussions and charting in urgent and emergency situations is provided in the AOM *Emergency Skills Workshop Manual*.

RISK FACTORS

PPH often occurs in the absence of known risk factors. Major identifiable risk factors were present in only 38% of cases of atonic PPH treated with blood transfusion, from a population-based US study of hospital births between 1995 and 2004. (19) In a population-based study of births in Norway between 1999 and 2004, risk factors were noted in 70% of cases of obstetric hemorrhage where blood loss was > 1500 mL or blood loss of any volume was treated with blood transfusion. (30) While numerous studies have assessed risk factors for PPH, many of these studies are older and/or were conducted in low-income settings and may not be generalizable to a modern, highly resourced population. Due to the evolving nature of pregnancy care, the following risk factors may be of particular relevance to Ontario midwives.

Racism

Several studies from the US suggest that Black birthing parents experience inequitable rates of PPH. A first study found that Black birthing parents have increased odds of PPH compared with white birthing parents (aOR 1.23, 95% CI 1.1-1.4), while a second study found that Black birthing parents are less likely to receive greater levels of antihemorrhagic intervention than White birthing parents (aOR 0.55, 95% CI 0.30-0.98). (31,32) A third found that Black birthing parents are at higher risk of severe morbidity (shock, stroke, heart failure and transfusion) from PPH (aRR 1.18, 95% CI 1.16-1.21). (33)

Race is a socially constructed rather than biological category. Research has shown that individuals across "racial" groups have more in common than those within the same "racial group."(34) When interpreting the above results, it is critical to recognize systemic racism and colonialist legacies as underlying reasons for the observed inequities.[2] Though many researchers continue to incorrectly attribute inequities to biological differences, there is increasing recognition that racism and discrimination are root causes of harm. For example, Jardine et al. attribute their finding that birthing parents from an "ethnic minority background" are more likely to experience PPH to these individuals' not receiving the same level of observation and prophylactic treatment. (35) Another study has highlighted practice patterns, including provider biases, as significantly impacting PPH outcomes. (36) The research on health-care inequities demonstrates that Indigenous and racialized communities continue to grapple with implicit biases and overt discrimination from health-care providers, which is detrimental to the quality and timing of care these individuals receive. (39–43)

[2] Many resources are available to support midwives in learning about how systemic racism and colonialism impact health in Canada. Please see the AOM's racial equity toolkit for more information.

Research gap:

Ontario currently lacks a system for collecting race- and ethnicity-based health data, making the extent of differences in outcomes for the perinatal population difficult to ascertain. Moreover, the data indicators collected in the Ontario perinatal database do not reflect the importance and value of culturally appropriate care and safety provided by Indigenous, Black and racialized midwives. The AOM continues to advocate for perinatal data collection that is applicable and meaningful and upholds data governance frameworks such as the First Nations principles of ownership, control, access and possession (OCAP), as well as Black communities' engagement, governance, access and protection (EGAP) principles.

Good Practice Statement:

2. Midwives should recognize and address systemic racism and colonialism as causes of inequitable PPH outcomes for racialized clients. Midwives should engage in ongoing self-reflection, provide equitable access and advocacy, and support racially concordant client care. **[new 2024]**

   Good practice statement

   This good practice statement recognizes that racism, not biological difference, impacts inequitable rates of PPH for racialized clients. Acknowledging and addressing one's own implicit biases, as well as structural racism embedded in the health-care system, works toward closing gaps in the quality and safety of care for Indigenous, Black and racialized clients, and other equity-denied birthing communities.

Anemia

There is high heterogeneity in studies that examine the link between anemia during pregnancy and PPH; studies use varying Hb cut-offs to define anemia and measure Hb at different times throughout pregnancy. However, research has consistently demonstrated that whether measured at the start of pregnancy, during the third trimester or before delivery, low Hb is associated with increased odds of PPH (OR 1.39-4.27). (37–40) Furthermore, as Hb levels decrease, there appears to be an increase in odds of PPH (undefined). In one meta-analysis of six studies, the odds of PPH were four to five times greater (OR 6.15, 95% CI 3.86-9.79) when a Hb level of 70 g/L or less was used to define anemia, compared with a level of less than 100 g/L. (39) Midwives may initiate treatment of anemia during pregnancy with antenatal iron supplementation. For more information about iron deficiency anemia and treatment options during pregnancy, please see the AOM resource Iron deficiency anemia in the childbearing year.

Assisted reproductive therapy (ART)

There is a growing body of research that investigates the association between ART and PPH. A meta-analysis of two large cohort studies (n = 40 183), defining ART as in vitro fertilization or intracytoplasmic sperm injection, shows that ART increases the risk of PPH (RR 1.29, 95% CI 1.06-1.75). (41) Data from smaller observational studies supports these findings. (37,38,42)

There have been questions as to whether the association between ART and PPH is due to factors associated with infertility rather than ART itself. One common confounder in the studies to examine the impact of ART is the role of multiple gestations. A study that explored the extent to which multiple gestations mediate the risk of pregnancy complications after ART suggests that both direct and mediated pathways contribute to the association, meaning that a higher prevalence of multiples only partially explains the increased risk of PPH after ART. (42) Those who conceive with ART may be older, and they may also be more likely to experience placental abnormalities, which have been identified as independent risk factors for PPH. (43)

Induction or augmentation of labour

Studies have found an association between induction of labour and PPH (aOR 1.22–1.69), though the methods of induction in these studies were not examined. (38,44–47) The use of oxytocin for induction or augmentation of labour has been associated with increased risk of PPH, which has been hypothesized to be due to oxytocin receptor desensitization. (48–50) Those who receive high levels of oxytocin during labour are more likely to experience desensitization, and thus be less receptive to both synthetic and natural oxytocin in the third stage of labour. This can result in reduced contractility and a higher risk of PPH. (48,49,51)

Results from a 2020 study show that birthing parents with spontaneous onset of labour who were augmented with four to seven hours of oxytocin had higher odds of PPH (≥ 500 ml) than those who were augmented with oxytocin for two hours or less (aOR 2.36, 95% CI 1.64-3.40). (48) Birthing

parents who were induced and received seven to 12 hours of oxytocin had higher odds of PPH than those who were induced with less than two hours of oxytocin (aOR 1.51, 95% CI 1.05-2.19). For induction, research has found a dose response relationship where the longer the duration of oxytocin use, the greater the risk of PPH. (48)

Duration of labour

There is a large body of evidence that examines the impact of duration of labour on the risk of PPH, though this evidence is complicated by varying definitions of prolonged labour and potential confounders (e.g., oxytocin use). Several studies suggest that a prolonged second stage of labour (52–55) as well as a prolonged third stage (55–58) increase the odds of PPH. Additionally, studies have found an association between length of pushing time and PPH. (59,60)

Choice of birthplace

A 2020 meta-analysis of 16 studies that examined the links between place of birth and birth interventions also explored the rates of PPH, finding that clients who planned to give birth at home were less likely to experience PPH than those who planned hospital births, in settings where care was well integrated into the health-care system (OR 0.66, 95% CI 0.54-0.80). (61) For nulliparous clients, the odds of PPH were no different for those planning home birth vs. hospital birth. These studies took place in health-care systems similar to the Ontario context, where both active management and physiologic or expectant management were available, regardless of birthplace setting. Systematic review authors point to the importance of midwives' and clients' risk assessment, which helps ensure the safety of home birth.

Water birth

Results from a 2022 meta-analysis found lower odds of PPH (blood loss > 1000 mL) in the water birth group compared with those who did not give birth in the water (OR 0.76, 95% CI 0.66-0.89). (62) However, they found no significant differences in the incidence of PPH defined as blood loss of 500-1000 mL (OR 0.94, 95% CI 0.50-1.78).

Additional risk factors

Table 2 describes antenatal and intrapartum factors associated with PPH in meta-analyses and large-cohort and case control studies, where PPH was defined as blood loss ≥ 1000 mL or blood loss resulting in blood transfusion, hysterectomy or other procedure to control bleeding (e.g., surgical repair). It is not clear how the presence of multiple risk factors affects the overall risk of PPH in a given pregnancy.

TABLE 2: SELECTED RISK FACTORS FOR ATONIC PPH

	Risk factor	Range of aOR or ORs	Sources
Stronger risk factors (OR > 4)			
Known before birth	**Placenta previa**	6.38-14.43	(37,46,63–66)
Moderate risk factors (OR 2-4)			
Known before birth	**Multifetal gestation**	2.11-3.77	(38,44–46,63–66)
	Uterine fibroids	2.0-4.0	(38,66–68)
	Chorioamnionitis	1.88-2.66	(38,44,46,63)
	Previous PPH	1.59-4.94	(37,69–71)
	Hypertensive disorders of pregnancy	1.53-2.88	(38,44,46,63,66,72,73)
	Parity > 5	1.4-2.53	(46,66)
	Previous CS	1.3-2.68	(37,45,66,69)
Known after birth	**CS with labour**	1.7-3.16	(38,44,45)
	Birthweight > 4500 g	1.46-3.15	(38,45,46,63,74)
	CS	1.39-8.79	(46,63,64,66,67,75)
	Instrumental delivery (forceps or vacuum)	1.34-3.11	(46,47,63,66)

	Risk factor	Range of aOR or ORs	Sources
	CS without labour	1.3-2.47	(38,44,45)
Weaker risk factors (OR < 2)			
Known before birth	**BMI ≥ 30 kg/m2**	1.86	(76)
	Age < 20	1.47-1.8	(44,46,63)
	SSRI exposure	1.34-2.6	(77,78)
	32-36 weeks' GA	1.31-1.42	(46,65)
	Polyhydramnios	1.3-1.9	(44,63,66)
	Parity = 0	1.10-1.91	(38,45,46,69)
	Age ≥ 40	1.08-1.7	(44,45,79)

Good Practice Statement:

3. Identification of risk factors for PPH should occur in an ongoing manner throughout the course of antenatal and intrapartum care. Midwives should consider their clients' risk factors, preferences, values and risk tolerance, in informed choice discussions about options for management of the third stage of labour and choice of birthplace. **[2024]**

Good practice statement

This good practice statement recognizes continuity of care and midwives' abilities to identify emerging risk factors for PPH, as well as the client as the primary decision-maker.

APPROACHES TO MANAGEMENT OF THE THIRD STAGE

Defining third-stage management approaches

Expectant management

The term "physiologic management" is often used interchangeably with "expectant management" in the context of obstetric research. However, "expectant management" often describes the absence of active management, rather than the coordinated activities used by the midwife in providing physiological third-stage care to a client. Traditionally, expectant third-stage management has been characterized as a "hands-off" approach in which:

- A uterotonic agent is not administered prophylactically;
- Placental separation is awaited without intervention;
- Cord clamping is delayed;
- The placenta is born spontaneously through birthing parent effort or gravity alone.

Physiologic management

Physiologic management encompasses many of the same components of expectant management (e.g., absence of uterotonic, no controlled cord traction, delivery of optimal cord clamping). However, physiological "care," as understood by midwives and midwifery researchers, also encompasses actions meant to promote the physiological processes of the third stage. (80,81) While there is no consensus about what constitutes physiological third-stage care, the following factors are often included in more expansive definitions:

- Facilitating a comfortable, warm environment;
- Encouraging an upright position to facilitate birth of placenta;
- Refraining from fundal massage;
- Paying close attention to signs of excessive blood loss;
- Being mindful of direct and indirect signs of placental separation, including those observed by the parturient;
- Occasionally "lifting" or "easing" the cord to bring out the placenta once separation has occurred;
- Facilitating immediate skin-to-skin contact with the newborn, along with early chest/breastfeeding.

Hastie and Fahy's model of "midwifery guardianship" proposes additional criteria for "holistic psychophysiological" third-stage care conducive to sensations of calmness, mindfulness and safety. They theorize that environmental conditions that facilitate relaxation, skin-to-skin contact and early chest/breastfeeding optimize processes that encourage oxytocin release and uptake and uterine contraction and retraction. (82,83) Psychophysiological care is thought

to stimulate parasympathetic processes, producing a cascade of hormones (oxytocin, endorphins, prolactin, adrenocorticotrophic hormone and catecholamines) that stimulate the endogenous physiological processes of the third stage of labour. (82) In physiologic management, midwives support hormonal, psychological and physiological processes that encourage endogenous oxytocin production, such as maintaining a calm, unhurried, warm environment and upright positioning. Midwives consider physiologic management an appropriate approach to the third stage of labour in clients with physiologic labour and birth.

Active management

Historically, an active management package included the administration of uterotonic agents, controlled cord traction and uterine massage after delivery of the placenta as methods for preventing PPH. The implementation of these components varied: different uterotonics were used, in different doses, using different routes, at different times. Controlled cord traction may have been used, depending on provider preference and skill, and timing of the clamping and cutting of the cord also differed. Today active management is increasingly defined as the use of a prophylactic uterotonic alone (8,83), and no guideline groups recommend uterine massage. See Table 3 for more details on international approaches.

TABLE 3: APPROACHES TO THE MANAGEMENT OF THE THIRD STAGE OF LABOUR

	Physiologic	Expectant	Active (WHO 2012)	Active (FIGO 2022)	Active (SOGC 2022)
Prophylactic uterotonic	No	No	Yes	Yes	Yes
Cord clamping	After the cord stops pulsing or the placenta is delivered	After the cord stops pulsing or the placenta is delivered	1-3 minutes after birth (19)	Delayed > 1 minute after birth	Delayed > 1 minute after birth
Controlled cord traction	No. Occasionally, "lifting" or "easing" the cord to bring out a placenta once separation has occurred	No	Optional and only with a skilled attendant	Only with a skilled attendant	No
Uterine massage	No	No	No	No	No
Other aspects	Immediate skin-to-skin; early chest/ breastfeeding; upright position				

Third-stage management: active vs. expectant

A 2019 Cochrane review identified four RCTs (n = 4829) that compared active management with expectant management in the third stage. (85) Results from meta-analyses show that for **participants at low risk of bleeding**, as defined by individual study authors, the effects of active management on reducing rates of blood loss ≥ 1000 mL are unclear, due to *very low certainty of evidence*. However, results show that active management probably reduces the need for blood transfusion, incidence of primary blood loss ≥ 500 mL, and use of therapeutic uterotonics; while it likely increases afterpains in this low-risk population (*moderate certainty of evidence*). It may also increase postnatal vomiting between birth and discharge and return to hospital as an in- or outpatient due to bleeding, in low-risk participants (*low certainty of evidence*). For the general population of pregnant people in these studies, including those at both low and high risk of PPH, the effects of active management are very similar, although the evidence for this population suggests that active management may reduce rates of blood loss ≥ 1000 mL. For a closer look at differences in seven key outcomes for all vs. low-risk participants, see Table 4.

TABLE 4: CRITICAL AND IMPORTANT OUTCOMES FOR ALL VS. LOW-RISK PARTICIPANTS

Outcome	In low-risk participants, when compared with expectant management, active management:	In all participants, when compared with expectant management, active management:
Blood loss ≥ 1000 mL	Has uncertain effects	May result in 16 fewer per 1000
Blood transfusion	Probably results in 10 fewer per 1000	May result in 19 fewer per 1000
Return to hospital due to bleeding	May increase by 15 more per 1000	Probably increases by 15 more per 1000
Blood loss ≥ 500 mL	Probably results in 84 fewer per 1000	May result in 95 fewer per 1000
Therapeutic uterotonic use	Probably results in 141 fewer per 1000	May result in 171 fewer per 1000
Postnatal vomiting	May result in 53 more per 1000	May result in 44 more per 1000
Afterpains	Probably results in 27 more per 1000	Probably results in 27 more per 1000

Results from these studies are limited in their applicability to the Ontario midwifery context. There has been considerable criticism of the design, implementation and findings of three of the included trials, including a recognition of high rates of non-adherence, and lack of blinding in studies where blood loss was visually estimated. (71,73) Due to these limitations, it is unclear whether the decrease in risk of PPH associated with active management represents a true effect. Furthermore, these trials were undertaken in the 1980s and 1990s, meaning that the described ways of practising are outdated. For instance, active management is now increasingly defined as just the delivery of oxytocin. In the reviewed studies, the active management packages included various uterotonics that are no longer commonly used in Ontario; early cord clamping, which is no longer recommended; and controlled cord traction. The expectant management package as defined in these studies is also limited: it does not reflect many of the actions taken by midwives during the third stage of labour when active management is not chosen, such as the facilitation of a warm, calm, safe environment to stimulate the parasympathetic processes. As such, the results of these studies should be interpreted with caution and their limitations acknowledged.

Third-stage management: active vs. physiologic

Three large observational studies (n = 53 398) with low-risk individuals receiving care more aligned with a midwifery approach investigated the effects of active vs. physiologic or psychophysiologic management of the third stage of labour. (86–88) Across the three studies, physiologic or psychophysiologic management may have included: immediate, sustained skin-to-skin contact; gentle encouragement for support people to remain focused on the parent-infant dyad; early chest/breastfeeding; delayed cord clamping (DCC); spontaneous birth of the placenta using birthing parent effort and gravity; and continuity of care. Results from these studies show that physiologic management may be more effective at reducing rates of blood loss ≥ 500 mL (58 more per 1000) and ≥ 1000 mL (11 more per 1000), compared with active management (*low certainty of evidence*).

Authors argue that optimal management of the third stage of labour is complex and that facilitating optimal hormonal response includes both minimizing the release of catecholamines and facilitating the release of endorphins. (82,86) With optimal physiologic management of the third stage of labour, the risk of blood loss ≥ 500 mL or 1000 mL may be reduced to a greater degree than with active management.

Research gap:

To better understand the impacts of physiologic management, more research is needed. RCT evidence to demonstrate these impacts may not be feasible, as randomization to physiologic management may not elicit sensations of calmness, mindfulness and safety, components that are critical to this approach. Large-cohort studies exploring this approach should build on the important work of midwifery researchers in this area and further explore critical PPH outcomes.

Third-stage management: Indigenous cultural practices

Many cultures consider the placenta and the umbilical cord sacred, valuing this special connection with the baby. Indigenous birthing parents may follow specific teachings and perform cultural ceremonies related to birth, as well as placenta burial which necessitates that the placenta be brought home. It is critical to honour these ceremonies, and for midwives to provide culturally safe care, by supporting and advocating for Indigenous clients' access to perform their cultural practices in all health-care settings.

Indigenous midwives use a variety of methods to support Indigenous clients in the prevention and management of PPH, demonstrating extensive knowledge and training. Western biomedical world views and colonial structures have tried to discredit and eradicate these ways of knowing (89); yet despite these ongoing attempts at erasure, Indigenous midwives continue to reclaim and revitalize Indigenous birth knowledge and ceremonies.

The AOM's recognition of Indigenous knowledge, medicine and practices related to third-stage management is in response to the Truth and Reconciliation Commission Calls to Action, which urge "those who can effect change within the Canadian health-care system to recognize the value of Aboriginal healing practices and use them in the treatment of Aboriginal patients in collaboration with Aboriginal healers and Elders where requested by Aboriginal patients."(90)

Third-stage management: additional considerations

Choice of birthplace

A retrospective study (n = 16 210) based on the New Zealand College of Midwives' research database showed that the overall incidence of blood loss ≥ 1000 mL was 1.3% and that it did not vary significantly by place of birth (home, birth centre, secondary or tertiary hospital).(87) Across birth settings, active management was associated with increased risk of blood loss ≥ 1000 mL compared with physiologic management (adjusted RR 2.12, 95% CI 1.39-3.22). Active management was used in only 25.9% of home births.

There is a further imperative to support keeping birth close to home for Indigenous, remote and rural communities, as it is particularly "vital that Indigenous Peoples are surrounded with all the love and support possible, which includes their families, community members and the land." (91) This must be achieved by investing in community-based, Indigenous-led midwifery that prioritizes access to local, remote and on-reserve services, resulting in better health outcomes. (91) Birthing in community with care provided by Indigenous midwives ensures that Indigenous clients do not suffer harm associated with exposure to "the systemic bias, racism, and trauma that is part of Canadian health care systems, which continues the trauma of colonization." (91)

Delayed cord clamping

Delayed cord clamping is widely recommended and has become the standard of care across Ontario, as it is associated with beneficial impacts for the neonate, including improved long-term iron stores and Hb concentration. (92) There have been concerns around neonatal exposure to oxytocin before cord clamping if placental transfusion is not complete; however there is no research that examines these impacts. (93) Theoretically, DCC could prolong the third stage of labour, which contributes to concerns that DCC may result in greater blood loss. However, research shows that when DCC is included as part of an active management package, there is a reduction in rates of blood loss ≥ 500 mL and in rates of manual removal of the placenta. DCC may make little to no difference to rates of blood loss ≥ 1000 mL, rates of blood transfusion, the need for additional uterotonics or admission to the NICU, compared with early cord clamping. Without the administration of a uterotonic, DCC may slightly reduce birthing parent Hb, but otherwise it may make little to no difference in rates of severe postpartum bleeding. (83,84) The impacts of DCC on hyperbilirubinemia outcomes are addressed by the AOM in CPG 18: Prevention and Management of Hyperbilirubinemia.

Chest/breastfeeding and skin-to-skin contact

Research has suggested that birthing parents who received uterotonics during third-stage management are less likely to chest/breastfeed at 48 hours, compared with those who did not receive intrapartum uterotonics. (94) This finding is important, as chest/breastfeeding and skin-to-skin contact can stimulate the release of oxytocin, which can help with uterine contraction, thus potentially reducing the risk of PPH.

Systematic review evidence shows that skin-to-skin contact may decrease estimated blood loss, as well as the duration of the third stage. (95) Further systematic review evidence supports skin-to-skin contact as a method of promoting chest/breastfeeding (94), which has been shown to have significant health benefits. (97,98) Chest/breastfeeding and skin-to-skin contact are also important for parent-infant bonding, impacting cortisol levels across the dyad. These accessible interventions align with midwifery values and the

promotion of physiologic, low-intervention birth. (93)

Herbal and homeopathic approaches

Some clients may know of and be interested in the use of herbal or homeopathic approaches during the third stage of labour to prevent PPH. (99) Midwives who support clients in their use of natural health products must have the appropriate knowledge, skills and judgment to do so. Of note, many herbal agents are considered natural health products and therefore do not carry a drug identification number (DIN); they are not covered by insurance, including the Ontario Drug Benefit (ODB), or for those enrolled in Ontario Works (OW) or the Ontario Disability Support Program (ODSP). As well, herbal agents may not be easily obtainable in rural or remote areas.

Systematic review evidence suggests that motherwort, used widely in China to prevent PPH, may reduce rates of PPH and result in fewer adverse events when used alone or in combination with oxytocin. (100) Research is very limited on the effectiveness of Capsella bursa-pastoris (shepherd's purse), which has contractile and anti-inflammatory properties; and Plantago major and Anethum graveolens (dill), both of which contain tannins and flavonoids that could stimulate estrogen receptors and smooth-muscle contraction. (101,102) Further high-quality research into the effectiveness and safety of herbal and homeopathic approaches to third-stage management would be beneficial.

Recommendations and Good Practice Statement:

4. Midwives should discuss the risks and benefits of physiologic management and active management with clients as part of an informed choice discussion. This discussion should address:
   - How risk factors, if present, may increase a client's risk of PPH and impact considerations about choice of birthplace;
   - The client's preferences, values and risk tolerance;
   - The client's cultural practices associated with the third stage.

   This discussion, including the client's choice, should be appropriately documented. **[2024]**

   Strong recommendation: low certainty of evidence

   This recommendation recognizes multiple reasonable approaches to third-stage management, including evidence that supports physiologic management by midwives. It also recognizes that the presence of one or more risk factors is not necessarily predictive of PPH, and that the client is the primary decision-maker.

5. Regardless of the third-stage management approach chosen, midwives should:
   - Offer delayed cord clamping;
   - Encourage immediate skin-to-skin contact, early chest/breastfeeding and other measures that may encourage the release and uptake of oxytocin;
   - Support the client's cultural practices and preferences associated with the third stage;
   - Await signs of placental separation and monitor for excessive blood loss. **[new 2024]**

   Good practice statement

   This good practice statement recognizes the benefits of delayed cord clamping and physiologic processes that encourage the release and uptake of oxytocin. It also recognizes midwives' ability to assess and monitor clients for signs of PPH and respond to emergency situations as they emerge.

6. When physiologic management is chosen, midwives should:
   - Await signs of placental separation;
   - Allow the placenta to be born spontaneously with birthing parent effort or gravity;
   - Consider guiding out the placenta after separation;
   - Support other hormonal, psychological and physiologic processes that encourage endogenous oxytocin production, such as maintaining a calm, warm environment and upright positioning. **[2024]**

   Strong recommendation: low certainty of evidence

   This recommendation supports physiologic birth, recognizing observational literature that demonstrates the benefits of physiologic management packages provided by midwives.

COMPONENTS OF THE ACTIVE MANAGEMENT PACKAGE

Type of uterotonic

Internationally, oxytocin is the recommended uterotonic for the prevention of PPH. A 2018 Cochrane network meta-analysis explores the effectiveness of various uterotonic agents and combinations of agents for the prevention of PPH, as well as the side effects of these approaches. (103) The network meta-analysis includes 196 RCTs (n = 135 559), with participants who had a vaginal birth (71.5% of studies) or caesarean birth, in hospital (95.4% of studies) or community settings. Eligible studies compared the systemic administration of uterotonic agents of any dosage, route or regimen at birth for prevention of PPH. Some studies included controlled cord traction, cord clamping and/or uterine massage as part of active management packages.

Results from the meta-analysis demonstrate that oxytocin is more effective than misoprostol, injectable prostaglandins and ergometrine, with fewer side effects in vaginal births. Oxytocin may reduce rates of blood loss ≥ 500 mL (*low certainty of evidence*), the need for blood transfusion (*very low to moderate certainty of evidence*) and harms/side effects (*very low to moderate certainty of evidence*) when compared with misoprostol, injectable prostaglandins and ergometrine.

Carbetocin appears to be similar to oxytocin, if not more effective for those who have vaginal births. Prophylactic carbetocin likely results in fewer cases of blood loss ≥ 500 mL, with little to no difference in rates of blood transfusions or side effects (*moderate certainty of evidence*) when compared with oxytocin. Carbetocin may also reduce the rate of additional uterotonic use (*low certainty of evidence*). The evidence related to carbetocin's effect on blood loss ≥ 1000 mL, as well as its effect on hypertension, is unclear. However, as a cost-effective, heat-stable uterotonic with a long duration of action, it could become a feasible option for community births. To better understand the effects of carbetocin in low-risk individuals having vaginal births, further research is warranted. See Table 5 for absolute numbers.

TABLE 5: UTEROTONICS COMPARED WITH OXYTOCIN FOR THE PREVENTION OF PPH IN VAGINAL BIRTHS

	Absolute risks per 1000			
	Carbetocin	**Misoprostol**	**Injectable prostaglandins**	**Ergometrine**
Blood loss > 500 mL	Probably results in 34 fewer	May result in 10 more	May result in 6 more	May result in 11 more
Blood loss > 1000 mL	Uncertain	Probably results in 6 more	Uncertain	May result in 2 fewer
Additional uterotonics	May result in 64 fewer	May result in 5 more	May result in 52 fewer	May result in 3 fewer
Blood transfusion	Probably results in 3 fewer	Probably results in 2 fewer	Uncertain	May result in 2 more
Vomiting	Probably results in 1 fewer	Probably results in 8 more	May result in 36 more	Probably results in 18 more
Hypertension	Uncertain	May result in 38 more	Uncertain	May result in 573 more
Fever	Probably results in 2 more	Probably results in 39 more	May result in 3 more	Uncertain

Route of administration

A 2020 Cochrane systematic review that included seven RCTs (n = 7817) compared IM and IV administration of prophylactic oxytocin in participants who had vaginal births at term. Results suggest that IV oxytocin, compared with IM, reduces the rate of blood transfusions (RR 0.44, 95% CI 0.26-0.77, p = 0.004) and the risk of blood loss ≥ 500 mL (RR 0.78, 95% CI 0.66-0.92, p = 0.004; *high certainty of evidence*); and probably reduces rates of blood loss ≥ 1000 mL (RR 0.65, 95% CI 0.39-1.09, p = 0.10), as well as serious birthing parent morbidity (RR 0.47, 95% CI 0.22-1.00, p = 0.05; *moderate certainty of evidence*). It may also reduce the

need for additional uterotonics (RR 0.78, 95% CI 0.49-1.25, p = 0.30; *low certainty of evidence*).

Though research suggests that IV administration may be more effective for the prevention of PPH, it is not the most feasible option in all settings. For clients with risk factors for PPH, the timing of the placement of an IV port may be an important consideration. For low-risk clients with no additional risk factors for PPH where an IV is not indicated for other clinical reasons and is therefore not set up, IM oxytocin is a reasonable choice. In those contexts, IM administration is the most accessible in terms of quick administration. See Appendix B for details on recommended IV and IM doses of oxytocin.

Timing of administration

One small RCT (n = 600) compared oxytocin administration (IM or IV) at one minute after delivery of the anterior shoulder versus one minute after birth, common times when a uterotonic is administered prophylactically in the Canadian setting. The study (*low certainty of evidence*) found that there may be little to no difference in the risk of blood loss ≥ 600 mL (RR 1.00, 95% CI 0.50-2.01, p = 1.00) according to timing of administration. (104) Both options are reasonable. Waiting until after birth to administer a prophylactic uterotonic in clients without prenatal ultrasounds reduces the theoretical risk of entrapping an undiagnosed twin, and it gives the midwife time to assess and palpate the fundus to exclude the presence of another baby. (105)

Controlled cord traction

Four RCTs examined the effectiveness of controlled cord traction (CCT) compared with no CCT in an active management package. (106,107) Results from meta-analyses suggest that CCT, as part of active management, reduces the risk of blood loss ≥ 500 mL (RR 0.93, 95% CI 0.88-0.99, p = 0.03), rates of manual removal of the placenta (RR 0.69, 95% CI 0.57-0.82, p < 0.0001), and pain (RR 0.78, 95% CI 0.61-0.99, p = 0.04; *high certainty of evidence*). However, CCT probably makes little to no difference in the risk of blood loss ≥ 1000 mL, rates of blood transfusion, additional uterotonic use and rates of operative procedures (*moderate certainty of evidence*). As noted in the *AOM's Emergency Skills Workshop Manual*, CCT may result in uterine prolapse and/or uterine inversion if effective counterpressure is not applied, especially if traction is applied before the uterus has contracted sufficiently. (29) Some clients receiving active management may be interested in CCT, while others may prefer a hands-off approach.

Recommendation:

7. When active management is chosen for the prevention of PPH, midwives should:
   - Use oxytocin as the uterotonic (IV or IM);
   - Consider carbetocin, where available, as a reasonable alternative to oxytocin;
   - Consider CCT, while guarding the uterus, after the placenta has separated. **[new 2024]**

   Strong recommendation: moderate certainty of evidence

   This recommendation recognizes a large body of research in support of oxytocin as an effective strategy to prevent blood loss with minimal side effects compared with other uterotonics. It also recognizes the small body of evidence supporting the use of CCT as part of an active management package.

Adjuncts to oxytocin

Uterotonics

Results from a 2018 Cochrane network meta-analysis indicate that the combination of misoprostol plus oxytocin and ergometrine plus oxytocin may each result in 37 fewer cases per 1000 of blood loss ≥ 500 mL compared with prophylactic use of oxytocin alone (*low certainty of evidence*) and likely makes little to no difference in rates of blood loss ≥ 1000 mL (*moderate certainty of evidence*). However, these combinations also have significant side effects. Moderate certainty of evidence shows that both combinations likely increase the rate of vomiting (18 and 25 more per 1000, respectively). High certainty of evidence shows that misoprostol plus oxytocin results in 51 per 1000 more cases of fever. Doses in the included studies ranged from 200 to 800 mcg. Ergometrine is vasoconstrictive and is contraindicated for those with hypertension or cardiovascular disease. There is also concern that it may increase the risk of retained placenta. (108,109) See Appendix B for dosages and pharmacokinetics.

Tranexamic acid

Tranexamic acid (TXA) is an inexpensive, stable anti-fibrinolytic agent used in surgery to prevent the breakdown of clots (fibrinolysis), thereby reducing blood loss. A systematic review of 16 RCTs (n = 7122) examined

the effectiveness of 1 g TXA alongside standard active management using oxytocin (IV or IM) for the prevention of PPH in participants with vaginal deliveries. (110) High certainty of evidence from meta-analyses found adding TXA to oxytocin reduces the need for blood transfusions (nine fewer per 1000) and additional uterotonics (74 fewer per 1000), while moderate certainty of evidence shows that it probably reduces rates of blood loss ≥ 500 mL (60 fewer per 1000) and ≥ 1000 mL (eight fewer per 1000) compared with oxytocin with placebo or no treatment. TXA increases rates of nausea or vomiting (45 more per 1000; *high certainty of evidence*), and it likely does not increase thromboembolic events (*moderate certainty of evidence*); there were only five instances of thromboembolic events across study participants. When limited to low-risk populations, the results are similar. See Appendix B for dosage and pharmacokinetics.

Additional considerations

When considering adjuncts for third-stage management, midwives must balance any benefit against the increased risk of side effects. Midwives use knowledge, skills and judgment in selecting appropriate adjuncts, given the clinical picture. Choice in adjuncts may also be influenced by availability and access.

Recommendation:

8. Midwives may consider concurrent administration of an additional uterotonic with oxytocin for active management of the third stage of labour, according to the clinical picture. **[new 2024]**

   Weak recommendation: low certainty of evidence

   This recommendation recognizes that midwives use knowledge, skills and judgment to determine if adjuncts are required, alongside a consideration of risks and benefits, client risk factors, client preferences and values and birthplace setting.

Uterine massage

Three RCTs investigated the effects of an active management package with or without uterine massage after placental delivery. (111–113) Pooled results show that routine use of uterine massage in an active management package may make little to no difference in any of the outcomes assessed, including blood loss (≥ 400 or 500 mL or ≥ 1000 mL), use of additional uterotonics, blood transfusion or other hemostatic procedures (*low certainty of evidence*). In one study, one-third (32.3%) of participants in the uterine massage group reported pain or discomfort when receiving uterine massage; and 1.4% asked to have uterine massage discontinued. (112) Importantly, if the uterus is massaged before the placenta has fully separated from the uterine wall, it may cause partial separation of the placenta, and hemorrhage may result.

Recommendation:

9. Uterine massage is not recommended as a routine component of active management of the third stage. **[2024]**

   Strong recommendation: low certainty of evidence

   This recommendation recognizes that the available research does not support the routine use of uterine massage after prophylactic oxytocin has been administered, as it introduces potential harm to clients with no clear benefit. There is no evidence available on the use of routine uterine massage where no prophylactic uterotonic has been administered.

Fundal tone assessment

After delivery of the placenta, fundal checks are routinely done by abdominal palpation. This practice allows for confirmation of uterine tone, as a uterus in a state of contraction will feel firm upon palpation, whereas a non-contracting uterus may feel soft and "boggy." Fundal checks also identify if the uterus is centrally located and positioned at or just below the umbilicus as expected. No studies were found that examined the effectiveness of uterine tone assessment in the immediate postpartum following vaginal birth. (13)

Summary statement

- Fundal tone assessment is an important part of how midwives assess uterine atony and monitor for possible complications. Fundal tone assessments do not include routine rubbing or massaging of the uterus and should be conducted with minimal disruption of the parent-infant dyad.

Measurement of blood loss

Blood loss can be measured in a variety of ways to aid in the diagnosis of PPH:

- Visual estimation, in which a health-care provider makes a quantitative estimate of the amount of blood loss;
- Gravimetric technique, in which a health-care provider weighs the amount of blood loss;
- Calibrated technique, in which a health-care provider calibrates blood collected (usually with a drape/collector bag) to provide a direct measurement.

Calibrated drapes

One RCT (n = 5561) compared the use of calibrated drapes with visual estimation for the measurement of blood loss after vaginal birth and found that calibrated drapes may slightly reduce severe morbidity (four fewer per 1000), blood transfusions (two fewer per 1000) and use of therapeutic uterotonics (seven fewer per 1000); and it may slightly increase rates of manual removal of the placenta (four more per 1000; *low certainty of evidence*) compared with visual estimation. (114)

When calibrated drapes were compared with gravimetric techniques (weighing of blood and blood-soaked materials) for the measurement of blood loss after vaginal birth, RCT evidence (n = 900) showed an increase in reported blood loss ≥ 500 mL (40 more per 1000); and little to no difference in the use of therapeutic uterotonics (*high certainty of evidence*). Calibrated drapes may also result in reduced rates of further operative procedures (four fewer per 1000) and manual removal of the placenta (four fewer per 1000); and they may make little to no difference to rates of blood transfusion, surgical procedures or embolization or postdelivery Hb (*low certainty of evidence*). (114)

Gravimetric methods

There is very low certainty of evidence from three observational studies that compared gravimetric methods with visual estimation, and therefore results must be interpreted with caution.

One retrospective study (n = 1001) examined the effectiveness of quantitative methods (weighing materials as well as blood collected using a buttocks drape) compared with visual estimation; it only noted a difference in the length of hospital stay for those who had quantitative blood loss (2.6 days) vs. estimated blood loss (3.2 days; *very low certainty of evidence*). (115) A second prospective cohort study (n = 150) that compared blood loss measurement using a gravimetric technique (weighing of gauze, pads, absorbent materials, plastic sheet and plastic bag) with visual estimation by health-care providers found that mean blood loss was visually underestimated by 91 mL to 92 mL. (116) Another small study (n = 112) that compared blood loss measurement using a gravimetric technique (sheets and gauze measured within Bellini scale for blood loss estimation) with visual estimation reported a higher mean estimated blood loss using the gravimetric technique than visual estimation in the first hour and second hour. In both studies, mean estimated blood loss was not clinically significant. (117)

Additional considerations

A number of simulation studies indicated that there may be a high level of error using visual estimation, with inaccuracy increasing with greater volumes of blood lost. (118–120) It is important to keep in mind that in simulation studies clinicians cannot make assessments considering other clinical indicators that guide the diagnosis of PPH. Beyond measurement of blood loss, practitioners have described their responses as "automatic, intuitive reactions to the speed, nature and visibility of blood flow."(121) Other clinical indicators are also used to determine when to initiate treatment. These include blood pressure; pulse; assessment of tone, tissue, trauma and thrombin; client-

reported light-headedness, dizziness or weakness; and/or consideration of risk factors.

Though visual estimation can be used regardless of birthplace, calibrated drapes and gravimetric methods may not be accessible or practical in all settings. The use of calibrated drapes may not be acceptable to birthing parents, as it necessitates a dorsal position for third-stage management. Although collecting and weighing blood-soaked materials could theoretically be done in the home setting, it is not practical in all situations, as it requires time and resources that may be unavailable to midwives.

Recommendation:

10. Midwives should routinely estimate blood loss visually. Quantitative methods may be used where feasible. **[new 2024]**

    Weak recommendation: low certainty of evidence

    This recommendation recognizes the limits of the research evidence on methods of blood loss estimation. It also recognizes the limited feasibility of implementing quantitative blood loss measurement outside of hospital settings and settings with limited care providers.

PHARMACOLOGICAL TREATMENT OF PPH

First-line treatment

Oxytocin is considered a standard first-line treatment for PPH in Canada and internationally. A 2020 Cochrane network meta-analysis included two RCTs that explored the effectiveness of oxytocin and misoprostol for the treatment of primary PPH. (122) Carbetocin was not included. Compared with oxytocin alone as a first-line treatment for PPH, misoprostol appeared to be less effective in treating PPH, and it introduced significant side effects. For every 1000 clients, low certainty of evidence showed that administration of misoprostol as a first-line treatment vs. oxytocin may result in:

- 54 more cases of additional blood loss ≥ 500 mL;
- 26 more cases of additional uterotonic use;
- 11 more cases of additional blood loss ≥ 1000 mL;
- 234 more cases of fever.

Misoprostol also likely introduces increased risk of blood transfusion (23 more per 1000) and vomiting (28 more per 1000; *moderate certainty of evidence*). Of these trials, only one administered prophylactic oxytocin as part of third-stage management, while the other administered no prophylactic uterotonic agent.

Research gap:

Though carbetocin has shown promise as a prophylactic agent in the prevention of PPH, its effectiveness for the treatment of PPH is not well understood. Research evidence is not currently available to determine whether carbetocin is effective as a first-line treatment for PPH in individuals having a vaginal birth. The WHO's *Roadmap to Combat PPH between 2023 and 2030* identifies as a top research priority the study of carbetocin's effectiveness and safety for treatment of PPH in those who receive carbetocin prophylactically. (24)

Recommendation:

11. Midwives should use oxytocin as the first-line uterotonic for the treatment of PPH due to uterine atony. **[2024]**

    Strong recommendation: moderate certainty of evidence

    This recommendation acknowledges the effectiveness of oxytocin as a first-line treatment. Further research on the efficacy of carbetocin compared with oxytocin is required.

Adjuncts to first-line treatment

Additional uterotonics

The same 2020 Cochrane network meta-analysis found that misoprostol in combination with oxytocin is likely more effective than oxytocin alone, resulting in 34 fewer cases of blood loss ≥ 500 mL and four fewer cases of blood loss ≥ 1000 mL per 1000 clients (*moderate certainty of evidence*). However, the addition of misoprostol likely increases the number of individuals who experience fever (312 more per 1000) and vomiting (29 more per 1000; *moderate certainty of evidence*). No difference was found in a composite of death or severe morbidity or the use of additional uterotonics. When considering the use of misoprostol as an adjunct to oxytocin for treatment, midwives must balance any benefits against the increased risk of side effects. See Appendix B for additional details on misoprostol dosages.

Recommendation:

12. Midwives may consider concurrent administration of an additional uterotonic with oxytocin for the treatment of PPH, considering client risk factors and the clinical picture. **[new 2024]**

    Weak recommendation: moderate certainty of evidence

    This recommendation recognizes the limited evidence on adjuncts, with current evidence demonstrating that the addition of misoprostol may improve some PPH outcomes but with significant side effects. Midwives must balance benefits and harms and consider client preferences, values and risk tolerance.

Tranexamic acid

A systematic review, including two RCTs (n = 14 363) investigated the use of TXA, an anti-fibrinolytic to prevent the breakdown of clots, as an adjunct in PPH treatment for participants who underwent a vaginal birth. (123,124) Participants were randomized to receive TXA or no treatment/placebo, along with usual care, which included the use of oxytocin. High certainty of evidence from the meta-analysis suggests that concurrent administration of TXA with oxytocin reduces rates of hysterectomy (three fewer per 1000). TXA also probably reduces rates of death due to bleeding (three fewer per 1000; *moderate certainty of evidence*) and may reduce rates of blood transfusions (42 fewer per 1000; *low certainty of evidence*) and admission to ICU (28 fewer per 1000; *low certainty of evidence*). See Appendix B for information on TXA dosages.

Recommendation:

13. Midwives may consider TXA as an adjunct PPH treatment, if available. **[new 2024]**

    Weak recommendation: low certainty of evidence

    This recommendation recognizes the literature that suggests that TXA may be a beneficial addition in PPH treatment. TXA is not currently available in all communities.

Second-line treatment

There is no consensus on the most effective second-line uterotonic for the treatment of primary PPH due to uterine atony, when oxytocin has failed to stop bleeding. Trial-based research is generally not feasible due to the emergency nature of PPH. Because of this lack of evidence, there is little to guide midwives in balancing the risks and benefits of each uterotonic while also considering the client's specific clinical context.

One US study described hospital-level patterns of second-line uterotonic use (methylergonovine, carboprost or misoprostol) in the treatment of uterine atony. (125) Statistical adjustments for demographic characteristics, mode of birth, medical and obstetric conditions, year of delivery and hospital characteristics did not explain the variation in practice, suggesting that second-line uterotonic usage is largely based on non-medical factors such as physician preference, drug availability, cost and community standards. These results are in agreement with the WHO recommendation that, because data is lacking, decisions for second-line uterotonic use where oxytocin has failed to stop bleeding "must be guided by the experience of the provider, the availability of the drugs, and by known contraindications."(10)

Good practice statement:

14. Available research does not clearly support the use of one particular uterotonic over another for second-line treatment of primary PPH due to uterine atony (ergot alkaloids, prostaglandins or carbetocin). Midwives should choose a second-line uterotonic based on clinical context. **[2024]**

    Good practice statement

    This good practice statement recognizes recognizes that in the absence of clear evidence, midwives should use their clinical experience, community standards, drug availability and the clinical context of the client and birth to guide second-line uterotonic use.

NON-PHARMACOLOGICAL TREATMENT OF PPH

Uterine massage

Uterine massage is also referred to as "rubbing up a contraction" or "massaging the fundus." (126,127) Massaging the atonic uterus is thought to stimulate myometrial contractions to diminish excessive bleeding and expel blood and retained clots. (128) Once the placenta has been delivered, massage is often recommended as a first step in treatment of atonic PPH. (10) Although uterine massage is frequently used as an intervention to expel clots, no research was identified evaluating its use.

Good practice statement:

15. In cases of uterine atony, midwives should consider performing uterine massage to stimulate a contraction following delivery of the placenta. Midwives should expel blood clots when clinically indicated. **[new 2024]**

    Good practice statement

    This good practice statement recognizes midwives' clinical judgment and skills in managing atonic PPH.

Emptying the bladder

A full bladder may prevent the uterus from contracting effectively, contributing to PPH. Encouraging the client to void or catheterizing the bladder may improve uterine atony. This step is typically undertaken after the administration of first-line treatment and/or uterine massage.

Summary statement

- Emptying the bladder is one common response midwives may use to manage PPH.

Bimanual compression

Bimanual compression of the uterus, performed internally or externally, is the simplest form of uterine tamponade. No studies were found that examined the effectiveness of internal bimanual compression. One systematic review (129) identified a small trial (n = 64) that examined the effectiveness of external uterine compression for management of PPH. (130) Due to very low certainty of evidence attributed to a small sample size and high risk of bias, we are uncertain of its effects.

A simulation study that compared one-provider vs. two-provider technique for bimanual compression found that bimanual compression by one provider could not produce adequate compression of the uterus for more than 150 seconds continuously. (131) The researchers suggest that even when correctly performed by a single provider, it may not be sufficient to compress the uterus. Midwives may consider a two-person technique, whereby one primary care provider applies internal lower uterine segment pressure with an assistant providing external pressure with both hands to the uterine fundus. This approach reduces fatigue and enables effective compression of the uterus for five minutes. (131) Despite limited evidence, bimanual compression is considered a useful and potentially life-saving method to temporarily control acute bleeding that has not responded to uterine massage and/or uterotonic agents.

Recommendation:

16. When bleeding caused by uterine atony is unresponsive to pharmacological treatment methods, midwives should consider bimanual compression as a useful and potentially life-saving method. **[new 2024]**

    Strong recommendation: very low certainty of evidence

    This recommendation recognizes that bimanual compression (internal or external) is one of a series of actions midwives may take to manage atonic PPH. A two-person approach may be more effective.

Uterine balloon tamponade

Evidence from case series and case reports has found the pooled success rate of UBT to be 85.9% (95% CI 83.9-87.9%) and when limited to vaginal deliveries, 87%. (132) "Success" of UBT was defined by systematic review authors as the number of UBT success cases divided by the total number of participants treated with UBT, "regardless of the definition of UBT success in each individual study." In comparing types of UBT, researchers have found success rates for the Bakri balloon of 91%, and 84% for the condom-loaded Foley's catheter. (133)

One systematic review examined the effectiveness of UBT for vaginal births from two angles: individual-level effectiveness of UBT (compared with standard care); and institution-level effectiveness of PPH management protocols with UBT (compared with PPH management protocols without UBT). (134)

One included RCT of 116 participants (*very low certainty of evidence*) compared the use of a condom-catheter UBT plus misoprostol with misoprostol alone for participants with PPH due to suspected uterine atony unresponsive to first-line treatment after vaginal birth in Benin and Mali. (135) The impacts of UBT plus misoprostol on surgical intervention and/or death, conservative surgical interventions, blood transfusions and transfer rates are unclear due to very low certainty of evidence. (123)

A second cluster randomized trial was found that examined the impacts of introducing UBT, with each hospital having a control (pre-introduction) period and an intervention (post-introduction) period. (136) Low certainty of evidence from this cluster RCT found that an institutional protocol of UBT use for PPH may increase the rate of surgical interventions and/or death (RR 4.08, 95% CI 1.07-15.58); rates of conservative surgical interventions (RR 2.82, 95% CI 1.03-7.71); and rates of blood transfusion (RR 1.24, 95% CI 0.86-1.80). (123) However, results from two non-randomized studies in high-income settings that examined institutional protocols for Bakri UBT found that they may lower rates of surgical interventions and/or death, with relative risks ranging from 0.33 to 0.95 (*low certainty of evidence*). (137,138)

There is a paucity of well-designed, well-controlled studies to examine the effectiveness of UBT on controlling bleeding in high-resource settings. However, evidence from case reports and case series continues to demonstrate its effectiveness in controlling PPH, which is of particular importance for community settings.

Recommendation:

17. Midwives should consider the use of UBT for atonic PPH that is unresponsive to other treatment methods, and where transport to hospital is necessary or when delays in accessing hospital-based care are anticipated. **[2024]**

    Weak recommendation: very low certainty of evidence

    This recommendation recognizes the growing body of literature supporting the use of UBT at all care levels and for all obstetric providers. It acknowledges that midwives attend births in the community and that use of UBT for intractable uterine atony is a potentially life-saving measure.

External aortic compression

In the presence of PPH unresponsive to uterotonics and interventions, external aortic compression has been used to reduce blood loss and promote stabilization of the client until further treatment is available. External aortic compression can be performed manually or with the use of a non-pneumatic anti-shock garment (NASG).

Manual external aortic compression

Manual external aortic compression involves abdominal compression of the aorta against the spinal column to impede blood flow to the uterus. One observational study

(n = 912) compared PPH outcomes in the time periods before and after the use of external aortic compression as an adjunct intervention. (139) We are uncertain of the effects of manual aortic compression on deaths, shock and morbid conditions from PPH, as there was very low certainty of evidence due to issues with risk of bias and imprecision.

Non-pneumatic anti-shock garment

An NASG is a cost-effective device that applies external pressure to the client's lower body and uterus to redirect blood flow upward to vital organs. It is commonly utilized in low-resource settings and can be used while awaiting transport or during transfer. One systematic review examined the effects of an NASG compared with standard care in one RCT and five observational studies. (140) Results from the RCT (*moderate certainty of evidence*) suggest that an NASG, compared with standard care, probably reduces birthing parent mortality (RR 0.43, 95% CI 0.14-1.33, p = 0.14) and severe birthing parent morbidity or death (RR 0.38, 95% CI 0.13-1.18, p = 0.10).

The five observational studies (*low certainty of evidence*) show similar results, with a reduction in birthing parent mortality when an NASG was used (RR 0.52, 95% CI 0.36-0.77, p = 0.001). Both RCT and observational literature suggest that an NASG may make little to no difference to rates of blood transfusion.

An NASG may be of particular use to midwives working in rural or remote settings while awaiting transport, in cases of severe PPH that are unresponsive to other treatment methods. (125)

Recommendation:

18. In the presence of unresponsive PPH, midwives may use external aortic compression to reduce blood loss and promote stabilization of a client until further treatment is available. External aortic compression may include:
    - Manual external aortic compression;
    - The use of an NASG, where available. **[new 2024]**

    Weak recommendation: very low certainty of evidence

    This recommendation acknowledges that midwives attend births in the community and that use of external aortic compression is a potentially life-saving measure for PPH unresponsive to other interventions when transport to hospital is necessary and delays in accessing hospital care are anticipated.

Clients who decline blood products

In a review of the evidence on blood volume replacement after severe PPH, midwifery researchers recommend that IV use of crystalloid fluids, either Ringer's lactate solution or normal saline (0.9% NaCl), should be "limited to the treatment of mild to moderate hemorrhage [undefined], and blood products, including packed RBCs, fresh frozen plasma, and platelets, should be the main volume replacement used during severe PPH." (141) If blood loss continues, large quantities of crystalloid fluids can dilute clotting factors and fibrinogen and impair coagulation, potentially dislodging clots that were preventing further bleeding. (141)

Options for the management of PPH among clients who decline blood products include recombinant factor VIIa (rVIIa), TXA, desmopressin, aprotinin and epoetin alfa, in place of allogeneic blood transfusion. (142) There is currently insufficient evidence to support the effectiveness of these treatments over blood transfusion.

Clients may decline blood products for a variety of personal, cultural and religious reasons. The majority of research on those who decline blood products involves members of the Jehovah's Witnesses religious group. (143,144) A retrospective study from the UK found that in a group of 90 Jehovah's Witnesses (116 births) followed for 14 years, the rate of PPH ≥ 1000 mL was 6% and one death occurred. (145) A second retrospective cohort study conducted at a New York hospital found that of 334 pregnant people who were Jehovah's Witnesses, 24 (6%) met the criteria for obstetric hemorrhage. There were two deaths, both attributed to PPH. (146) While these studies suggest that Jehovah's Witnesses are at increased risk of adverse outcomes related to PPH, the small size of these studies limits the precision of these findings.

There is great variance in the types of blood products and transfusions (e.g., allogeneic or autologous transfusion) clients may be comfortable accepting. (147) Because individuals vary in their choices regarding use of blood products, and because availability of bloodless alternatives may vary in different communities, a care plan is warranted in the event of severe PPH. (148) Care plans may include immediate treatment of prenatal anemia with antenatal iron

supplementation, advanced medical directives regarding blood products, and exploration of client preferences for treatment in the event of severe PPH. (149,150) If available in the community, midwives may consider offering clients a prenatal consult with a physician to discuss alternatives to blood products and their hospital protocol for management of severe PPH. Informed choice discussions related to blood and blood products should be documented.

Good practice statement:

19. For clients who decline blood and blood products, midwives should discuss possible increased risks of morbidity and mortality following severe PPH. Midwives should develop or facilitate a care plan in the event of severe PPH, when blood or blood products would usually be recommended. **[2024]**

    Good practice statement

    This good practice statement values the importance of respectful care and interprofessional collaboration to provide client access to options available in the community.

RECOVERY AND CARE FOLLOWING PPH

Bleeding in the postpartum period

Overall, there is a paucity of research to determine normal postpartum bleeding vs. bleeding patterns that indicate medical intervention. Midwives must therefore use their clinical judgment to determine when follow-up care is needed.

A systematic review of 18 studies looking at lochia patterns among participants who were not diagnosed with primary PPH found an average duration of lochia of 24 to 26 days. However, as bleeding beyond six weeks postpartum was also commonly observed, the authors emphasize the lack of a standard definition for clinically acceptable postpartum blood loss. (151) Heavy bleeding was defined as "requiring more than four pads per day for 10 days or more, or a perineal pad saturated every hour." The type or size of pad was not specified. One of the included studies found that those who had long labours and instrumental delivery experienced increased duration and amount of lochia. (152)

Individuals with a history of secondary PPH (OR 6.0, 95% CI 2.1-16.8), vaginal bleeding < 24 weeks' gestation (OR 3.0, 95% CI 1.6-5.9), third-trimester hospital admission for a variety of reasons (OR 2.0, 95% CI 1.4-2.8), smoking (OR 2.7, 95% CI 1.8-3.9), prolonged third stage (OR 3.1, 95% CI 1.2-7.5) or incomplete third stage (OR 2.1, 95% CI 1.0-4.4), or primary PPH ≥ 500 mL (OR 4.7, 95% CI 1.9-11.6) may be at increased risk of excessive bleeding in the postpartum period. This information may also aid midwives in diagnosing delayed or secondary PPH, occurring after the first 24 hours. (153)

Good practice statement:

20. Midwives should review with all clients:
    - Typical postpartum blood loss in the immediate postpartum period;
    - How to recognize atypical blood loss and signs and symptoms that may indicate shock or hemodynamic instability;
    - How to contact the midwife and access urgent care when necessary. **[2024]**

    Good practice statement

    This good practice statement recognizes the skill of midwives in providing health information to clients and normalizes care provided in the community setting.

Chest/breastfeeding following PPH

One observational study (n = 501) found that 16 individuals who experienced PPH chest/breastfed for a shorter duration than those who did not experience PPH (3.74 days vs. 8.42 days). (154) In both groups, the duration of chest/breastfeeding was very short (three to nine days), and it may be confounded by other factors and not accurately capture the preferences and values of midwifery clients.

One population-based Australian study in New South Wales (n = 39 787) explored the association between red blood cell transfusions as a result of PPH and chest/breastfeeding at discharge. (155) All participants had experienced PPH, although those who experienced massive hemorrhage or other comorbidities (as indicated by admission to ICU, transfusion of platelets and administration of coagulation factors or other serum) were excluded. Subjects who experienced PPH and

required blood transfusion were slightly less likely to have any record of chest/breastfeeding at discharge (aRR 0.94, 99% CI 0.92-0.95) compared with those who experienced PPH and did not receive transfusions.

In one nested multicentre study (n = 206), 70% of participants who experienced blood loss < 2000 mL and who had planned to chest/breastfeed were exclusively chest/breastfeeding in the first postpartum week, compared with fewer than 50% of those with blood loss ≥ 3000 mL. (27) While 85% of respondents reported that they had intended to chest/breastfeed, only 63% of participants were doing so during the first postpartum week. Blood loss > 1500 mL was associated with dyad separation within one hour of birth, and fewer than one-third of babies were in their birthing parent's arms within one hour of birth, which may have had an impact on success. Participants also self-reported delays in milk production after PPH. Overall, despite experiencing PPH, those who desired to chest/breastfeed achieved a high rate of initiation and duration. There was, however, a trend toward later initiation and higher rates of formula supplementation as estimated blood loss increased. (27)

Research on the impact of PPH on milk production is limited. In rare cases, difficulties with breastfeeding can be an initial symptom of absent or deficient prolactin secretion, which is attributable to Sheehan's syndrome, a rare complication of severe PPH. (27) Sheehan's syndrome is a necrosis of the pituitary gland that can be caused by hypovolemic shock and/or vascular insult. A major sign of Sheehan's is failure to lactate following severe obstetric hemorrhage. Other possible postpartum signs and symptoms include amenorrhea, oligomenorrhea, weakness, fatigue, hot flashes, decreased muscle mass and decreased libido.

Summary statement

- Lactation support, provided by midwives as a standard of care, may be an important part of recovery after PPH for individuals who plan to chest/breastfeed.

Placentophagy

The practice of placentophagy (consuming the placenta following birth) is common among nearly all placental mammals, except for cetaceans, seals, camelids and humans. (156) A study of 179 human societies found no evidence of placentophagy prior to 1970, although interest has increased in high-resource settings in recent years. (157) Reported effects of placentophagy include prevention of postpartum depression, increased milk production and reduction of postpartum bleeding, although the health benefits and risks have not been well studied. (157–159) The benefits of placentophagy are purportedly due to hormones and minerals found in the placenta, which compensate for declines during pregnancy. (160)

A study that analyzed the nutritional components of 10 ground human placentas found high levels of iron (149% of daily value), compared with iron levels in ground chicken (21%), ground beef (46%) and spinach (68%). No harmful levels of heavy metals, including lead, arsenic and mercury, were detected. (161) The presence of high levels of iron may contribute to beliefs about placentophagy as a treatment for PPH-related sequelae, but there is insufficient evidence of its effectiveness in treating iron deficiency. (162)

Contradictory reports highlight concerns about possible Group B Streptococcus infection resulting from placentophagy. (163,164) Given the small sample size of these studies, results should be interpreted with caution.

Research gap:

No research was found on the effects of placentophagy as a treatment for PPH or potential PPH-related sequelae.

Iron deficiency anemia

Estimates of iron deficiency anemia following PPH vary, though researchers consistently find that blood loss is negatively associated with Hb levels; as the amount of blood loss increases, Hb levels decrease. For example, in a secondary analysis of three RCTs, researchers found that postpartum anemia, defined as Hb < 100 g/L, was less frequent among birthing people with blood loss 500 mL to 999 mL (31%), and more frequent for those who experienced blood loss > 1000 mL (54%). (165) Furthermore, a large retrospective analysis in Germany (n = 43 807) found that the rate of anemia (< 80 g/L) was 13% among those with a blood loss of 501 mL to 1000 mL and 43.6% for those with blood loss > 1000 mL. (166)

A client's risk of postpartum anemia will depend on both their prenatal iron status and the extent of blood loss. (12,166) When PPH occurs, monitoring and treating iron deficiency anemia as warranted may improve both hematologic status and clinically relevant outcomes such as fatigue and quality of life for the client. For more information on iron deficiency anemia, see the AOM resource *Iron deficiency anemia in the childbearing year*.

Monitoring for iron deficiency anemia

Clinically significant anemia is usually described as Hb < 100 g/L at 24 to 48 hours postpartum. (167,168) Some researchers suggest that due to hemodynamic change combined with blood loss during the intrapartum period, a period of at least 48 hours should pass before assessing Hb levels. (12,167) One study suggests that if Hb is assessed between 24 and 48 hours postpartum, a lower diagnostic cut-off of < 80 g/L be used. (191) Other authors suggest that assessment of Hb is most reliable at one week postpartum, once the body has returned to pre-pregnancy circulating blood volume. (12,167) Serum ferritin values less than 15 µg/L are often considered to be highly sensitive and specific for the diagnosis of anemia during pregnancy. (167,169) However, because ferritin is an acute-phase reactant that is elevated in the presence of inflammation, and the immediate postpartum period is associated with a systemic inflammatory response, ferritin levels are likely to be artificially elevated for one to six weeks after delivery and therefore may be unreliable for diagnosing anemia during the postpartum period. (12,167,170,171)

In the absence of PPH, a routine assessment of Hb in the postpartum period may not be a community standard. In some cases, postpartum treatment of iron deficiency anemia may be based on prenatal levels.

Treatment of iron deficiency anemia: oral vs. IV iron therapy

Parenteral iron is increasingly presented as a safe, effective alternative to oral iron therapy for significant postpartum anemia. Parenteral preparations currently available in Canada include iron dextran, iron sucrose and sodium ferric gluconate.

Thirteen RCTs examined the use of oral vs. IV iron for the treatment of iron deficiency anemia in postpartum individuals. (172–175) Pooled results (*low certainty of evidence*) found that oral iron compared with IV iron therapy may increase gastrointestinal symptoms (121 more per 1000) and rates of red blood cell transfusions (18 more per 1000), and it may make little to no difference to serious adverse events. Low certainty of evidence from one study found that fatigue and depression scores decreased in both groups during the 12 weeks, with lower scores for those receiving IV iron. (176)

IV iron vs. blood transfusion

Researchers discourage blood transfusion for postpartum clients except as a life-saving measure. (168,177–179) Risks of blood transfusion include transmission of pathogens, transfusion reactions and allo-immunization. (168,178,179) IV iron has been proposed as a potential alternative to blood transfusion for managing severe iron deficiency anemia in postpartum individuals. One small RCT (n = 13) and one non-randomized quasi-experimental study (n = 44) compared IV iron with blood transfusion. Authors reported on fatigue at 12 weeks, as well as mean Hb levels at six weeks, though we are uncertain of the results due to very low certainty of evidence. (180) Further studies are needed, with larger sample sizes and critical outcomes.

Additional considerations

Clients in some communities may experience higher rates of nutritional deficiencies, and midwives should take this into consideration when recommending or offering treatment for iron deficiency anemia after PPH. Midwives should consider clients in their wider social and cultural context, exploring underlying issues related to food security, cultural factors and nutrition as part of the informed choice discussion on iron deficiency anemia following PPH.

IV iron is not typically administered by a midwife and is often given in a hospital outpatient setting. This may not be a viable option for individuals living in rural or remote settings; those who lack support with child care or transportation; or those who will face charges related to hospital admission due to their insurance status. The AOM continues to advocate that resources such as IV treatment and appropriate testing for hemopathologies be covered for pregnant people, regardless of their insurance status. Hospital admission may also interrupt chest/breastfeeding and infant-parent bonding.

For more information on iron deficiency anemia, see the AOM resource *Iron deficiency anemia in the childbearing year*.

Recommendation:

21. For clients who experience PPH and/or have signs and symptoms of iron deficiency anemia, midwives should recommend oral iron supplementation or IV iron supplementation, as clinically indicated. **[new 2024]**

    Strong recommendation: very low certainty of evidence

    This recommendation recognizes continuity of care and midwives' ability to effectively assess clients in the postpartum period. It also recognizes client preferences and values, as well as inequitable access to IV iron.

Perspectives and needs of clients who experience PPH and their families

Compared with acute clinical management of PPH, there is less information available to guide midwives in providing care to meet the physical and emotional needs of clients recovering from significant postpartum blood loss. (181)

Studies have shown that birthing people and their partners can suffer from long-term emotional and psychological effects of PPH, including post-traumatic stress disorder (PTSD), postpartum depression (PPD), anxiety and other mental illnesses. (182–187) These psychological effects can result in residual pain for the birthing person, as well as depression, persistent fear of dying and fear leading to elective caesarean sections for future births. (184,185,187,188) In one study, the fear and anxiety of PPH recurrence led to 21% of birthing people deciding not to have another child; and of those who did, 60% reported intense anxiety throughout the pregnancy. (184) Some birthing parents have also identified a desire in their partners to avoid another pregnancy, as a result of their PPH experience. (189) A recent systematic review found that of seven studies reporting on the association between PPH and PTSD, three showed no association, while two suggested that there may be an increased risk of PTSD in birthing people who have had PPH. (190)

Considerations for debriefing clients and families following PPH

In multiple qualitative studies, birthing parents and their support people describe a lack of information about PPH presented antenatally; a lack of communication during PPH; a lack of debriefing; and if there was debriefing, that it was delivered at inopportune times. (121,183,186,187,191) Debriefing should include:

- Information on what happened and, if possible, why it happened;
- Implications for postpartum care for the birthing person and infant;
- Impact on future pregnancies, including risk of reoccurrence;
- Possible effects on mental health. (121,183,186,187,191)

An important aspect of postpartum care for clients who have experienced PPH may be discussing the event with the client, their partner and possibly others who were present at the birth, as well as offering the client an opportunity for counselling if such resources are available in the community. (192,193) For more information on Ontario midwifery client experiences of PPH, see the AOM resource Midwifery Client Experiences of Postpartum Hemorrhage (181), as well as the client-directed resource *Life after postpartum hemorrhage: Recovering from the unexpected*. (194)

Practice points for communication during and following PPH

The best practices listed in Figure 1 have the potential to lessen the negative emotional and psychological impacts of PPH. (181,195,196)

FIGURE 1: Practice points for communication during and after PPH

During PPH	• Include client and family members or support people in decision-making during an emergency, supporting an informed choice process; • Help clients and families understand what is happening; • Manage emergency situations in a calm, skilled manner; • Ensure good communication with all involved health-care professionals during the emergency; • Ensure that health-care professionals, the client and support people are clear about who will assume the role of most responsible provider (MRP); • Provide information to reassure support people if they are waiting anxiously.
Hospital transfer	• Provide continuity of care, if possible, during transfers, e.g., midwives riding in the ambulance or starting IVs; • Advocate for clients' emotional and physical needs, e.g., have a private room away from other new families; • Facilitate access to baby for clients who require intensive care (or vice versa); • Facilitate regular updates with clients on their baby's progress if they cannot be with them; • Support chest/breastfeeding or milk expression, even if clients are in intensive care; • Keep baby skin-to-skin, if possible, during the management of PPH.
Follow-up	• Offer the client and support people the opportunity to discuss the events of the birth and review the charts and clinical notes. Flexible timing for these meetings is important—some clients may be ready before others; • Ensure good communication afterwards to help clients make sense of the experience.
Postnatal support	• Advocate for support, if available, from the client's primary care team after discharge. The ability to debrief and check in is important as clients recover and get back to normal life; • Offer or refer clients for counselling to address long-term mental health impacts.

CONCLUSION

Postpartum hemorrhage due to uterine atony is one of the most common obstetric emergencies. In preventing PPH, both active and physiologic management approaches are reasonable for third-stage management among clients with low-risk births. Midwives should discuss the risks and benefits of both approaches with all clients, facilitating the collaborative process of informed decision-making and recognizing clients as primary decision-makers in their care. This includes decision-making around managing the third stage and where to give birth (e.g., at home or in a birth centre, a hospital, a midwifery clinic, or a remote health centre). Ultimately, clients are best suited to decide which option suits them best, by weighing the risks and benefits within the context of their own values and interests.

As skilled primary care providers, midwives are trained to identify emerging risk factors and complications, manage emergency situations and seek out more specialized care when required. In all birth settings, midwives bring the necessary medical equipment and medication to respond to atonic PPH if it arises. Midwives work collaboratively with paramedics across Ontario, providing continuity of care during ambulance transfers and in the hospital when care must be transferred to another provider. Future investments in midwifery, such as an expanded pharmacopeia, will ensure that midwives have access to the full complement of medications needed to treat PPH, as well as the necessary equipment, such as NASGs, to ensure that all clients have equal, effective access to care.

In providing care to clients who experience PPH, midwives are well positioned to advocate for clients' emotional and physical needs during the emergency and to facilitate as much access to the newborn as possible to support chest/breastfeeding, skin-to-skin contact and bonding. Afterwards, midwives may offer clients and their support people the opportunity to debrief the experience, and they may provide a referral to counselling, if needed.

SUMMARY OF GOOD PRACTICE STATEMENTS & RECOMMENDATIONS

1. Midwives should consider a postpartum hemorrhage to be:

    - Postpartum blood loss ≥ 1000 mL;
    - Any postpartum blood loss that causes signs and symptoms of hypovolemic shock or hemodynamic instability. [new 2024]

    Good practice statement

    This good practice statement recognizes that blood loss and its physiologic consequences vary across individuals. Midwives use various clinical indicators and account for community standards and hospital protocols to guide timely decision-making. They are skilled at responding to emergency situations in all birthplace settings.

2. Midwives should recognize and address systemic racism and colonialism as causes of inequitable PPH outcomes for racialized clients. Midwives should engage in ongoing self-reflection, provide equitable access and advocacy, and support racially concordant client care. [new 2024]

    Good practice statement

    This good practice statement recognizes that racism, not biological difference, impacts inequitable rates of PPH for racialized clients. Acknowledging and addressing one's own implicit biases, as well as structural racism embedded in the health-care system, works toward closing gaps in the quality and safety of care for Indigenous, Black and racialized clients, and other equity-denied birthing communities.

3. Identification of risk factors for PPH should occur in an ongoing manner throughout the course of antenatal and intrapartum care. Midwives should consider their clients' risk factors, preferences, values and risk tolerance, in informed choice discussions about options for management of the third stage of labour and choice of birthplace. [2024] **Good practice statement**

    This good practice statement recognizes continuity of care and midwives' abilities to identify emerging risk factors for PPH, as well as the client as the primary decision-maker.

4. Midwives should discuss the risks and benefits of physiologic management and active management with clients as part of an informed choice discussion. This discussion should address:

    - How risk factors, if present, may increase a client's risk of PPH and impact considerations about choice of birthplace;
    - The client's preferences, values and risk tolerance;
    - The client's cultural practices associated with the third stage.

    This discussion, including the client's choice, should be appropriately documented. [2024]

    Strong recommendation: low certainty of evidence

    This recommendation recognizes multiple reasonable approaches to third-stage management, including evidence that supports physiologic management by midwives. It also recognizes that the presence of one or more risk factors is not necessarily predictive of PPH, and that the client is the primary decision-maker.

5. Regardless of the third-stage management approach chosen, midwives should:

    - Offer delayed cord clamping;
    - Encourage immediate skin-to-skin contact, early chest/breastfeeding and other measures that may encourage the release and uptake of oxytocin;
    - Support the client's cultural practices and preferences associated with the third stage;
    - Await signs of placental separation and monitor for excessive blood loss. [new 2024]

    ### Good practice statement

    This good practice statement recognizes the benefits of delayed cord clamping and physiologic processes that encourage the release and uptake of oxytocin. It also recognizes midwives' ability to assess and monitor clients for signs of PPH and respond to emergency situations as they emerge.

6. When physiologic management is chosen, midwives should:

    - Await signs of placental separation;
    - Allow the placenta to be born spontaneously with birthing parent effort or gravity;
    - Consider guiding out the placenta after separation;
    - Support other hormonal, psychological and physiologic processes that encourage endogenous oxytocin production, such as maintaining a calm, warm environment and upright positioning. [2024]

    ### Strong recommendation: low certainty of evidence

    This recommendation supports physiologic birth, recognizing observational literature that demonstrates the benefits of physiologic management packages provided by midwives.

7. When active management is chosen for the prevention of PPH, midwives should:

    - Use oxytocin as the uterotonic (IV or IM);
    - Consider carbetocin, where available, as a reasonable alternative to oxytocin;
    - Consider CCT, while guarding the uterus, after the placenta has separated. [new 2024]

    ### Strong recommendation: moderate certainty of evidence

    This recommendation recognizes a large body of research in support of oxytocin as an effective strategy to prevent blood loss with minimal side effects compared with other uterotonics. It also recognizes the small body of evidence supporting the use of CCT as part of an active management package.

8. Midwives may consider concurrent administration of an additional uterotonic with oxytocin for active management of the third stage of labour, according to the clinical picture. [new 2024]

    ### Weak recommendation: low certainty of evidence

    This recommendation recognizes that midwives use knowledge, skills and judgment to determine if adjuncts are required, alongside a consideration of risks and benefits, client risk factors, client preferences and values and birthplace setting.

9. Uterine massage is not recommended as a routine component of active management of the third stage. [2024]

    ### Strong recommendation: low certainty of evidence

    This recommendation recognizes that the available research does not support the routine use of uterine massage after prophylactic oxytocin has been administered, as it introduces potential harm to clients with no clear benefit. There is no evidence available on the use of routine uterine massage where no prophylactic uterotonic has been administered.

10. Midwives should routinely estimate blood loss visually. Quantitative methods may be used where feasible. [new 2024]

    Weak recommendation: low certainty of evidence

    This recommendation recognizes the limits of the research evidence on methods of blood loss estimation. It also recognizes the limited feasibility of implementing quantitative blood loss measurement outside of hospital settings and settings with limited care providers.

11. Midwives should use oxytocin as the first-line uterotonic for the treatment of PPH due to uterine atony. [2024] **Strong recommendation: moderate certainty of evidence**

    This recommendation acknowledges the effectiveness of oxytocin as a first-line treatment. Further research on the efficacy of carbetocin compared with oxytocin is required.

12. Midwives may consider concurrent administration of an additional uterotonic with oxytocin for the treatment of PPH, considering client risk factors and the clinical picture. [new 2024]

    Weak recommendation: moderate certainty of evidence

    This recommendation recognizes the limited evidence on adjuncts, with current evidence demonstrating that the addition of misoprostol may improve some PPH outcomes but with significant side effects. Midwives must balance benefits and harms and consider client preferences, values and risk tolerance.

13. Midwives may consider TXA as an adjunct PPH treatment, if available. [new 2024]

    Weak recommendation: low certainty of evidence

    This recommendation recognizes the literature that suggests that TXA may be a beneficial addition in PPH treatment. TXA is not currently available in all communities.

14. Available research does not clearly support the use of one particular uterotonic over another for second-line treatment of primary PPH due to uterine atony (ergot alkaloids, prostaglandins or carbetocin). Midwives should choose a second-line uterotonic based on clinical context. [2024]

    Good practice statement

    This good practice statement recognizes that in the absence of clear evidence, midwives should use their clinical experience, community standards, drug availability and the clinical context of the client and birth to guide second-line uterotonic use.

15. In cases of uterine atony, midwives should consider performing uterine massage to stimulate a contraction following delivery of the placenta. Midwives should expel blood clots when clinically indicated. [new 2024]

    Good practice statement

    This good practice statement recognizes midwives' clinical judgment and skills in managing atonic PPH.

16. When bleeding caused by uterine atony is unresponsive to pharmacological treatment methods, midwives should consider bimanual compression as a useful and potentially life-saving method. [new 2024]

    Strong recommendation: very low certainty of evidence

    This recommendation recognizes that bimanual compression (internal or external) is one of a series of actions midwives may take to manage atonic PPH. A two-person approach may be more effective.

17. Midwives should consider the use of UBT for atonic PPH that is unresponsive to other treatment methods, and where transport to hospital is necessary or when delays in accessing hospital-based care are anticipated. [2024]

Weak recommendation: very low certainty of evidence

This recommendation recognizes the growing body of literature supporting the use of UBT at all care levels and for all obstetric providers. It acknowledges that midwives attend births in the community and that use of UBT for intractable uterine atony is a potentially life-saving measure.

18. In the presence of unresponsive PPH, midwives may use external aortic compression to reduce blood loss and promote stabilization of a client until further treatment is available. External aortic compression may include:

    - Manual external aortic compression;
    - The use of an NASG, where available. [new 2024]

Weak recommendation: very low certainty of evidence

This recommendation acknowledges that midwives attend births in the community and that use of external aortic compression is a potentially life-saving measure for PPH unresponsive to other interventions when transport to hospital is necessary and delays in accessing hospital care are anticipated.

19. For clients who decline blood and blood products, midwives should discuss possible increased risks of morbidity and mortality following severe PPH. Midwives should develop or facilitate a care plan in the event of severe PPH, when blood or blood products would usually be recommended. [2024]

Good practice statement

This good practice statement values the importance of respectful care and interprofessional collaboration to provide client access to options available in the community.

20. Midwives should review with all clients:

    - Typical postpartum blood loss in the immediate postpartum period;
    - How to recognize atypical blood loss and signs and symptoms that may indicate shock or hemodynamic instability;
    - How to contact the midwife and access urgent care when necessary. [2024]

Good practice statement

This good practice statement recognizes the skill of midwives in providing health information to clients and normalizes care provided in the community setting.

21. For clients who experience PPH and/or have signs and symptoms of iron deficiency anemia, midwives should recommend oral iron supplementation or IV iron supplementation, as clinically indicated. [new 2024]

Strong recommendation: very low certainty of evidence

This recommendation recognizes continuity of care and midwives' ability to effectively assess clients in the postpartum period. It also recognizes client preferences and values, as well as inequitable access to IV iron.

REFERENCES

1. Balshem H, Helfand M, Schünemann HJ, Oxman AD, Kunz R, Brozek J, et al. GRADE guidelines: 3. Rating the quality of evidence. J Clin Epidemiol [Internet]. 2011 Apr;64(4):401–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21208779

2. Guyatt GH, Oxman AD, Kunz R, Falck-Ytter Y, Vist GE, Liberati A, et al. Going from evidence to recommendations. BMJ [Internet]. 2008 May 10;336(7652):1049–51. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18467413

3. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ [Internet]. 2008 Apr 26 [cited 2013 May 31];336(7650):924–6. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2335261&tool=pmcentrez&rendertype=abstract

4. Andrews J, Guyatt G, Oxman AD, Alderson P, Dahm P, Falck-Ytter Y, et al. GRADE guidelines: 14. Going from evidence to recommendations: the significance and presentation of recommendations. J Clin Epidemiol [Internet]. 2013 Jul;66(7):719–25. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23312392

5. Andrews JC, Schünemann HJ, Oxman AD, Pottie K, Meerpohl JJ, Coello PA, et al. GRADE guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. J Clin Epidemiol [Internet]. 2013 Jul;66(7):726–35. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23570745

6. Guyatt GH, Alonso-Coello P, Schünemann HJ, Djulbegovic B, Nothacker M, Lange S, et al. Guideline panels should seldom make good practice statements: guidance from the GRADE Working Group. J Clin Epidemiol [Internet]. 2016 Dec;80:3–7. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27452192

7. de Vries PLM, Deneux-Tharaux C, Baud D, Chen KK, Donati S, Goffinet F, et al. Postpartum haemorrhage in high-resource settings: Variations in clinical management and future research directions based on a comparative study of national guidelines. BJOG. 2023 Dec 31;130(13):1639–52.

8. Robinson debbie, Basso M, Chan C, Duckitt K, Lett R. Guideline No. 431: Postpartum Hemorrhage and Hemorrhagic Shock. Journal of Obstetrics and Gynaecology Canada. 2022 Dec;44(12):1293-1310.e1.

9. Royal College of Obstetricians and Gynaecologists. Prevention and Management of Postpartum Haemorrhage. BJOG. 2017 Apr;124(5):e106–49.

10. World Health Organization. WHO Recommendations for the Prevention and Treatment of Postpartum Hemorrhage [Internet]. Geneva; 2012 [cited 2014 Jul 30]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23586122

11. Practice Bulletin No. 183: Postpartum Hemorrhage. Obstetrics & Gynecology. 2017 Oct;130(4):e168–86.

12. Milman N. Postpartum anemia I: definition, prevalence, causes, and consequences. Ann Hematol [Internet]. 2011 Nov [cited 2013 Apr 8];90(11):1247–53. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21710167

13. Leduc D, Senikas V, Lalonde AB, CLINICAL PRACTICE OBSTETRICS COMMITTEE. Active management of the third stage of labour: prevention and treatment of postpartum hemorrhage. J Obstet Gynaecol Can [Internet]. 2009 Oct [cited 2013 Apr 7];31(10):980–93. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0020729209005992

14. Rath WH. Postpartum hemorrhage--update on problems of definitions and diagnosis. Acta Obstet Gynecol Scand [Internet]. 2011 May;90(5):421–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21332452

15. Better Outcomes Registry & Network (BORN) Ontario. Postpartum hemorrhage among pregnant individuals with a live or stillbirth . 2023.

16. Public Health Agency of Canada. Perinatal Health Indicators for Canada 2017: A report from the Canadian perinatal surveillance system. Ottawa; 2017.

17. Mehrabadi A, Liu S, Bartholomew S, Hutcheon J a, Kramer MS, Liston RM, et al. Temporal trends in postpartum hemorrhage and severe postpartum hemorrhage in Canada from 2003 to 2010. J Obstet Gynaecol Can [Internet]. 2014 Jan;36(1):21–33. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24444284

18. Knight M, Callaghan WM, Berg C, Alexander S, Bouvier-Colle MH, Ford JB, et al. Trends in postpartum hemorrhage in high resource countries: a review and recommendations from the International Postpartum Hemorrhage Collaborative Group. BMC Pregnancy Childbirth [Internet]. 2009 Nov 27;9:55. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19943928

19. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. Anesth Analg [Internet]. 2010 May 1;110(5):1368–73. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20237047

20. Ford JB, Roberts CL, Simpson JM, Vaughan J, Cameron CA. Increased postpartum hemorrhage rates in Australia. Int J Gynaecol Obstet [Internet]. 2007 Sep [cited 2014 Oct 26];98(3):237–43. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17482190

21. Janssen PA, Saxell L, Page LA, Klein MC, Liston RM, Lee SK. Outcomes of planned home birth with registered midwife versus planned hospital birth with midwife or physician. CMAJ [Internet]. 2009 Sep 15 [cited 2013 Jun 10];181(6–7):377–83. Available from: http://www.cmaj.ca/

content/181/6-7/377.full

22. Hutton EK, Cappelletti A, Reitsma AH, Simioni J, Horne J, McGregor C, et al. Outcomes associated with planned place of birth among women with low-risk pregnancies. CMAJ [Internet]. 2016 Mar 15;188(5):E80-90. Available from: http://www.ncbi.nlm.nih.gov/pubmed/26696622

23. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health [Internet]. 2014 Jun [cited 2014 Jul 14];2(6):e323-33. Available from: http://www.thelancet.com/journals/a/article/PIIS2214-109X%2814%2970227-X/fulltext

24. World Health Organization. A Roadmap to combat postpartum haemorrhage between 2023 and 2030. Geneva; 2023.

25. Joseph KS, Rouleau J, Kramer MS, Young DC, Liston RM, Baskett TF, et al. Investigation of an increase in postpartum haemorrhage in Canada. BJOG [Internet]. 2007 Jun;114(6):751–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17516968

26. Carroli G, Cuesta C, Abalos E, Gulmezoglu a M. Epidemiology of postpartum haemorrhage: a systematic review. Best Pract Res Clin Obstet Gynaecol [Internet]. 2008 Dec [cited 2013 Mar 24];22(6):999–1012. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18819848

27. Thompson JF, Heal LJ, Roberts CL, Ellwood DA. Women's breastfeeding experiences following a significant primary postpartum haemorrhage: A multicentre cohort study. Int Breastfeed J [Internet]. 2010 May 27 [cited 2013 Mar 27];5:5. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2889881&tool=pmcentrez&rendertype=abstract

28. Thompson JF, Roberts CL, Ellwood D a. Emotional and physical health outcomes after significant primary post-partum haemorrhage (PPH): a multicentre cohort study. Aust N Z J Obstet Gynaecol [Internet]. 2011 Aug [cited 2013 Apr 14];51(4):365–71. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21806578

29. Association of Ontario Midwives. Emergency Skills Workshop Manual. Toronto; 2021.

30. Al-Zirqi I, Vangen S, Forsen L, Stray-Pedersen B. Prevalence and risk factors of severe obstetric haemorrhage. BJOG [Internet]. 2008 Sep [cited 2014 Oct 28];115(10):1265–72. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18715412

31. Guan CS, Boyer TM, Darwin KC, Henshaw C, Michos ED, Lawson S, et al. Racial disparities in care escalation for postpartum hemorrhage requiring transfusion. Am J Obstet Gynecol MFM. 2023 Jun;5(6):100938.

32. Taylor K, Noel E, Chapple AG, Buzhardt S, Sutton E. Risk factors for postpartum hemorrhage in a tertiary hospital in South-Central Louisiana. The Journal of Maternal-Fetal & Neonatal Medicine. 2024 Mar 6;35(25):7353–9.

33. Gyamfi-Bannerman C, Srinivas SK, Wright JD, Goffman D, Siddiq Z, D'Alton ME, et al. Postpartum hemorrhage outcomes and race. Am J Obstet Gynecol. 2018 Aug;219(2):185.e1-185.e10.

34. Graves JL. Great Is Their Sin. Ann Am Acad Pol Soc Sci. 2015 Sep 10;661(1):24–50.

35. Jardine J, Gurol-Urganci I, Harris T, Hawdon J, Pasupathy D, van der Meulen J, et al. Risk of postpartum haemorrhage is associated with ethnicity: A cohort study of 981 801 births in England. BJOG. 2022 Jul;129(8):1269–77.

36. Lu MC, Fridman M, Korst LM, Gregory KD, Reyes C, Hobel CJ, et al. Variations in the Incidence of Postpartum Hemorrhage Across Hospitals in California. Matern Child Health J. 2005 Sep 18;9(3):297–306.

37. Liu CN, Yu FB, Xu YZ, Li JS, Guan ZH, Sun MN, et al. Prevalence and risk factors of severe postpartum hemorrhage: a retrospective cohort study. BMC Pregnancy Childbirth. 2021 Apr 26;21(1):332.

38. Nyfløt LT, Sandven I, Stray-Pedersen B, Pettersen S, Al-Zirqi I, Rosenberg M, et al. Risk factors for severe postpartum hemorrhage: a case-control study. BMC Pregnancy Childbirth. 2017 Jan 10;17(1):17.

39. Young MF, Oaks BM, Tandon S, Martorell R, Dewey KG, Wendt AS. Maternal hemoglobin concentrations across pregnancy and maternal and child health: a systematic review and meta-analysis. Ann N Y Acad Sci. 2019 Aug;1450(1):47–68.

40. Omotayo MO, Abioye AI, Kuyebi M, Eke AC. Prenatal anemia and postpartum hemorrhage risk: A systematic review and meta-analysis. J Obstet Gynaecol Res. 2021 Aug;47(8):2565–76.

41. Qin J, Liu X, Sheng X, Wang H, Gao S. Assisted reproductive technology and the risk of pregnancy-related complications and adverse pregnancy outcomes in singleton pregnancies: a meta-analysis of cohort studies. Fertil Steril. 2016 Jan;105(1):73-85.e1-6.

42. Oberg AS, VanderWeele TJ, Almqvist C, Hernandez-Diaz S. Pregnancy complications following fertility treatment-disentangling the role of multiple gestation. Int J Epidemiol. 2018 Aug 1;47(4):1333–42.

43. Tang D, Cheng Y, Feng X, Li X, Coyte PC. The use of IVF/ICSI and risk of postpartum hemorrhage: A retrospective cohort study of 153,765 women in China. Front Public Health. 2023 Mar 21;11.

44. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. Anesth Analg. 2010 May 1;110(5):1368–73.

45. Al-Zirqi I, Vangen S, Forsen L, Stray-Pedersen B. Prevalence and risk factors of severe obstetric haemorrhage. BJOG. 2008

Sep;115(10):1265–72.

46. Mehrabadi A, Hutcheon JA, Lee L, Kramer MS, Liston RM, Joseph KS. Epidemiological investigation of a temporal increase in atonic postpartum haemorrhage: a population-based retrospective cohort study. BJOG. 2013 Jun;120(7):853–62.

47. Graugaard HL, Maimburg RD. Is the increase in postpartum hemorrhage after vaginal birth because of altered clinical practice?: A register-based cohort study. Birth. 2021 Sep;48(3):338–46.

48. Erickson EN, Carlson NS. Predicting Postpartum Hemorrhage After Low-Risk Vaginal Birth by Labor Characteristics and Oxytocin Administration. J Obstet Gynecol Neonatal Nurs. 2020 Nov;49(6):549–63.

49. Nyfløt LT, Stray-Pedersen B, Forsén L, Vangen S. Duration of labor and the risk of severe postpartum hemorrhage: A case-control study. PLoS One. 2017;12(4):e0175306.

50. Belghiti J, Kayem G, Dupont C, Rudigoz RC, Bouvier-Colle MH, Deneux-Tharaux C. Oxytocin during labour and risk of severe postpartum haemorrhage: a population-based, cohort-nested case-control study. BMJ Open. 2011;1(2):e000514.

51. Balki M, Ramachandran N, Lee S, Talati C. The Recovery Time of Myometrial Responsiveness After Oxytocin-Induced Desensitization in Human Myometrium In Vitro. Anesth Analg. 2016 May;122(5):1508–15.

52. Matta P, Turner J, Flatley C, Kumar S. Prolonged second stage of labour increases maternal morbidity but not neonatal morbidity. Aust N Z J Obstet Gynaecol. 2019 Aug;59(4):555–60.

53. Dalbye R, Aursund I, Volent V, Moe Eggebø T, Øian P, Bernitz S. Associations between duration of active second stage of labour and adverse maternal and neonatal outcomes: A cohort study of nulliparous women with spontaneous onset of labour. Sex Reprod Healthc. 2021 Dec;30:100657.

54. Pergialiotis V, Bellos I, Antsaklis A, Papapanagiotou A, Loutradis D, Daskalakis G. Maternal and neonatal outcomes following a prolonged second stage of labor: A meta-analysis of observational studies. Eur J Obstet Gynecol Reprod Biol. 2020 Sep;252:62–9.

55. Ushida T, Matsuo S, Nakamura N, Iitani Y, Imai K, Nakano-Kobayashi T, et al. Reassessing the duration of each stage of labor and their relation to postpartum hemorrhage in the current Japanese population. J Obstet Gynaecol Res. 2022 Jul;48(7):1760–7.

56. Frolova AI, Stout MJ, Tuuli MG, López JD, Macones GA, Cahill AG. Duration of the Third Stage of Labor and Risk of Postpartum Hemorrhage. Obstetrics and gynecology. 2016 May;127(5):951–6.

57. Chikkamath SB, Katageri GM, Mallapur AA, Vernekar SS, Somannavar MS, Piaggio G, et al. Duration of third stage labour and postpartum blood loss: a secondary analysis of the WHO CHAMPION trial data. Reprod Health. 2021 Nov 14;18(1):230.

58. van Ast M, Goedhart MM, Luttmer R, Orelio C, Deurloo KL, Veerbeek J. The duration of the third stage in relation to postpartum hemorrhage. Birth. 2019 Dec;46(4):602–7.

59. Looft E, Simic M, Ahlberg M, Snowden JM, Cheng YW, Stephansson O. Duration of Second Stage of Labour at Term and Pushing Time: Risk Factors for Postpartum Haemorrhage. Paediatr Perinat Epidemiol. 2017 Mar;31(2):126–33.

60. Dionne MD, Deneux-Tharaux C, Dupont C, Basso O, Rudigoz RC, Bouvier-Colle MH, et al. Duration of Expulsive Efforts and Risk of Postpartum Hemorrhage in Nulliparous Women: A Population-Based Study. PLoS One. 2015;10(11):e0142171.

61. Reitsma A, Simioni J, Brunton G, Kaufman K, Hutton EK. Maternal outcomes and birth interventions among women who begin labour intending to give birth at home compared to women of low obstetrical risk who intend to give birth in hospital: A systematic review and meta-analyses. EClinicalMedicine. 2020 Apr;21:100319.

62. Cristina T, Mara T, Arianna S, Gennaro S, Rosaria C, Pantaleo G. Impact of waterbirth on post-partum hemorrhage, genital trauma, retained placenta and shoulder dystocia: A systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2022 Sep;276:26–37.

63. Mehrabadi A, Liu S, Bartholomew S, Hutcheon JA, Kramer MS, Liston RM, et al. Temporal trends in postpartum hemorrhage and severe postpartum hemorrhage in Canada from 2003 to 2010. J Obstet Gynaecol Can. 2014 Jan;36(1):21–33.

64. Li S, Gao J, Liu J, Hu J, Chen X, He J, et al. Incidence and Risk Factors of Postpartum Hemorrhage in China: A Multicenter Retrospective Study. Front Med (Lausanne). 2021;8:673500.

65. Davey MA, Flood M, Pollock W, Cullinane F, McDonald S. Risk factors for severe postpartum haemorrhage: A population-based retrospective cohort study. Aust N Z J Obstet Gynaecol. 2020 Aug;60(4):522–32.

66. Kramer MS, Berg C, Abenhaim H, Dahhou M, Rouleau J, Mehrabadi A, et al. Incidence, risk factors, and temporal trends in severe postpartum hemorrhage. Am J Obstet Gynecol. 2013 Nov;209(5):449.e1-7.

67. Kramer MS, Dahhou M, Vallerand D, Liston R, Joseph KS. Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? J Obstet Gynaecol Can. 2011 Aug;33(8):810–9.

68. Wang X, Wang G, Han R, Gao M, Wang F, Hong Y, et al. Uterine fibroids increase the risk of preterm birth and other adverse birth events: a systematic review and meta-analysis. Transl Pediatr. 2022 Jun;11(6):978–86.

69. Thies-Lagergren L, Kvist LJ, Gottvall K, Jangsten E. A Swedish register-based study exploring primary postpartum

hemorrhage in 405 936 full term vaginal births between 2005 and 2015. Eur J Obstet Gynecol Reprod Biol. 2021 Mar;258:184–8.

70. Ruiter L, Kazemier BM, Mol BWJ, Pajkrt E. Incidence and recurrence rate of postpartum hemorrhage and manual removal of the placenta: A longitudinal linked national cohort study in The Netherlands. Eur J Obstet Gynecol Reprod Biol. 2019 Jul;238:114–9.

71. Thams AB, Larsen MH, Rasmussen SC, Jeppegaard M, Krebs L. Incidence of postpartum hemorrhage and risk factors for recurrence in the subsequent pregnancy. Arch Gynecol Obstet. 2023 Apr;307(4):1217–24.

72. Lisonkova S, Sabr Y, Mayer C, Young C, Skoll A, Joseph KS. Maternal morbidity associated with early-onset and late-onset preeclampsia. Obstetrics and gynecology. 2014 Oct;124(4):771–81.

73. von Schmidt auf Altenstadt JF, Hukkelhoven CWPM, van Roosmalen J, Bloemenkamp KWM. Pre-eclampsia increases the risk of postpartum haemorrhage: a nationwide cohort study in the Netherlands. PLoS One. 2013;8(12):e81959.

74. Beta J, Khan N, Khalil A, Fiolna M, Ramadan G, Akolekar R. Maternal and neonatal complications of fetal macrosomia: systematic review and meta-analysis. Ultrasound Obstet Gynecol. 2019 Sep;54(3):308–18.

75. Taylor K, Noel E, Chapple AG, Buzhardt S, Sutton E. Risk factors for postpartum hemorrhage in a tertiary hospital in South-Central Louisiana. J Matern Fetal Neonatal Med. 2022 Dec;35(25):7353–9.

76. Fyfe EM, Thompson JMD, Anderson NH, Groom KM, McCowan LM. Maternal obesity and postpartum haemorrhage after vaginal and caesarean delivery among nulliparous women at term: a retrospective cohort study. BMC Pregnancy Childbirth [Internet]. 2012 Oct 18 [cited 2013 Mar 27];12:112. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3495044&tool=pmcentrez&rendertype=abstract

77. Skalkidou A, Sundström-Poromaa I, Wikman A, Hesselman S, Wikström A, Elenis E. SSRI use during pregnancy and risk for postpartum haemorrhage: a national register-based cohort study in Sweden. BJOG. 2020 Oct;127(11):1366–73.

78. Lindqvist PG, Nasiell J, Gustafsson LL, Nordstrom L. Selective serotonin reuptake inhibitor use during pregnancy increases the risk of postpartum hemorrhage and anemia: a hospital-based cohort study. Journal of Thrombosis and Haemostasis. 2014 Dec;12(12):1986–92.

79. Staniczenko AP, Wen T, Cepin AG, Guglielminotti J, Logue TC, Krenitsky N, et al. Deliveries Among Patients Aged 11-19 Years and Risk for Adverse Pregnancy Outcomes. Obstetrics and gynecology. 2022 Jun 1;139(6):989–1001.

80. Fahy KM. Third stage of labour care for women at low risk of postpartum haemorrhage. J Midwifery Womens Health [Internet]. 2009 [cited 2013 Mar 24];54(5):380–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19720339

81. Begley CM, Guilliland K, Dixon L, Reilly M, Keegan C. Irish and New Zealand midwives' expertise in expectant management of the third stage of labour: the "MEET" study. Midwifery [Internet]. 2012 Dec [cited 2013 May 15];28(6):733–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22015217

82. Hastie C, Fahy KM. Optimising psychophysiology in third stage of labour: theory applied to practice. Women Birth [Internet]. 2009 Sep [cited 2013 Jun 23];22(3):89–96. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19345629

83. Saxton A, Fahy K, Hastie C. Effects of skin-to-skin contact and breastfeeding at birth on the incidence of PPH: A physiologically based theory. Women Birth [Internet]. 2014 Dec 8 [cited 2014 Nov 5];27(4):250–3. Available from: http://www.sciencedirect.com/science/article/pii/S1871519214000572

84. World Health Organization. WHO Recommendations for the Prevention and Treatment of Postpartum Haemorrhage: Evidence base [Internet]. Geneva; 2012. 1–41 p. Available from: http://www.ncbi.nlm.nih.gov/books/NBK131946/

85. Begley CM, Gyte GM, Devane D, McGuire W, Weeks A, Biesty LM. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev [Internet]. 2019;2:CD007412. Available from: http://www.ncbi.nlm.nih.gov/pubmed/30754073

86. Fahy K, Hastie C, Bisits A, Marsh C, Smith L, Saxton A. Holistic physiological care compared with active management of the third stage of labour for women at low risk of postpartum haemorrhage: a cohort study. Women Birth [Internet]. 2010 Dec [cited 2013 Mar 27];23(4):146–52. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20226752

87. Davis D, Baddock S, Pairman S, Hunter M, Benn C, Anderson J, et al. Risk of severe postpartum hemorrhage in low-risk childbearing women in new zealand: exploring the effect of place of birth and comparing third stage management of labor. Birth [Internet]. 2012 Jun [cited 2013 Mar 26];39(2):98–105. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23281857

88. Dixon L, Tracy SK, Guilliland K, Fletcher L, Hendry C, Pairman S. Outcomes of physiological and active third stage labour care amongst women in New Zealand. Midwifery [Internet]. 2013 Jan [cited 2013 Jul 14];29(1):67–74. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22188999

89. Cole B. "The Very Future of our Nations": How Aboriginal Midwifery Represents a Practical Model for Utilization of Traditional Knowledge. Journal of Integrated Studies. 2017;10(1).

90. Truth and Reconciliation Commission of Canada. Truth and Reconciliation Commission of Canada: Calls to Action. Winnpeg; 2015.

91. National Council of Indigenous Midwives. Position Statement on Evacuation for Birth. 2020.

92. McDonald SJ, Middleton P, Dowswell T, Morris PS. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. Cochrane Database Syst Rev [Internet]. 2013 Jul 11 [cited 2013 Jul 11];7(7):CD004074. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23843134

93. Royal College of Obstetricians and Gynaecologists. Clamping of the Umbilical Cord and Placental Transfusion (Scientific Impact Paper No. 14) [Internet]. 2015. Available from: https://www.rcog.org.uk/globalassets/documents/guidelines/scientific-impact-papers/sip-14.pdf

94. Jordan S, Emery S, Watkins A, Evans JD, Storey M, Morgan G. Associations of drugs routinely given in labour with breastfeeding at 48 hours: analysis of the Cardiff Births Survey. BJOG [Internet]. 2009 Nov [cited 2013 Mar 24];116(12):1622–9; discussion 1630-2. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19735379

95. Almutairi WM, Ludington SM, Quinn Griffin MT, Burant CJ, Al-Zahrani AE, Alshareef FH, et al. The Role of Skin-to-Skin Contact and Breastfeeding on Atonic Postpartum Hemorrhage. Nursing reports (Pavia, Italy) [Internet]. 2020 Dec 25;11(1):1–11. Available from: http://www.ncbi.nlm.nih.gov/pubmed/34968307

96. Moore ER, Bergman N, Anderson GC, Medley N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev [Internet]. 2016;11:CD003519. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27885658

97. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Database Syst Rev [Internet]. 2002;(1):CD003517. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11869667

98. Pound CM, Moreau K, Rohde K, Barrowman N, Aglipay M, Farion KJ, et al. Lactation support and breastfeeding duration in jaundiced infants: a randomized controlled trial. PLoS One [Internet]. 2015;10(3):e0119624. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25747308

99. Li MX, Liu CR, Chen M, Shang HC, Wang W, Luo XC, et al. Effects of Motherwort Injection Versus Intramuscular Oxytocin for Preventing Postpartum Hemorrhage Among Women Who Underwent Cesarean Section. Front Pharmacol [Internet]. 2022;13:859495. Available from: http://www.ncbi.nlm.nih.gov/pubmed/35401190

100. Yu J, Cai Y, Su G, Li Y. Motherwort Injection for Preventing Postpartum Hemorrhage in Women with Vaginal Delivery: A Systematic Review and Meta-Analysis of Randomized Evidence. Evid Based Complement Alternat Med [Internet]. 2019;2019:1803876. Available from: http://www.ncbi.nlm.nih.gov/pubmed/31354850

101. Ghalandari S, Kariman N, Sheikhan Z, Mojab F, Mirzaei M, Shahrahmani H. Effect of Hydroalcoholic Extract of Capsella bursa pastoris on Early Postpartum Hemorrhage: A Clinical Trial Study. J Altern Complement Med [Internet]. 2017 Oct;23(10):794–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/28590768

102. Zahra K, Kimiya D, Nahid G, Zohre F, Sadat HS, Ali M. The effects of rectal suppositories of Plantago major and Anetheum Graveolens on postpartum hemorrhage: A randomized triple blinded clinical trial. J Herb Med [Internet]. 2022 Feb;31:100526. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2210803321001068

103. Gallos ID, Williams HM, Price MJ, Merriel A, Gee H, Lissauer D, et al. Uterotonic agents for preventing postpartum haemorrhage: a network meta-analysis. Cochrane Database Syst Rev [Internet]. 2018 Apr 25;4(4):CD011689. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29693726

104. Oguz Orhan E, Dilbaz B, Aksakal SE, Altınbas S, Erkaya S. Prospective randomized trial of oxytocin administration for active management of the third stage of labor. Int J Gynaecol Obstet [Internet]. 2014 Nov [cited 2015 Jul 7];127(2):175–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25108586

105. POPPHI. Prevention of Postpartum Hemorrhage: Implementing Active Management of the Third Stage of Labor (AMTSL) A Reference Manual for Health Care Providers. PATH; 2007.

106. Hofmeyr GJ, Mshweshwe NT, Gülmezoglu AM. Controlled cord traction for the third stage of labour. Cochrane Database Syst Rev. 2015 Jan 29;1(1):CD008020.

107. Hanafi S, El-Shehawy H, Meshmesh K. Impact of controlled cord traction in the management of the third stage of labor on postpartum hemorrhage. Evidence Based Women' s Health Journal. 2014 May;4(2):78–81.

108. Hammar M, Boström K, Borgvall B. Comparison between the Influence of Methylergometrine and Oxytocin on the Incidence of Retained Placenta in the Third Stage of Labour. Gynecol Obstet Invest. 1990;30(2):91–3.

109. Begley CM. A comparison of "active" and "physiological" management of the third stage of labour. Midwifery [Internet]. 1990 Mar [cited 2013 Jul 28];6(1):3–17. Available from: http://www.ncbi.nlm.nih.gov/pubmed/2182978

110. Abu-Zaid A, Baradwan S, Alshahrani MS, Bakhsh H, Badghish E, Khadawardi K, et al. Prophylactic tranexamic acid among women undergoing vaginal delivery to reduce postpartum blood loss and related morbidities: A systematic review and meta-analysis of 17 randomized controlled trials. J Gynecol Obstet Hum Reprod. 2022 Jun;51(6):102378.

111. Erkaya R, Karabulutlu Ö, Çalik KY. Uterine massage to reduce blood loss after vaginal delivery. Health Care Women Int. 2021 Aug 9;1–17.

112. Chen M, Chang Q, Duan T, He J, Zhang L, Liu X. Uterine Massage to Reduce Blood Loss After Vaginal Delivery. Obstetrics & Gynecology. 2013 Aug;122(2):290–5.

113. Abdel-Aleem H, Hofmeyr GJ, Shokry M, El-Sonoosy E. Uterine massage and postpartum blood loss. International Journal of Gynecology & Obstetrics. 2006 Jun;93(3):238–9.

114. Diaz V, Abalos E, Carroli G. Methods for blood loss estimation after vaginal birth. Cochrane Database of Systematic Reviews. 2018 Sep 13;2018(9).

115. Ayala M, Nookala V, Fogel J, Fatehi M. Visual estimation of blood loss versus quantitative blood loss for maternal outcomes related to obstetrical hemorrhage. Baylor University Medical Center Proceedings. 2023 May 4;36(3):341–5.

116. Al Kadri HMF, Al Anazi BK, Tamim HM. Visual estimation versus gravimetric measurement of postpartum blood loss: a prospective cohort study. Arch Gynecol Obstet. 2011 Jun 28;283(6):1207–13.

117. Khaleghinezhad K, Dadgar S, Hashempor M, Baharian N, Golmakani N. Comparing the estimation of postpartum hemorrhage using the weighting method and National Guideline with the postpartum hemorrhage estimation by midwives. Iran J Nurs Midwifery Res. 2015;20(4):471.

118. Glover P. Blood loss at delivery: how accurate is your estimation? Aust J Midwifery [Internet]. 2003 Jun [cited 2014 Oct 26];16(2):21–4. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15553427

119. Lemée J, Scalabre A, Chauleur C, Raia-Barjat T. Visual estimation of postpartum blood loss during a simulation training: A prospective study. J Gynecol Obstet Hum Reprod. 2020 Apr;49(4):101673.

120. Lilley G, Burkett-St-Laurent D, Precious E, Bruynseels D, Kaye A, Sanders J, et al. Measurement of blood loss during postpartum haemorrhage. Int J Obstet Anesth [Internet]. 2015 Feb [cited 2015 Jul 21];24(1):8–14. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25433576

121. Hancock A, Weeks A, Furber C, Campbell M, Lavender T. The Recognition of Excessive blood loss At ChildbirTh (REACT) Study: a two-phase exploratory, sequential mixed methods inquiry using focus groups, interviews and a pilot, randomised crossover study. BJOG. 2021 Oct 27;128(11):1843–54.

122. Parry Smith WR, Papadopoulou A, Thomas E, Tobias A, Price MJ, Meher S, et al. Uterotonic agents for first-line treatment of postpartum haemorrhage: a network meta-analysis. Cochrane Database Syst Rev. 2020 Nov 24;11(11):CD012754.

123. Della Corte L, Saccone G, Locci M, Carbone L, Raffone A, Giampaolino P, et al. Tranexamic acid for treatment of primary postpartum hemorrhage after vaginal delivery: a systematic review and meta-analysis of randomized controlled trials. J Matern Fetal Neonatal Med. 2020 Mar;33(5):869–74.

124. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Lancet [Internet]. 2017 May 27;389(10084):2105–16. Available from: http://www.ncbi.nlm.nih.gov/pubmed/28456509

125. Bateman BT, Tsen LC, Liu J, Butwick AJ, Huybrechts KF. Patterns of second-line uterotonic use in a large sample of hospitalizations for childbirth in the United States: 2007-2011. Anesth Analg [Internet]. 2014 Dec [cited 2015 Aug 17];119(6):1344–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25166464

126. Royal College of Obstetricians and Gynaecologists. Postpartum Haemorrhage, Prevention and Management. RCOG Green-top Guideline No. 52 [Internet]. 2009 May. Available from: https://obgyn.onlinelibrary.wiley.com/doi/epdf/10.1111/1471-0528.14178

127. Chapman V, Charles C. The Midwife's Labour and Birth Handbook [Internet]. 2nd ed. Oxford: Wiley-Blackwell; 2009 [cited 2013 Jun 11]. Available from: http://books.google.com/books?id=Qvkto1WButkC&pgis=1

128. Cunningham F, Leveno K, Bloom S, Dashe J, Hoffman B, Casey B, et al., editors. Williams Obstetrics. 25th Editi. NY: McGraw-Hill Education; 2018.

129. Kellie FJ, Wandabwa JN, Mousa HA, Weeks AD. Mechanical and surgical interventions for treating primary postpartum haemorrhage. Cochrane Database Syst Rev. 2020 Jul 1;7(7):CD013663.

130. Chantrapitak W, Srijanteok K, Puangsa-art S. Lower uterine segment compression for management of early postpartum hemorrhage after vaginal delivery at Charoenkrung Pracharak Hospital. J Med Assoc Thai. 2009 May;92(5):600–5.

131. Andreatta P, Perosky J, Johnson TRB. Two-provider technique for bimanual uterine compression to control postpartum hemorrhage. J Midwifery Womens Health [Internet]. 2012 [cited 2013 Aug 7];57(4):371–5. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22758359

132. Suarez S, Conde-Agudelo A, Borovac-Pinheiro A, Suarez-Rebling D, Eckardt M, Theron G, et al. Uterine balloon tamponade for the treatment of postpartum hemorrhage: a systematic review and meta-analysis. Am J Obstet Gynecol. 2020 Apr;222(4):293.e1-293.e52.

133. Darwish AM, Abdallah MM, Shaaban OM, Ali MK, Khalaf M, Sabra AMA. Bakri balloon versus condom-loaded Foley's catheter for treatment of atonic postpartum hemorrhage secondary to vaginal delivery: a randomized controlled trial. The Journal of Maternal-Fetal & Neonatal Medicine. 2018 Mar 19;31(6):747–53.

134. Pingray V, Widmer M, Ciapponi A, Hofmeyr G, Deneux C, Gülmezoglu M, et al. Effectiveness of uterine tamponade devices for refractory postpartum haemorrhage after vaginal birth: a systematic review. BJOG. 2021 Oct 19;128(11):1732–43.

135. Dumont A, Bodin C, Hounkpatin B, Popowski T, Traoré M, Perrin R, et al. Uterine balloon tamponade as an adjunct to misoprostol for the treatment of uncontrolled postpartum

haemorrhage: a randomised controlled trial in Benin and Mali. BMJ Open. 2017 Sep 1;7(9):e016590.

136. Anger H, Dabash R, Durocher J, Hassanein N, Ononge S, Frye L, et al. The effectiveness and safety of introducing condom-catheter uterine balloon tamponade for postpartum haemorrhage at secondary level hospitals in Uganda, Egypt and Senegal: a stepped wedge, cluster-randomised trial. BJOG. 2019 Dec 18;126(13):1612–21.

137. Laas E, Bui C, Popowski T, Mbaku OM, Rozenberg P. Trends in the rate of invasive procedures after the addition of the intrauterine tamponade test to a protocol for management of severe postpartum hemorrhage. Am J Obstet Gynecol [Internet]. 2012 Oct [cited 2013 May 27];207(4):281.e1-7. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23021688

138. Revert M, Rozenberg P, Cottenet J, Quantin C. Intrauterine Balloon Tamponade for Severe Postpartum Hemorrhage. Obstetrics & Gynecology. 2018 Jan;131(1):143–9.

139. Soltan MH, Sadek RR. Experience managing postpartum hemorrhage at Minia University Maternity Hospital, Egypt: No mortality using external aortic compression. Journal of Obstetrics and Gynaecology Research. 2011 Nov;37(11):1557–63.

140. Pileggi-Castro C, Nogueira-Pileggi V, Tunçalp Ö, Oladapo OT, Vogel JP, Souza JP. Non-pneumatic anti-shock garment for improving maternal survival following severe postpartum haemorrhage: a systematic review. Reprod Health. 2015 Mar 31;12:28.

141. Schorn MN, Phillippi JC. Volume replacement following severe postpartum hemorrhage. J Midwifery Womens Health [Internet]. 2014 Jan [cited 2015 Jul 1];59(3):336–43. Available from: http://doi.wiley.com/10.1111/jmwh.12186

142. Braithwaite P, Chichester M, Reid A. When the pregnant Jehovah's Witness patient refuses blood: implications for nurses. Nurs Womens Health [Internet]. 2010 Dec;14(6):462–70. Available from: http://doi.wiley.com/10.1111/j.1751-486X.2010.01593.x

143. Doyle J. A commemorative history of the Department of Anaesthesia, University of Toronto. 2015. p. 1 Module 4: Blood Transfusions and the Jehovah's Witnesses Patient. Available from: http://www.anesthesia.utoronto.ca/edu/cme/courses/m04.htm

144. Chand NK, Subramanya HB, Rao GV. Management of patients who refuse blood transfusion. Indian J Anaesth [Internet]. 2014 Sep;58(5):658–64. Available from: http://www.ijaweb.org/text.asp?2014/58/5/658/144680

145. Massiah N, Athimulam S, Loo C, Okolo S, Yoong W. Obstetric care of Jehovah's Witnesses: a 14-year observational study. Arch Gynecol Obstet [Internet]. 2007 Oct 11;276(4):339–43. Available from: http://link.springer.com/10.1007/s00404-007-0346-0

146. Singla AK, Lapinski RH, Berkowitz RL, Saphier CJ. Are women who are Jehovah's Witnesses at risk of maternal death? Am J Obstet Gynecol [Internet]. 2001 Oct;185(4):893–5. Available from: http://www.sciencedirect.com/science/article/pii/S0002937801001089

147. Gyamfi C, Berkowitz RL. Responses by pregnant Jehovah's Witnesses on health care proxies. Obstetrics and gynecology [Internet]. 2004 Sep;104(3):541–4. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15339766

148. Tanaka M, Matsuzaki S, Endo M, Kakigano A, Mimura K, Takiuchi T, et al. Obstetric outcomes and acceptance of alternative therapies to blood transfusion by Jehovah's Witnesses in Japan: a single-center study. Int J Hematol. 2018 Oct 29;108(4):432–7.

149. Husarova V, Donnelly G, Doolan A, Garstka M, Ni Ainle F, McCaul C. Preferences of Jehovah's Witnesses regarding haematological supports in an obstetric setting: experience of a single university teaching hospital. Int J Obstet Anesth. 2016 Feb;25:53–7.

150. Zeybek B, Childress AM, Kilic GS, Phelps JY, Pacheco LD, Carter MA, et al. Management of the Jehovah's Witness in Obstetrics and Gynecology. Obstet Gynecol Surv. 2016 Aug;71(8):488–500.

151. Fletcher S, Grotegut C a, James AH. Lochia patterns among normal women: a systematic review. J Womens Health (Larchmt) [Internet]. 2012 Dec [cited 2013 Apr 8];21(12):1290–4. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23101487

152. Chi C, Bapir M, Lee CA, Kadir RA. Puerperal loss (lochia) in women with or without inherited bleeding disorders. Am J Obstet Gynecol [Internet]. 2010 Jul;203(1):56.e1-5. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20417483

153. Marchant S, Alexander J, Thomas P, Garcia J, Brocklehurst P, Keene J. Risk factors for hospital admission related to excessive and/or prolonged postpartum vaginal blood loss after the first 24 h following childbirth. Paediatr Perinat Epidemiol [Internet]. 2006 Sep [cited 2015 Nov 25];20(5):392–402. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16911017

154. Brown A, Jordan S. Impact of birth complications on breastfeeding duration: an internet survey. J Adv Nurs. 2013 Apr;69(4):828–39.

155. Drayton BA, Patterson JA, Nippita TA, Ford JB. Red blood cell transfusion after postpartum haemorrhage and breastmilk feeding at discharge: A population-based study. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2016 Dec 15;56(6):591–8.

156. Odent M. Placentophagy. Midwifery Today Int Midwife. 2014;(109):17–8.

157. Coyle CW, Hulse KE, Wisner KL, Driscoll KE, Clark CT. Placentophagy: therapeutic miracle or myth? Arch Womens Ment Health [Internet]. 2015 Oct 4;18(5):673–80. Available from: http://link.springer.com/10.1007/s00737-015-0538-8

158. Selander J. Research on placenta encapsulation. Midwifery Today Int Midwife [Internet]. 2014;(109):33. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24734488

159. Selander J, Cantor A, Young SM, Benyshek DC. Human maternal placentophagy: a survey of self-reported motivations and experiences associated with placenta consumption. Ecol Food Nutr [Internet]. 2013 Mar;52(2):93–115. Available from: http://www.tandfonline.com/doi/abs/10.1080/03670244.2012.719356

160. Johnson SK, Groten T, Pastuschek J, Rödel J, Sammer U, Markert UR. Human placentophagy: Effects of dehydration and steaming on hormones, metals and bacteria in placental tissue. Placenta. 2018 Jul;67:8–14.

161. Chang S, Lodico L, Williams Z. Nutritional composition and heavy metal content of the human placenta. Placenta. 2017 Dec;60:100–2.

162. Gryder LK, Young SM, Zava D, Norris W, Cross CL, Benyshek DC. Effects of Human Maternal Placentophagy on Maternal Postpartum Iron Status: A Randomized, Double-Blind, Placebo-Controlled Pilot Study. J Midwifery Womens Health. 2017 Jan 3;62(1):68–79.

163. Buser GL, Mató S, Zhang AY, Metcalf BJ, Beall B, Thomas AR. Notes from the Field: Late-Onset Infant Group B Streptococcus Infection Associated with Maternal Consumption of Capsules Containing Dehydrated Placenta — Oregon, 2016. MMWR Morb Mortal Wkly Rep. 2017 Jun 30;66(25):677–8.

164. Johnson SK, Pastuschek J, Benyshek DC, Heimann Y, Möller A, Rödel J, et al. Impact of tissue processing on microbiological colonization in the context of placentophagy. Sci Rep. 2022 Mar 29;12(1):5307.

165. Anger H, Durocher J, Dabash R, Winikoff B. How well do postpartum blood loss and common definitions of postpartum hemorrhage correlate with postpartum anemia and fall in hemoglobin? PLoS One. 2019 Aug 22;14(8):e0221216.

166. Bergmann RL, Richter R, Bergmann KE, Dudenhausen JW. Prevalence and risk factors for early postpartum anemia. Eur J Obstet Gynecol Reprod Biol [Internet]. 2010 Jun [cited 2013 Apr 10];150(2):126–31. Available from: http://dx.doi.org/10.1016/j.ejogrb.2010.02.030

167. Breymann C. Diagnosis and treatment of iron-deficiency anaemia during pregnancy and postpartum. Arch Gynecol Obstet [Internet]. 2010 [cited 2015 Jun 3];282(5):577–80. Available from: http://resolver.scholarsportal.info/resolve/09320067/v282i0005/577_datoiadpap.xml

168. Nash CM, Allen VM. The Use of Parenteral Iron Therapy for the Treatment of Postpartum Anemia. J Obstet Gynaecol Can [Internet]. 2015;37(5):439–42. Available from: www.jogc.com/abstracts/full/201505_Commentary_1.pdf

169. Barroso F, Allard S, Kahan BC, Connolly C, Smethurst H, Choo L, et al. Prevalence of maternal anaemia and its predictors: a multi-centre study. Eur J Obstet Gynecol [Internet]. 2011 Nov [cited 2015 Mar 6];159(1):99–105. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21890259

170. Becuzzi N, Zimmermann R, Krafft A. Long-term efficacy of postpartum intravenous iron therapy. Biomed Res Int [Internet]. 2014 Jan [cited 2015 May 11];2014:815437. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4238267&tool=pmcentrez&rendertype=abstract

171. Bhandal N, Russell R. Intravenous versus oral iron therapy for postpartum anaemia. BJOG [Internet]. 2006 Nov [cited 2015 Jun 10];113(11):1248–52. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17004982

172. Markova V, Norgaard A, Jørgensen KJ, Langhoff-Roos J. Treatment for women with postpartum iron deficiency anaemia. Cochrane Database Syst Rev [Internet]. 2015 Dec 2 [cited 2015 Aug 18];8(12):CD010861. Available from: http://doi.wiley.com/10.1002/14651858.CD010861.pub2

173. Radhika AG, Sharma AK, Perumal V, Sinha A, Sriganesh V, Kulshreshtha V, et al. Parenteral Versus Oral Iron for Treatment of Iron Deficiency Anaemia During Pregnancy and post-partum: A Systematic Review. The Journal of Obstetrics and Gynecology of India. 2019 Feb 6;69(1):13–24.

174. Sultan P, Bampoe S, Shah R, Guo N, Estes J, Stave C, et al. Oral vs intravenous iron therapy for postpartum anemia: a systematic review and meta-analysis. Am J Obstet Gynecol. 2019 Jul;221(1):19-29.e3.

175. Iyoke CA, Emegoakor FC, Ezugwu EC, Lawani LO, Ajah LO, Madu JA, et al. Effect of treatment with single total-dose intravenous iron versus daily oral iron(III)-hydroxide polymaltose on moderate puerperal iron-deficiency anemia. Ther Clin Risk Manag. 2017 May;Volume 13:647–53.

176. Holm C, Thomsen LL, Norgaard A, Langhoff-Roos J. Single-dose intravenous iron infusion or oral iron for treatment of fatigue after postpartum haemorrhage: a randomized controlled trial. Vox Sang. 2017 Apr;112(3):219–28.

177. Milman N. Prepartum anaemia: prevention and treatment. Ann Hematol. 2008;87:949–59.

178. Dodd JM, Dare MR, Middleton P. Treatment for women with postpartum iron deficiency anaemia. Cochrane Database of Systematic Reviews [Internet]. 2012 Oct 18;12(4):CD004222. Available from: http://doi.wiley.com/10.1002/14651858.CD004222.pub2

179. Prick BW, Duvekot JJ, van der Moer PE, van Gemund N, van der Salm PCM, Jansen a. JG, et al. Cost-effectiveness of red blood cell transfusion vs. non-intervention in women with acute anaemia after postpartum haemorrhage. Vox Sang [Internet]. 2014 Nov [cited 2015 Jun 3];107(4):381–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25130704

180. Holm C, Thomsen LL, Norgaard A, Langhoff-Roos J.

Single-dose intravenous iron infusion versus red blood cell transfusion for the treatment of severe postpartum anaemia: a randomized controlled pilot study. Vox Sang. 2017 Feb;112(2):122–31.

181. Association of Ontario Midwives. Midwifery client experiences of postpartum hemorrhage [Internet]. 2015 [cited 2015 Oct 26]. p. 6. Available from: http://www.aom.on.ca/files/Health_Care_Professionals/Clinical_Practice_Guidelines/WEX_Midwife_PPH_Resource.pdf

182. Ricbourg A, Gosme C, Gayat E, Ventre C, Barranger E, Mebazaa A. Emotional impact of severe post-partum haemorrhage on women and their partners: an observational, case-matched, prospective, single-centre pilot study. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2015 Oct;193:140–3.

183. Briley AL, Silverio SA, Singh C, Sandall J, Bewley S. "It's like a bus, going downhill, without a driver": A qualitative study of how postpartum haemorrhage is experienced by women, their birth partners, and healthcare professionals. Women and Birth. 2021 Nov;34(6):e599–607.

184. Parry-Smith W, Okoth K, Subramanian A, Gokhale KM, Chandan JS, Humpston C, et al. Postpartum haemorrhage and risk of mental ill health: A population-based longitudinal study using linked primary and secondary care databases. J Psychiatr Res. 2021 May;137:419–25.

185. Carroll M, Daly D, Begley CM. The prevalence of women's emotional and physical health problems following a postpartum haemorrhage: a systematic review. BMC Pregnancy Childbirth. 2016 Dec 5;16(1):261.

186. Finlayson K, Downe S, Vogel JP, Oladapo OT. What matters to women and healthcare providers in relation to interventions for the prevention of postpartum haemorrhage: A qualitative systematic review. PLoS One. 2019 May 8;14(5):e0215919.

187. Dunning T, Harris JM, Sandall J. Women and their birth partners' experiences following a primary postpartum haemorrhage: a qualitative study. BMC Pregnancy Childbirth. 2016 Dec 18;16(1):80.

188. Falk M, Nelson M, Blomberg M. The impact of obstetric interventions and complications on women's satisfaction with childbirth a population based cohort study including 16,000 women. BMC Pregnancy Childbirth. 2019 Dec 11;19(1):494.

189. Sentilhes L, Gromez A, Clavier E, Resch B, Descamps P, Marpeau L. Long-term psychological impact of severe postpartum hemorrhage. Acta Obstet Gynecol Scand [Internet]. 2011 Jun [cited 2013 Apr 8];90(6):615–20. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21370999

190. Zaat TR, van Steijn ME, de Haan-Jebbink JM, Olff M, Stramrood CAI, van Pampus MG. Posttraumatic stress disorder related to postpartum haemorrhage: A systematic review. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2018 Jun;225:214–20.

191. Woiski MD, Belfroid E, Liefers J, Grol RP, Scheepers HC, Hermens RP. Influencing factors for high quality care on postpartum haemorrhage in the Netherlands: patient and professional perspectives. BMC Pregnancy Childbirth. 2015 Dec 23;15(1):272.

192. Elmir R, Schmied V, Jackson D, Wilkes L. Between life and death: women's experiences of coming close to death, and surviving a severe postpartum haemorrhage and emergency hysterectomy. Midwifery [Internet]. 2012 Apr [cited 2013 Mar 27];28(2):228–35. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21251734

193. Gamble J, Creedy DK. A counselling model for postpartum women after distressing birth experiences. Midwifery [Internet]. 2009 Apr [cited 2013 Jun 17];25(2):e21-30. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17673341

194. Association of Ontario Midwives. Life after postpartum hemorrhage: recovering from the unexpected [Internet]. 2015 [cited 2015 Oct 26]. Available from: http://www.aom.on.ca/Health_Care_Professionals/Client_Resources_-_Clinical.aspx

195. Hinton L. Conditions that threaten women's lives in childbirth & pregnancy | healthtalkonline.org [Internet]. 2013 [cited 2014 Jul 22]. Available from: http://www.healthtalk.org/peoples-experiences/pregnancy-children/conditions-threaten-womens-lives-childbirth-pregnancy/topics

196. Hinton L, Locock L, Knight M. Experiences of the quality of care of women with near-miss maternal morbidities in the UK. BJOG [Internet]. 2014 Sep [cited 2015 Jun 7];121 Suppl:20–3. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4312976&tool=pmcentrez&rendertype=abstract

197. PPH CPG Work Group. Postpartum Hemorrhage. Association of Ontario Midwives. Toronto, ON: Assocation of Ontario Midwives; 2016.

198. McDonald S. Management of the Third Stage of Labor. J Midwifery Womens Health. 2007;52(1):254–61.

199. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva Switzerland: World Health Organization Press; 2012.

200. Davies GAL, Tessier JL, Woodman MC, Lipson A, Hahn PM. Maternal Hemodynamics After Oxytocin Bolus Compared With Infusion in the Third Stage of Labor: A Randomized Controlled Trial. Obstetrics & Gynecology [Internet]. 2005 Feb [cited 2018 Nov 4];105(2):294–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15684155

201. Löytved-Hardegg JJ, Brunner M, Ries JJ, von Felten S, Heugel C, Lapaire O, et al. Replacement of oxytocin bolus administration by infusion: influences on postpartum outcome. Arch Gynecol Obstet [Internet]. 2016 Jun 4 [cited 2019 Jun 25];293(6):1219–25. Available from: http://link.springer.com/10.1007/s00404-015-3916-6

202. Charles D, Anger H, Dabash R, Darwish E, Ramadan MC,

Mansy A, et al. Intramuscular injection, intravenous infusion, and intravenous bolus of oxytocin in the third stage of labor for prevention of postpartum hemorrhage: a three-arm randomized control trial. BMC Pregnancy Childbirth [Internet]. 2019 Jan 18 [cited 2019 Jun 25];19(1):38. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-019-2181-2

203. Pfizer Canada ULC. Prescribing Information: Oxytocin Injection USP [Internet]. Kirkland, QC; 2018 [cited 2019 Jun 25]. Available from: https://www.pfizer.ca/sites/g/files/g10056681/f/201905/Oxytocin_PI_221052_18Dec2018_E.pdf

204. Breathnach F, Geary M. Uterine atony: definition, prevention, nonsurgical management, and uterine tamponade. Semin Perinatol [Internet]. 2009 Apr;33(2):82–7. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19324236

205. Canadian Pharmacists Association. Compendium of Pharmaceuticals and Specialties (CPS) [Internet]. Ottawa: Marquis Book Printing; 2019 [cited 2018 Oct 31]. Available from: https://www.pharmacists.ca/products-services/compendium-of-pharmaceuticals-and-specialties/

206. Gallos ID, Williams HM, Price MJ, Merriel A, Gee H, Lissauer D, et al. Uterotonic agents for preventing postpartum haemorrhage: a network meta-analysis. Cochrane Database Syst Rev [Internet]. 2018;4(4):CD011689. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29693726

207. The Society of Obstetricians and Gynaecologists of Canada. Advances in Labour and Risk Management ALARM Course Manual. 26th ed. Society of Obstetricians and Gynaecologists of Canada; 2020.

208. Drew T, Balki M. What does basic science tell us about the use of uterotonics? Best Pract Res Clin Obstet Gynaecol. 2019 Nov;61.

209. Wainman B, Murray-Davis B, McDonald H, Hutton E, Cheng E, Geurts C. Pharmacology Revealed: An interactive eBook. McMaster University; 2014.

210. Khan RU, El-Refaey H. Pathophysiology of Postparum Hemorrhage and Third Stage of Labor. In: Arulkumaran S, Karoshi M, Keith L, Lalonde AB, B-Lynch C, editors. A Comprehensive Textbook of Postpartum Hemorrhage. 2nd ed. Sapiens Publishing; 2012. p. 94–100.

211. Pfizer Canada. Product Monograph: Hemabate Sterile Solution [Internet]. Kirkland, QC; 2014 [cited 2019 Jun 26]. Available from: https://www.pfizer.ca/sites/g/files/g10050796/f/201710/Hemabate_PM_E_170114_21Feb2014.pdf

212. Mousa HA, Blum J, Abou El Senoun G, Shakur H, Alfirevic Z. Treatment for primary postpartum haemorrhage. Cochrane Database Syst Rev [Internet]. 2014 Feb 13;(2):CD003249. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24523225

213. Sheldon WR, Blum J, Durocher J, Winikoff B. Misoprostol for the prevention and treatment of postpartum hemorrhage. Expert Opin Investig Drugs [Internet]. 2012 Feb 11 [cited 2019 Jun 26];21(2):235–50. Available from: http://www.tandfonline.com/doi/full/10.1517/13543784.2012.647405

214. Pfizer Canada. Product Monograph: Diclofenac Sodium and Misoprostol [Internet]. Kirkland, QC; 2018 [cited 2019 Jun 26]. Available from: www.pfizer.ca

215. Tang OS, Gemzell-Danielsson K, Ho PC. Misoprostol: pharmacokinetic profiles, effects on the uterus and side-effects. Int J Gynaecol Obstet [Internet]. 2007 Dec [cited 2016 Nov 7];99 Suppl 2:S160-7. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0020729207005073

216. Society of Obstetricians and Gynaecologists of Canada. ALARM Course Manual. . 30th ed. 2024.

217. Ferring Inc. Duratocin (carbetocin injection) PRODUCT MONOGRAPH [Internet]. Toronto, ON; 2018 [cited 2019 Jun 26]. Available from: https://www.ferring.ca/media/1022/duratocin-rts-pm-control-no-207185-en_28feb2018.pdf

218. Jin B, Du Y, Zhang F, Zhang K, Wang L, Cui L. Carbetocin for the prevention of postpartum hemorrhage: a systematic review and meta-analysis of randomized controlled trials. J Matern Fetal Neonatal Med [Internet]. 2016 Feb 4 [cited 2019 Jun 26];29(3):400–7. Available from: http://www.tandfonline.com/doi/full/10.3109/14767058.2014.1002394

219. Peters NCJ, Duvekot JJ. Carbetocin for the Prevention of Postpartum Hemorrhage. Obstet Gynecol Surv [Internet]. 2009 Feb [cited 2018 Nov 4];64(2):129–35. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19159497

220. WHO recommendation on tranexamic acid for the treatment of postpartum haemorrhage. Geneva; 2017.

APPENDIX A

Table 1: Updated 2024 Recommendations, Good Practice Statements and Explanation of Changes		
Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Diagnosis of PPH and Assessing fundal tone and blood loss (new)		
1. Midwives should consider any significant postpartum loss of blood that causes signs and symptoms of hypovolemic shock or hemodynamic instability to be a postpartum hemorrhage. **Strong recommendation; no evidence available.**	**1.** Midwives should consider a postpartum hemorrhage to be: • Postpartum blood loss ≥ 1000 mL; • Any postpartum blood loss that causes signs and symptoms of hypovolemic shock or hemodynamic instability. [new 2024] **Good practice statement** *This good practice statement recognizes that blood loss and its physiologic consequences vary across individuals. Midwives use various clinical indicators and account for community standards and hospital protocols to guide timely decision-making. They are skilled at responding to emergency situations in all birthplace settings.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.
2. Midwives should continue to visually estimate and document postpartum blood loss. **Weak recommendation; no evidence available.** *These recommendations recognize that effects of blood loss vary by individual and support individualized care. They recognize midwives' ability to assess effects of blood loss and the need for timely decision-making. Documentation of blood loss permits retrospective assessment and informs immediate and ongoing client care. Accurate blood loss estimation contributes to midwifery data collection and research.*	10. Midwives should routinely estimate blood loss visually. Quantitative methods may be used where feasible. [new 2024] **Weak recommendation: low certainty of evidence** *This recommendation recognizes the limits of the research evidence on methods of blood loss estimation. It also recognizes the limited feasibility of implementing quantitative blood loss measurement outside of hospital settings and settings with limited care providers.*	Two RCTs demonstrate that calibrated drapes may be more effective than visual estimation and gravimetric methods, though the evidence is limited. This update also recognizes issues of applicability and feasibility of quantitative methods in all midwifery settings. Adequate documentation will be addressed in the narrative section of the CPG. A new section has been added to the CPG titled "Assessing uterine tone and blood loss" that appears after Third Stage Management and before Pharmacological management of PPH. The recommendation on assessing blood loss appears in this section in the new CPG.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Risk Factors for PPH		
3. Identification of risk factors for PPH should occur in an ongoing manner throughout the course of antenatal and intrapartum care. Midwives should consider risk factors in an informed choice discussion about options for management of the third stage of labour and choice of birthplace.	**3.** Identification of risk factors for PPH should occur in an ongoing manner throughout the course of antenatal and intrapartum care. Midwives should consider their clients' risk factors, preferences, values and risk tolerance, in informed choice discussions about options for management of the third stage of labour and choice of birthplace. [2024] **Good practice statement** *This good practice statement recognizes continuity of care and midwives' abilities to identify emerging risk factors for PPH, as well as the client as the primary decision-maker.*	This good practice statement has been added to recognize key components of midwifery care, regardless of third stage management approach clients choose.
None	**2.** Midwives should recognize and address systemic racism and colonialism as causes of inequitable PPH outcomes for racialized clients. Midwives should engage in ongoing self-reflection, provide equitable access and advocacy, and support racially concordant client care. [new 2024] **Good practice statement** *This good practice statement recognizes that racism, not biological difference, impacts inequitable rates of PPH for racialized clients. Acknowledging and addressing one's own implicit biases, as well as structural racism embedded in the health-care system, works toward closing gaps in the quality and safety of care for Indigenous, Black and racialized clients, and other equity-denied birthing communities.*	Growing evidence demonstrating racial inequities in rates of PPH, as well as recognition of racism, rather than race, as a risk factor for PPH. These changes reflect midwifery's commitment to anti-oppressive practice. Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Approaches to Management of the Third Stage		
4. The risks and benefits of physiologic management compared with active management should be discussed with all clients as part of an informed choice discussion. This discussion should address: • how risk factors, if present, may increase the client's risk of PPH and impact considerations about choice of birth place; and • the client's values and preferences. This discussion, including the client's choice, should be appropriately documented in the client's chart. **Strong recommendation; low-quality evidence.** *This recommendation recognizes the client as the primary decision-maker. This recommendation recognizes that presence of one or more risk factors is not necessarily predictive of PPH, and that the original trials of active management may be interpreted differently in a low-risk population.*	**4.** Midwives should discuss the risks and benefits of physiologic management and active management with clients as part of an informed choice discussion. This discussion should address: • How risk factors, if present, may increase a client's risk of PPH and impact considerations about choice of birthplace; • The client's preferences, values and risk tolerance; • The client's cultural practices associated with the third stage. This discussion, including the client's choice, should be appropriately documented. [2024] **Strong recommendation: low certainty of evidence** *This recommendation recognizes multiple reasonable approaches to third-stage management, including evidence that supports physiologic management by midwives. It also recognizes that the presence of one or more risk factors is not necessarily predictive of PPH, and that the client is the primary decision-maker.*	Language changes; no changes to recommendation required. Updated recommendation more explicitly recognizes literature supporting physiologic management of the third stage by midwives, and enshrines client cultural and ceremonial practices as a critical part of individualized care.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Approaches to Management of the Third Stage		
None	**5.** Regardless of the third-stage management approach chosen, midwives should: • Offer delayed cord clamping; • Encourage immediate skin-to-skin contact, early chest/breastfeeding and other measures that may encourage the release and uptake of oxytocin; • Support the client's cultural practices and preferences associated with the third stage; • Await signs of placental separation and monitor for excessive blood loss. [new 2024] **Good practice statement** *This recommendation recognizes the benefits of delayed cord clamping and physiologic processes that encourage the release and uptake of oxytocin. It also recognizes midwives' ability to assess and monitor clients for signs of PPH and respond to emergency situations as they emerge.*	Following GRADE methodology, this recommendation is now considered as a Good Practice Statement. Good practice statements in this CPG represent guidance that the WG deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the Committee is confident that the action has net benefit to the client and that sensible alternatives do not exist.
5. When active management is chosen for the prevention of PPH, midwives should: • Use oxytocin as the uterotonic. • Once pulsation stops, clamp and cut the cord. • Use controlled cord traction to deliver the placenta. **Strong recommendation; moderate-quality evidence.** *This recommendation recognizes a large body of research recognizing the effectiveness of oxytocin at preventing blood loss with minimal side-effects compared to other uterotonics for active management, the neonatal benefits of delayed cord clamping, and the modest clinical benefit of controlled cord traction.*	**7.** When active management is chosen for the prevention of PPH, midwives should: • Use oxytocin as the uterotonic (IV or IM); • Consider carbetocin, where available, as a reasonable alternative to oxytocin; • Consider CCT, while guarding the uterus, after the placenta has separated. [new 2024] **Strong recommendation: moderate certainty of evidence** *This recommendation recognizes a large body of research in support of oxytocin as an effective strategy to prevent blood loss with minimal side effects compared with other uterotonics. It also recognizes the small body of evidence supporting the use of CCT as part of an active management package.*	A new network meta-analysis (2018) continues to demonstrate the effectiveness of oxytocin for prevention of PPH and highlights the small but growing body of evidence in support of carbetocin. Though research shows that IV administration may be most effective, both IV and IM are reasonable strategies. The evidence supporting CCT is limited, suggesting it may not have a substantial benefit. As such it is being considered optional in active management of the third stage. Delayed cord clamping is addressed in the previous statement, as it applies to clients regardless of third stage management approach.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Approaches to Management of the Third Stage		
None	**8.** Midwives may consider concurrent administration of an additional uterotonic with oxytocin for active management of the third stage of labour, according to the clinical picture. [new 2024] **Weak recommendation: low certainty of evidence** *This recommendation recognizes that midwives use knowledge, skills and judgment to determine if adjuncts are required, alongside a consideration of risks and benefits, client risk factors, client preferences and values and birthplace setting.*	A new network meta-analysis (2018) demonstrates that the combination of misoprostol + oxytocin shows benefits to PPH outcomes, though it introduces significant side effects. Ergometrine + oxytocin is another option, though it is vasoconstrictive, and may have negative impacts, such as retained placenta, that are not explored in this research. Midwives must balance the benefits and harms when considering the concurrent administration of an additional uterotonic. This recommendation also acknowledges that concurrent administration is not routinely used, and midwives use knowledge, skills and judgement to determine when use is appropriate.
6. When physiologic management is chosen, midwives should: • Await signs of placental separation and monitor for excessive blood loss. • Refrain from clamping or cutting the umbilical cord until pulsation stops or the placenta has delivered. • Allow the placenta to be born spontaneously with maternal effort or gravity. • Encourage immediate skin-to-skin contact with infant, early breastfeeding and other measures that may encourage the release and uptake of oxytocin. **Strong recommendation; low-quality evidence.** *This recommendation recognizes the physiology of normal birth. More research is needed to identify the most effective aspects of physiologic care in the third stage of labour.*	**6.** When physiologic management is chosen, midwives should: • Await signs of placental separation; • Allow the placenta to be born spontaneously with birthing parent effort or gravity; • Consider guiding out the placenta after separation; • Support other hormonal, psychological and physiologic processes that encourage endogenous oxytocin production, such as maintaining a calm, warm environment and upright positioning. [2024] **Strong recommendation; low certainty of evidence** *This recommendation supports physiologic birth, recognizing observational literature that demonstrates the benefits of physiologic management packages provided by midwives.*	Language changes only; no change required to recommendation.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Approaches to Management of the Third Stage		
7. Midwives may offer controlled cord traction to clients choosing physiologic management. **Weak recommendation; very low-quality evidence** *This recommendation recognizes observational data that associates a reduction in PPH > 700 mL with the use of controlled cord traction without a prophylactic uterotonic as well as randomized trials that show a slight reduction in blood loss > 500 mL, duration of the third stage, and manual removal of the placenta with use of controlled cord traction during active management of the third stage*	See Recommendation **#6** and Recommendation **#7** for consideration of CCT/guiding out the placenta in management of the third stage.	CCT as part of active management is now part of new recommendation #7. CCT as part of physiologic management is no longer recommended in the CPG. Instead new Recommendation #6 supports "guiding out the placenta after separation". TF felt that CCT was not part of physiologic management.
8. Uterine massage is not recommended for the prevention of PPH. Postpartum assessment of fundal tone is recommended. **Strong recommendation; low-quality evidence.** *This recommendation recognizes the importance of identifying uterine atony. Available research does not support the routine use of uterine massage after prophylactic oxytocin has been administered. There is no evidence available on the use of uterine massage where no prophylactic uterotonic has been administered.*	**9.** Uterine massage is not recommended as a routine component of active management of the third stage. [2024] **Strong recommendation; low certainty of evidence** *This recommendation recognizes that the available research does not support the routine use of uterine massage after prophylactic oxytocin has been administered, as it introduces potential harm to clients with no clear benefit. There is no evidence available on the use of routine uterine massage where no prophylactic uterotonic has been administered.*	Language changes; no changes to recommendation required. Fundal tone assessment will be addressed in a summary statement, as it is a standard care, though we found no evidence to support its use.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
Pharmacological management of PPH		
9. Midwives should use oxytocin as the first line uterotonic for the treatment of PPH due to uterine atony. **Strong recommendation; moderate-quality evidence.** *No high-quality research has shown superior efficacy of any uterotonic drug vs oxytocin in settings where it is available. The CMO requires that midwives carry at least 2 uterotonics: oxytocin plus 1 additional drug. The comparative effectiveness of uterotonics for treatment of PPH is identified as a research gap.*	**11.** Midwives should use oxytocin as the first-line uterotonic for the treatment of PPH due to uterine atony. [2024] **Strong recommendation: moderate certainty of evidence** *This recommendation acknowledges the effectiveness of oxytocin as a first-line treatment. Further research on the efficacy of carbetocin compared with oxytocin is required.*	Language changes; no changes to recommendation required.
None	**12.** Midwives may consider concurrent administration of an additional uterotonic with oxytocin for the treatment of PPH, considering client risk factors and the clinical picture. [new 2024] **Weak recommendation: moderate certainty of evidence** *This recommendation recognizes the limited evidence on adjuncts, with current evidence demonstrating that the addition of misoprostol may improve some PPH outcomes but with significant side effects. Midwives must balance benefits and harms and consider client preferences, values and risk tolerance.*	A new network meta-analysis (2020) demonstrates the misoprostol +oxytocin may be an effective treatment for PPH, though it introduces significant side effects. Midwives must balance the benefits and harms of concurrent administration. This recommendation also acknowledges that concurrent administration is not routinely used, and midwives use knowledge, skills and judgement to determine when use is appropriate.
None	**13.** Midwives may consider TXA as an adjunct PPH treatment, if available. [new 2024] **Weak recommendation: low certainty of evidence** *This recommendation recognizes the literature that suggests that TXA may be a beneficial addition in PPH treatment. TXA is not currently available in all communities.*	Systematic review evidence (2 RCTs) demonstrates effectiveness of TXA for management of PPH. However, TXA is not currently available or accessible to midwives.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
10. Available research does not clearly support the use of one particular uterotonic over another for second-line treatment of primary PPH due to uterine atony (ergot alkaloids, prostaglandins and carbetocin). Midwives should choose their second-line uterotonic based on clinical context. **Strong recommendation; very low-quality evidence.** *Access to each drug may vary by community. In the absence of clear evidence, midwives should use their clinical experience, community standards, and the clinical context of the client and birth to guide second-line uterotonic use.*	**14.** Available research does not clearly support the use of one particular uterotonic over another for second-line treatment of primary PPH due to uterine atony (ergot alkaloids, prostaglandins or carbetocin). Midwives should choose a second-line uterotonic based on clinical context. [2024] **Good practice statement** *This good practice statement recognizes that in the absence of clear evidence, midwives should use their clinical experience, community standards, drug availability and the clinical context of the client and birth to guide second-line uterotonic use.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.
Non-pharmacological management of PPH		
Summary statement: Uterine massage and bimanual compression are conservative first steps for the management of atonic PPH.	**15.** In cases of uterine atony, midwives should consider performing uterine massage to stimulate a contraction following delivery of the placenta. Midwives should expel blood clots when clinically indicated. [new 2024] **Good practice statement** *This good practice statement recognizes midwives' clinical judgment and skills in managing atonic PPH.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.
Summary statement: Uterine massage and bimanual compression are conservative first steps for the management of atonic PPH.	**16.** When bleeding caused by uterine atony is unresponsive to pharmacological treatment methods, midwives should consider bimanual compression as a useful and potentially life-saving method. [new 2024] **Strong recommendation: very low certainty of evidence** *This recognizes that bimanual compression (internal or external) is one of a series of actions midwives may take to manage atonic PPH. A two-person approach may be more effective.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
11. Midwives should consider the use of uterine balloon tamponade for PPH that is unresponsive to uterotonics, and where transport to hospital is necessary. **Weak recommendation; very low-quality evidence.** *This recommendation recognizes the growing body of literature supporting the use of UBT at all care levels and for all obstetric providers. It acknowledges that midwives attend births in the community and that use of UBT for intractable uterine atony is a potentially life-saving measure. It also recognizes the need for midwives to access the training and equipment needed to safely and effectively use UBT devices, when appropriate, for PPH unresponsive to other interventions.*	**17.** Midwives should consider the use of UBT for atonic PPH that is unresponsive to other treatment methods, and where transport to hospital is necessary or when delays in accessing hospital-based care are anticipated. [2024] **Weak recommendation: very low certainty of evidence** *This recommendation recognizes the growing body of literature supporting the use of UBT at all care levels and for all obstetric providers. It acknowledges that midwives attend births in the community and that use of UBT for intractable uterine atony is a potentially life-saving measure.*	Language changes; no changes to recommendation required.
None	**18.** Midwives may use external aortic compression to manage an active PPH that is unresponsive to other treatment methods. External aortic compression may include: • manual external aortic compression • the use of non-pneumatic anti-shock garment, where available [new 2024] **Weak recommendation: very low certainty of evidence** *This recommendation acknowledges that midwives attend births in the community and that use of external aortic compression is a potentially life-saving measure for PPH unresponsive to other interventions when transport to hospital is necessary and delays in accessing hospital care are anticipated.*	One observational study, with uncertain evidence, about the effectiveness of manual external aortic compression as well as systematic review evidence (RCT and observational data) that supports the use of NASG.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
12. For clients who refuse blood and blood products, midwives should discuss possible increased risks of morbidity and mortality following severe PPH. Midwives should develop or facilitate a plan of care in the event of severe PPH, where blood or blood products would normally be recommended. **Strong recommendation; very low-quality evidence.** *This recommendation recognizes the degree of potential risk for clients who refuse blood products. It also values the importance of respectful care and interprofessional collaboration to provide client access to options available in the community.*	**19.** For clients who decline blood and blood products, midwives should discuss possible increased risks of morbidity and mortality following severe PPH. Midwives should develop or facilitate a care plan in the event of severe PPH, when blood or blood products would usually be recommended. [2024] **Good practice statement** *This good practice statement values the importance of respectful care and interprofessional collaboration to provide client access to options available in the community.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist.
Postpartum Recovery and Care		
13. Midwives should review with all clients: • Normal postpartum blood loss in the immediate postpartum period (within the first 24 hours). • How to estimate postpartum blood loss and recognize signs and symptoms that may be indicative of shock or hemodynamic instability. • How to contact the midwife and access urgent care when necessary. **Strong recommendation; no evidence available.** *This recommendation is based on expert opinion. It recognizes the skill of midwives in providing health information to clients and normalizes care provided in the community setting.*	**20.** Midwives should review with all clients: • Typical postpartum blood loss in the immediate postpartum period; • How to recognize atypical blood loss and signs and symptoms that may indicate shock or hemodynamic instability; • How to contact the midwife and access urgent care when necessary. [2024] **Good practice statement** *This good practice statement recognizes the skill of midwives in providing health information to clients and normalizes care provided in the community setting.*	Following GRADE methodology, this information has been included as a Good Practice Statement. Good practice statements in this CPG represent guidance that the TF deemed important but that were not appropriate for formal ratings of certainty of evidence. Good practice statements are made when the TF is confident that the action has net benefit to the client and that sensible alternatives do not exist. Language has been updated.

Original Recommendation [2016]	Updated Recommendation [2024]	Explanation of Change(s)
14. Midwives should offer oral iron supplementation to clients with Hb < 100 g/L ideally measured at ≥ 48 hours postpartum, or to clients who have experienced PPH and who have signs and symptoms of iron deficiency anemia. Normal postpartum blood loss in the immediate postpartum period (within the first 24 hours). **Weak recommendation; low-quality evidence.** *This recommendation recognizes the lack of high-quality evidence on the clinical effectiveness of treating postpartum iron deficiency anemia.*	**21.** For clients who experience PPH and/or have signs and symptoms of iron deficiency anemia, midwives should recommend oral iron supplementation or IV iron supplementation, as clinically indicated. [new 2024] **Strong recommendation: very low certainty of evidence** *This recommendation recognizes continuity of care and midwives' ability to effectively assess clients in the postpartum period. It also recognizes client preferences and values, as well as inequitable access to IV iron.*	Addition of IV iron has been added as new systematic review evidence demonstrates the effectiveness of IV iron supplementation. Client preferences and values, as well as accessibility and equity to be considered.

APPENDIX B: DRUGS IN THE MIDWIFERY PHARMACOPEIA FOR THE MANAGEMENT OF PPH

The choice of the most appropriate uterotonic drug (1) will depend on the evaluation of risks and benefits of the following:

1. Complications associated with and likelihood of excessive blood loss
2. Morbidities associated with side-effects of uterotonic
3. The resources of the setting and community standards
4. Clinical circumstances (i.e., suspected or confirmed low-lying placenta, if hemorrhage is occurring with the placenta delivered or not, presence of hypertension, etc.). (2)

	Dose	Route	Action	Max dose
Oxytocin Prevention of PPH First-line drug for PPH	10 IU	IM	• Onset: IM: 2 to 3 minutes IV: instantaneous • Duration: ~ 60 minutes • Half-life: 3 minutes	• No more than 3 L of IV fluids containing oxytocin • IM may be repeated
	3 IU	IV push (administered over greater than 30 seconds)		
	20-40 IU in 1000 mL Normal Saline or Ringer's Lactate	IV infusion (rapid infusion for 4 minutes, achieving a bolus of 3 IU, then maximum infusion of 15 IU/hr*)		

Mechanism of action	• Acts on oxytocin receptors of smooth muscle to stimulate the upper uterine segment to contract rhythmically • Response depends on threshold of excitability
Adverse reactions	• Water intoxication with large volumes, prolonged infusion (headache, nausea and vomiting, abdominal pain, lethargy, drowsiness, unconsciousness, grand mal type seizures)
Contraindications	• Hypersensitivity to drug or drug class

Other notes	• IV route preferred due to faster onset of action, though IM is also reasonable
	• *Higher infusion rates or additional boluses will not provide further benefit and may cause adverse effects.
	• SOGC provides infusions rates to deliver 15 IU/hr
	  • 20 IU in 1 L IV fluid = 750 ml/hr
	  • 40 IU in 1 L IV fluid = 375 ml/hr
	• In the absence of an IV pump, midwives must rely on their knowledge, skills and clinical judgement to titrate the infusion as clinically appropriate.

Storage	• Should be stored according to the manufacturer's label; typically, controlled room temperature (20 to 25°C) or refrigerated (2° to 8°C).

Adapted (3-9)

Drugs in the Midwifery Pharmacopeia for the management of PPH

	Dose	Route	Action	Max dose
Ergonovine maleate Second or third-line drug for PPH due to uterine atony (if no contraindications)	0.25 mg	IM (preferred)	• Onset: 2 to 5 minutes • Duration: 3 hours • Half-life: 30 minutes	• Can be repeated q 2 hours
	0.25 mg (dilute in 5 mL of Normal Saline, administer slowly over 1 minute)	IV (if required in life-saving circumstances*)	• Onset: 1 minute • Duration: 45 minutes • Half-life: 30 minutes	

Mechanism of action	• Stimulates contractions of uterine and vascular smooth muscle (vasoconstrictor).
Adverse reactions	• Nausea and vomiting, hypertension, diarrhea, dizziness, abdominal pain and transient chest pain.
Contraindications	• Preeclampsia, eclampsia or hypertension. • If client is using certain drugs used to treat HIV (protease inhibitors, non-nucleoside reverse transcriptase inhibitors). • Hypersensitivity to drug or drug class.
Other notes	• *IV route not recommended due to association with increased risk of cerebrovascular and hypertensive complications; slow IV push may be considered in life-saving circumstances. • May increase risk of a trapped placenta if administered before placental delivery. • Ergonovine maleate is considered the second choice to oxytocin (from research on prevention of PPH and extrapolated to treatment of PPH) due to increased risk of side-effects. • May be considered in combination with oxytocin for active management of the third stage. However, this combination may have significant side effects and increase the risk of retained placenta. • Although included in the midwifery pharmacopeia, methylergonovine 0.2 mg (a synthetic analoque of ergonovine) has not been commercially available in Canada since 1998
Storage	• Should be stored according to the manufacturers label; typically, refrigerated (2˚C to 8˚C); protect from light.

Adapted (8-13)

Drugs in the Midwifery Pharmacopeia for the management of PPH

	Dose	Route	Action	Max dose
Carboprost tromethamine (Hemabate) Second or third-line drug for PPH (or if other drugs are unavailable or contraindicated)	0.25 mg	IM, Intramyometrial (IMM)	• Time to peak serum concentration (Tmax): IM: 15 minutes IMM: 5 minutes	• Can be repeated q 15 minutes, up to a maximum dose of 2 mg (8 doses)

Mechanism of action	• Synthetic 15-methyl analogue of PGF2α, a prostaglandin and a potent stimulator of myometrial contractility. • Prostaglandins have vasoactive effects and affect platelet function. • Smooth muscle stimulant and stimulates the GI tract.
Adverse reactions	• Nausea, vomiting, diarrhea, abdominal pain, pyrexia, bronchospasm.
Contraindications	• Asthma. • Hypersensitivity to drug or drug class.
Other notes	• Carboprost should be considered as a second or third-line uterotonic agent in the management of PPH due to uterine atony, which has been unresponsive to oxytocin and ergonovine (if there are no contraindications for use)
Storage	• Should be stored according to the manufacturers label; typically, refrigerated (2˚C to 8˚C).

Adapted (8,9,13–16)

Drugs in the Midwifery Pharmacopeia for the management of PPH

	Dose	Route	Action	Max dose
Misoprostol Second or third-line drug for PPH (or if other drugs are unavailable or contra-indicated)	400 mcg	SL (preferred*)	• Onset: 11 minutes[1] • Tmax: 30 minutes • Duration: 2-3 hours	• Do not exceed 1000 mcg

Mechanism of action	• Synthetic prostaglandin E1 analogue. Interacts with prostanoid receptors on uterus, causing uterine contraction. • May be administered orally, sublingually, vaginally or rectally. Vaginal route not recommended for active PPH, as tablets may be expelled with blood. • * SL route achieves the highest peak serum concentration as it is rapidly absorbed though the sublingual mucosa and avoids first-pass metabolism (hepatic). • PR route is associated with a delayed onset (100 minutes) due its lower peak serum concentration and longer time to reach peak serum concentration.
Adverse reactions	• Pyrexia, chills (32%-57% of clients), nausea and vomiting (usually resolves within 2-6 hours), diarrhea. • Pyrexia (8% dose ≤ 400 mcg, 45% dose ≥ 600 mcg) is more common in oral doses exceeding 600 mcg. • Use of higher dosages of misoprostol should be balanced against the likelihood of side-effects and potential consequences of any side-effects experienced (e.g., pyrexia in the postpartum person may be mistakenly treated as sepsis)
Contraindications	• Hypersensitivity to drug or drug class.
Other notes	• Variations exist among organizations regarding the suggested dose and route of misoprostol for the treatment of PPH. • For the treatment of PPH, ALARM cites a dose of 400 mcg SL, and the SOGC's Clinical Practice Guideline references a dose of 200-400 mcg, stating that doses over 400 mcg are not needed and that 200 mcg may be sufficient. • WHO (2012) recommends 800 µg of misoprostol SL when IV oxytocin is unavailable, or if bleeding is unresponsive to oxytocin; however, there is concern that dosage is associated with risk of hyperpyrexia. • Evidence suggests that there may be added benefit to misoprostol when used simultaneously with conventional oxytocin for both prevention and treatment, though there is an increased risk of side effects. • Off-label use is not approved by Health Canada for treatment of PPH. • There is no evidence on the effectiveness of a second dose.
Storage	• Should be stored according to the manufacturers label; typically, stable at room temperature

Adapted: (3,9,14,17–23)

[1] Onset refers to the mean time to increase uterine tonus. Tmax refers to the time to reach peak serum concentration. Note: peak serum concentration will vary by route of administration.

Drugs in the Midwifery Pharmacopeia for the management of PPH

	Dose	Route	Action	Max dose
Carbetocin Prevention of PPH	100 mcg	IM	• Onset: 2 minutes* • Duration: 120 minutes • Half-life: 40 minutes	• Single dose
	100 mcg	IV (over 30 to 60 seconds)	• Onset: 2 minutes • Duration: 60 minutes • Half-life: 40 minutes	

Mechanism of action	• Long-acting synthetic oxytocin analogue; stimulates rhythmic contractions of the uterus. Produces tetanic contractions that last for 11 minutes, followed by rhythmic contractions for 2 hours when given IM. • In comparison to oxytocin, carbetocin induces a prolonged uterine response when administered postpartum, in both amplitude and frequency of contractions.
Adverse reactions	• Feeling of warmth, headache, nausea and vomiting, hypotension, flushing, pruritis common in individuals after caesarean birth.
Contraindications	• Serious cardiovascular disorders. • Hypersensitivity to drug or drug class.
Other notes	• 2018 network meta-analysis found that carbetocin may be more effective than oxytocin in the prevention of some PPH outcomes. • Compared to oxytocin, carbetocin has a similar side-effect profile though is more expensive. • There is insufficient data on the use of carbetocin for treatment of PPH, especially in cases where carbetocin has been used prophylactically. • *The pharmacokinetics of IV and IM routes are almost the same except for duration of action which is longer with IM administration.
Storage	• Should be stored according to the manufacturers label; typically, stored at room temperature (15°C to 30°C).

Adapted (9–11,24–26)

Adjunct PPH medications

	Dose	Route	Action	Max dose
Tranexamic acid (TXA) Adjunct for treatment of PPH	1 g over 10 minutes	IV	• Onset: rapid • Half-life: 2-11 hours • Excreted in urine 95% unchanged	• Second dose of 1 g IV may be given if bleeding continues after 30 minutes

Mechanism of action	• Is an antifibrinolytic. • Inhibits conversion of plasminogen to plasmin by preventing plasminogen from binding to the fibrin molecule.
Adverse reactions	• Nausea, vomiting, visual disturbances, dizziness.
Contraindications	• History of thromboembolic event in pregnancy. • Subarachnoid hemorrhage. • Hypersensitivity to drug or drug class.
Other notes	• Use as an adjunct to standard treatment for PPH. • The initial dose of TXA should be administered within 3 hours of the time of birth. • Increasing evidence around its use as an adjunct for the prevention of PPH.
Storage	• Should be stored according to the manufacturers label; typically, stored at room temperature (15°C to 30°C).

Adapted (13,27,28)