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Prevention and Management of Postpartum Hemorrhage

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BACKGROUND

This guideline is based on a review of the evidence on the prevention and management of postpartum hemorrhage. MEDLINE was used to identify relevant research from 1990 onwards. The Cochrane and CINAHL databases were also accessed. Randomized controlled studies and other relevant studies were obtained and a search for published obstetric and midwifery clinical practice guidelines was undertaken. The level and quality of evidence following each recommendation is based on the grading system developed by the Canadian Task Force on the Periodic Health Exam (Appendix 1).[1] This guideline has been developed and reviewed by the Association of Ontario Midwives (AOM), and approved by the AOM Board of Directors.

INTRODUCTION

Postpartum hemorrhage is one of the top five causes of maternal mortality in both developed and developing countries. The midwife plays a central role in prevention and treatment of postpartum hemorrhage. This guideline provides midwives with an accessible review of the current evidence on postpartum hemorrhage that can be used to guide clinical practice and informed choice discussions. The physiology of third stage of labour is reviewed, and management of the third stage and of established postpartum hemorrhage are outlined.

PHYSIOLOGY OF THIRD STAGE

The third stage of labour consists of two phases: placental separation and placental expulsion. Separation occurs as a result of the sudden decrease in the size of the uterine cavity after the birth. As the uterus contracts, the site of placental attachment decreases in size, while the size of the placenta remains unchanged. The stress thereby created causes the placenta to buckle and it is sheared from the uterine wall.[2,3] Separation most often begins in the central portion of the placenta, resulting in the formation of a haematoma between the placenta and remaining decidua. The retroplacental clot is thought to facilitate the completion of separation, as the additional

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weight in the mid-point of the placenta helps to strip the adherent lateral borders, and to peel the membranes from the uterine wall.[4]

Once it has separated, the placenta descends into the lower uterine segment or into the upper vaginal vault. This is evidenced by: a sudden trickle or small gush of blood, lengthening of the amount of umbilical cord visible at the introitus, change in the size of the uterus from discoid to globular, or change in the position of the fundus.[2]

The expulsion of the placenta from the uterus occurs by one of two mechanisms. The more common Schultz mechanism results in the fetal side of the placenta presenting at the introitus, with the membranes inverted, trailing behind the placenta, and containing the retroplacental clot. The less common Duncan mechanism causes the placenta to escape sideways, with the maternal side presenting first. The membranes in this presentation are not peeled off as effectively, and may more often be delayed or retained.[5] It is thought that the two mechanisms occur as a result of the original site of attachment in the uterus, with higher implantations resulting in a Schultz presentation and placentas attached in the lower segment being expelled via the Duncan mechanism.[6]

Once expulsion of the placenta has occurred, bleeding from the placental site is controlled by the contraction of the "living ligature" of the oblique uterine muscle fibres in the upper uterine segment about the uterine blood vessels. As well, coagulation and fibrinolytic systems are activated, securing hemostasis by the formation of a fibrin "mesh" over the placental site.[4]

POSTPARTUM HEMORRHAGE

Definition

The World Health Organization defines postpartum hemorrhage (PPH) during vaginal delivery as blood loss of greater than 500 cc.[7] Alternative definitions of PPH as blood loss greater than 600 cc or greater than 1000 ccs have also been suggested.[6,8] For clinical purposes any blood loss that has the potential to produce hemodynamic compromise is considered a PPH. Estimating blood loss is fraught with inconsistencies – it has been suggested that clinicians' subjective assessments may underestimate blood loss by as much as 50%.[4,9]

PPH can be divided into primary PPH, which occurs within 24 hours of birth, and secondary PPH, which occurs between 24 hours and 6 weeks postpartum.[4]

Incidence

PPH occurs in five to fifteen percent of all deliveries and contributes to twenty-five to thirty percent of maternal mortality worldwide.[10] PPH with blood loss of >1000 ml affects one to five percent of births in the developed world.[11,12]

Causes

- **Uterine atony.** The uterus fails to contract effectively to control bleeding. Uterine atony accounts for 80-85% of all cases of primary PPH.[13]
- **Partial separation of the placenta.** With the placental in utero, the uterus is unable to contract effectively and there is copious blood loss from the site where separation has occurred.
- **Retained placental fragments.** Placental fragments impede efficient uterine contractions.
- **Placental pathology.** This includes variations of placenta previa, placenta accreta, percreta, increta or retained succenturiate lobe.
- **Trauma.** Trauma most commonly includes episiotomy, perineal, vaginal or cervical tears (particularly tears involving an artery). Trauma is often associated with operative delivery or caesarean section.
- **Coagulation disorders.** Such disorders are rarely seen. They may be inherited or acquired.

The SOGC Alarm course suggests that one can easily remember these causes when categorized as the "4 T's": tone, tissue, trauma, thrombin.[14]

Risk Factors

The likelihood that a woman will experience a postpartum hemorrhage is dependent upon a variety of factors. Table 1 outlines risk factors which may be identified antenatally as well as those that may be identified during the intrapartum or postpartum periods. It is important to note that although previously regarded as a risk factor, grand multiparity has not been found to be associated with an increased risk of PPH.[15,16,17]

Risk factor assessment is an ongoing process that begins with initial history taking and continues throughout the course of care. Assessment of risk factors is not prescriptive and needs to encompass the entire clinical picture including planned place of birth.

While risk factor identification is an ongoing aspect of management, two-thirds of PPHs occur without any

predisposing factors.[18] As many as twenty-eight percent of women who require postpartum blood transfusion have no risk factors.[19] Current evidence about risk factors is primarily based on practitioners' clinical experience and opinions. A higher quality of evidence would clarify the implications of risk factors on management of third stage. In the meantime, risk factors can be used to develop plans for care which prevent or minimize the risks associated with PPH.

Table 1: Risk factors for PPH by cause

Cause	Antenatal Risk Factors	Intrapartum/Postpartum Risk Factors
Tone	Nulliparity, previous PPH, obesity, uterine fibroids, gestational hypertension with proteinuria, placenta previa, placental abruption, overdistended uterus (twins, polyhydramnios)	Induced/augmented labour, chorioamnionitis, full bladder, assisted vaginal/operative birth, precipitous labour, prolonged labour, third stage greater than 30 minutes, shoulder dystocia, birth of a macrosomic infant
Tissue	Abnormal placenta on ultrasound	Retained placenta, incomplete placenta at time of delivery, placenta previa
Trauma	Previous uterine surgery	Laceration, uterine rupture or inversion, operative delivery, episiotomy
Thrombin	Pre-existing blood clotting disorder (hemophilia A, von Willebrand's) Coagulation disorder acquired in pregnancy (ITP, DIC, Thrombo-cytopenia with pre-eclampsia)	Intrauterine fetal demise

(Source: ESW, Scottish Obstetric Guideline, Reyel, SOGC, Aikins)

Recommendation #1: Identification of risk factors for PPH should occur in an ongoing manner throughout the course of care. (III)

MANAGEMENT OF THIRD STAGE

Two common options for the management of third stage are expectant (or physiological) management and active management. Expectant management can be defined as watchful waiting for signs of separation, and spontaneous delivery of the placenta.[20] Active management involves prophylactic measures to facilitate expulsion of the placenta, including administration of a prophylactic oxytocic, early clamping of the cord, and controlled cord traction.

Comparison of these two approaches is confounded by variations in the clinical practice of these two techniques. The term "physiologic management" in research trials does not refer just to avoiding the use of oxytocic drugs, as is sometimes assumed. Rather, it describes a regimen which includes no routine use of oxytocics, delaying the clamping of the umbilical cord until pulsations cease, no uterine manipulation or controlled cord traction, and delivery of the placenta by maternal effort within one hour of birth. Full physiologic management, as defined here, is not commonly used by practitioners in North America. However, care providers who do not routinely administer oxytocin, but who do employ controlled cord traction (sometimes called the Brandt-Andrews manoeuvre), may consider their management style to be physiologic rather than active. According to the definitions used in relevant clinical trials, this approach falls into neither category. The same discrepancy occurs for active management where, in practice, the oxytocic drug of choice, the timing of drug administration and route of delivery, the timing of cord clamping and the use of controlled cord traction may all vary.

Active Management

A systematic review comparing active versus expectant management of third stage[21] identified five relevant randomized controlled trials,[22,23,24,25,2] four of which the reviewers assessed to be of good quality. In these trials, active management was defined as administering a prophylactic uterotonic with the anterior shoulder or immediately after birth, early cord clamping and cutting, and controlled cord traction, while expectant management was defined as awaiting spontaneous delivery of the placenta with the aid of gravity or nipple stimulation. Active management resulted in statistically significant reductions in the risk of maternal blood loss (weighted mean difference -79.33 ml, 95% CI -94.29 to -64.37), postpartum hemorrhage (relative risk 0.38, 95% CI 0.32-0.46), and prolonged third stage of labour (weighted mean difference -9.77minutes, 95% CI -10.00 to -9.53). On the other hand, increases in the risk of maternal nausea (relative risk 1.83, 95% CI 1.51 to2.23), vomiting and raised blood pressure were associated with active management. These adverse effects were attributed primarily to the use of ergometrine. The Cochrane reviewers advocate for active management of third stage as the routine management of choice for women planning a vaginal delivery in hospital, and suggest that additional research is needed to clarify the implications in other settings, including homebirths.[21]

In 2003, the International Confederation of Midwives (ICM) and International Federation of Gynecologists and Obstetrics (FIGO) published a joint statement on the prevention of PPH.[27] In addition to recommending that birth attendants have the knowledge, skills and judgment to carry out active management of the third stage of labour and access to needed supplies and

equipment, the statement recommends that active management should be offered to all women in labour. The ICM/FIGO definition of active management includes delivery of oxytocin (10 IU IM) within one minute of the birth of the baby, clamping of the cord once it stops pulsing, controlled cord traction, and massage of the fundus until it is contracted.

Table 2: Summary of active management

Use of Uterotonics	— Oxytocin can be given after anterior shoulder, delivery on infant, or delivery of the placenta. — Give oxytocin 10 IU IM – other routes of delivery include 5 IU IV push, or 20-50 IU in 1L of normal saline. — Oxytocin should be stored between 15-30 C, and protected from freezing.
Clamping of the Cord	— Clamp the cord close to the perineum after delivery or once pulsation stops.
Controlled Cord Traction	— Place one hand on clamped cord and the other guarding the uterus. — Keep tension on the uterus and wait for a contraction. — Encourage mother to push with contraction and apply downward traction on cord. — If the placenta does not descend during 30-40 sec of CCT do not continue with traction. — As placenta delivers hold the placenta in two hands and turn until the membranes are twisted. Slowly pull to complete delivery. — Inspect placenta for completeness.
Uterine Massage	— Massage the fundus to ensure contraction. — Palpate uterus every 15 minutes in the first 2 hours.

(Source: Adapted from FIGO)

There is a gap in current research regarding what impact each of the individual components of active management has on preventing blood loss. It appears that the key element of active management is the administration of an oxytocic drug, but evaluation of the other components of active management is incomplete.[28,29] Subsequent sections of this guideline review the evidence regarding each of the components of active management. While future research may define the components of active management that are most effective in preventing PPH and which, if any, hold risk if used incorrectly or alone,[30,31] current evidence suggests that active management of the third stage is the most effective tool in preventing PPH and adverse sequelae. Informed choice discussions with women regarding active management of third stage must be documented in the woman's chart.

Recommendation #2: Active management should be offered to all pregnant women.(I-A)

Recommendation #3: Active management is strongly recommended for women with an identified increased risk of postpartum hemorrhage.(I-A)

A) Delivery of Uterotonic

One debated aspect of active management is the ideal choice of prophylactic uterotonic. While some argue that currently there is little evidence that any route, dose or timing of oxytocin administration is superior,[14,32] there has, in fact, been a fair amount of research done which compares the effects of oxytocin, ergonovine or a combination of these drugs, administered intravenously or intramuscularly.

A systematic review comparing ergometrine-oxytocin (Syntometrine) versus oxytocin (Syntocinon) for third stage management,[33] identified six relevant trials (involving 9332 women). The combination of ergonovine and oxytocin was associated with a small reduction in the risk of blood loss >500ml compared to oxytocin alone (odds ratio 0.82, 95% CI 0.71 to 0.95). There was no statistically significant difference between groups for blood loss of >1000 ml. Ergometrine-oxytocin was associated with statistically significant increases in the risks of nausea, vomiting and elevated diastolic blood pressure.[33]

Another systematic review examined the effects of prophylactic oxytocin in the third stage of labour on maternal and neonatal outcomes.[34] A total of fourteen randomized or quasi-randomized trials were included. Seven trials in which prophylactic oxytocin was compared to no uterotonics demonstrated the following benefits to be associated with oxytocin: reduced blood loss (RR for blood loss >500 ml 0.50; 95% CI 0.43 to 0.59) and reduced need for therapeutic oxytocics (RR 0.50, 95% CI 0.39 to 0.64). Six trials[35,36,37,38,39,40] in which oxytocin was compared to ergot alkaloids demonstrated little difference in effect other than a lower risk of manual removal of the placenta with oxytocin (RR 0.57, 95% CI 0.41 to 0.79), and a non-significant trend suggesting less raised blood pressure with oxytocin (RR 0.53, 95% CI 0.19 to 1.52). A comparison of ergometrine alone to ergometrine with oxytocin was examined in five trials, which demonstrated little difference in effect. The reviewers note that while oxytocin appears to be beneficial for the prevention of postpartum hemorrhage, overall there is insufficient information about other outcomes and adverse effects.[34]

The results of these reviews suggest that oxytocin appears to be the agent of choice of third stage management in low risk women.[30] Prophylactic oxytocin may be given as 10 IU IM, 20-50 IU per litre IV drip run at 100-150 cc/hr or 5 IU IV push.[10,14] Some authorities caution against the use of a bolus of intravenous oxytocin, citing small studies which suggest that such practices could compromise women's hemodynamic state[3]. However, a recent randomized controlled trial[41] has demonstrated no significant difference in hemodynamic status between women given prophylactic intravenous oxytocin by infusion or by bolus; this study does not address giving intravenous boluses of oxytocin to women who are already hemodynamically unstable. When caring for women who give birth without pain medication, care providers should remember that intramuscular oxytocin is experienced by most women as being relatively painful.

Recent research focussing on third stage management has examined alternatives to oxytocin and syntometrine. The majority of randomized controlled trials on the topic published in the last 8 years have investigated use of misoprostol, a prostaglandin E1 analogue.[42,43] Misoprostol is inexpensive, stable, easily stored, and can be given non-parenterally, and therefore has potential to be particularly useful in developing countries.[13] Three systematic reviews have been completed on misoprostol use since 2002.[44,44,46] This work concludes that misoprostol results in higher blood loss than conventional prophylactic uterotonics and is associated with significant increases in rates of shivering and fever. The efficacy, dose, and route of administration of misoprostol for prophylactic use in third stage continue to be investigated and it is not recommended for use in the prevention of PPH at this time.[13,29,44,45,46]

Injectable prostaglandins are another alternative to conventional uterotonics. Mean blood loss does appear to be reduced with injectable prostaglandins compared to conventional injectable uterotonics (weighted mean difference -70 ml, 95% CI -73 to -67), but these agents have more side effects.[45] Injectable prostaglandins appear to be more appropriate for use in the treatment of PPH than in its prevention.

An additional issue of debate related to the administration of prophylactic uterotonics is the ideal timing of this intervention. It has been variously suggested that oxytocin be given after the anterior shoulder, after the birth of the baby or after delivery of the placenta. Other midwifery and obstetrical guidelines argue for delivery after the anterior shoulder, and within one minute of delivery of the baby respectively.[14,27] Earlier work[47] which proclaimed that use of oxytocics at the time of birth confers a decreased chance of hemorrhage when compared to giving oxytocics after the placenta has been contradicted. A recent RCT that compared giving oxytocin before versus after placental delivery found no difference in the incidence of PPH or the length of third stage.[48] Given the lack of clarity in the research and limited evidence on which to base recommendations, prophylactic oxytocin can be given after the birth of the anterior shoulder, or after the delivery of the baby up to and including within one minute of delivery of the baby.[14,27]

Recommendation #4: When active management is employed, prophylactic oxytocin (given as 10 IU IM or 5 IU IV slow push) should be given after delivery of the anterior shoulder within up to one minute after birth of the infant. (I-B)

B) Clamping of the Cord

The second component of active management is early cord clamping. In trials investigating active management, early cord clamping, occurring within 30-60 seconds of delivery, is undertaken regardless of whether of not cord pulsation has ceased. The benefits of immediate cord clamping, and its impact on blood loss are a topic of debate.

When clamping is delayed until after pulsations have ceased, complete transfusion of blood from the placenta to the neonate occurs which leads to higher hemoglobin and additional iron stores in infants.[49] These effects in newborns are undetectable by 6 months after birth.[29] On the other hand, it is argued that early clamping is beneficial because reduced placental blood transfer decreases the incidence of neonatal jaundice.[29,50]

Seven trials have compared the timing of cord clamping. Statistically non-significant findings from clinical trials have suggested that there may be risks inherent in the intervention of early cord clamping, including retained placenta, and increased bleeding,[29] but there is not sufficient evidence to establish whether or not such risks exist. Methodological weakness, small sample size and variation in outcomes measured make interpretation difficult. Evidence published to date has not clearly established the impact of the timing of cord clamping on postpartum blood loss,[29,51] and further investigation is needed. Until such time as studies reveal the effect of this component of active management on blood loss and its ideal timing, clamping of the cord may be done immediately or when pulsation ceases.

Recommendation #5: When active management is employed, clamping of the cord may be done

immediately after delivery of the infant or when pulsation ceases. (I-C)

C) Controlled Cord Traction

Controlled cord traction is a component of active management that is somewhat overlooked in the research on third stage management. Two older trials suggest that controlled cord traction is associated with lower mean blood loss and shorter third stages compared to less active approaches.[29] These findings are supported by a recent RCT which found a reduction of postpartum hemorrhage in the controlled cord traction group (5.8% vs. 11%; OR 0.50, 95% CI 0.15-0.63).[52] The results of this trial may be confounded by differences in the timing and route of administration of oxytocin between the study groups.

Another small RCT (n=239) adds the element of cord drainage to the issue of cord traction. This study investigated the use of controlled cord traction in combination with cord drainage and found that compared to expectant management, the length of third stage and amount of blood loss was significantly reduced in the cord traction/drainage group.[53] A systematic review of trials involving placental cord drainage as an investigated variable identified two relevant studies. The reviewers concluded that there appears to be potential benefit from the use of cord drainage in terms of reducing the third stage of labour, but more research is needed to fully investigate its impact.[54] This practice is not typically included as a component of active management.

Overall the evidence shows that controlled cord traction results in a statistically significant decrease in the incidence of PPH. Further investigation into the role of controlled cord traction from larger trials with comparable study groups would be useful.

When performing controlled cord traction, it is important to observe some key principles in order to avoid the potential danger of uterine inversion. Controlled cord traction should not be attempted prior to separation of the placenta, and should only be done in the presence of a well-contracted uterus. While performing cord traction, the non-dominant hand of the practitioner should rest on the abdomen with the heel of the hand at the symphysis pubis, and the fingertips resting on the fundus. In addition to allowing the practitioner to confirm that the uterus is contracted and to guard the uterus, this hand position allows detection of any "dipping" in the fundus, which would indicate that the placenta is still attached and that traction should be discontinued until separation occurs.[55]

During controlled cord traction, the mother may be asked to push to assist expulsion. This may be of particular use in situations where the cord is beginning to separate, and the practitioner wishes to use minimal traction in facilitating expulsion. As the placenta begins to appear at the introitus, the non-dominant hand continues to guard the uterus by applying suprapubic pressure slightly toward the umbilicus until the placenta is completely expelled.[55]

Recommendation #6: Controlled cord traction may be used to decrease blood loss, and should be used in combination with uterine guarding above the pubic bone on a contracted uterus. (I)

Expectant Management

Expectant management is a low intervention approach wherein the placenta is expelled spontaneously while being aided by maternal effort, positioning or nipple stimulation. The umbilical cord is clamped and cut after the placenta is delivered.[28,29] Typically, the cord ceases to pulsate between 1-3 minutes after the birth, which may be considered "physiologic clamping".[56] Skin to skin contact between the mother and infant may support physiological processes that contribute to separation and delivery of the placenta.[57]

Worldwide, expectant management is frequently practiced. The Global Network for Perinatal and Reproductive Health conducted an observational, cross sectional survey in 10 countries and concluded that the rate of active management was 24.6%.[58] This low rate may be accounted for by women's desire for a more "natural" childbirth, a philosophy that active management is unnecessary, and a preference to avoid the potentially unpleasant effects of uterotonic agents.[59] The lack of availability of uterotonics also limits the use of active management in some countries.

A variation of expectant management that is used by many practitioners who may consider their management style to be physiologic rather than active is the Brandt-Andrews manoeuvre. This manoeuvre involves no administration of oxytocin, and controlled cord traction with or without early clamping. There currently is no research that compares the Brandt-Andrews manoeuvre to physiologic management of third stage. Both approaches seem to be reasonable variations to offer when a woman has chosen physiological management, given the evidence discussed earlier in this guideline that suggests that controlled cord traction decreases the risk of PPH.

Another component of third stage requiring consideration with respect to physiologic management is the duration. There is some debate regarding the maximum duration of a normal third stage. Third stage usually lasts from 5-15 min, but may last up to an hour.[4] After 30 minutes duration, there is an increase in the rates of postpartum hemorrhage.[60] Research has borne out the association between prolonged third stage and complications. It has been suggested that the most important aspect of third stage management is minimizing its duration, and that how this is accomplished is secondary. For example, in two trials demonstrating active management to be the superior approach, 26% and 16.4% of women in the physiologic groups had third stages exceeding 30 minutes (compared to 2.9% and 3.3% of women in the active management groups).[22,26] In another trial, which demonstrated no benefit to active management, third stage duration was less than 20 minutes in 93% of the physiologically managed and 95% of the actively managed groups respectively.[23]

Recommendation #7: Either expectant management or the Brandt-Andrews manoeuvre is an acceptable option for women who decline active management. (III)

MANAGEMENT OF PPH

The majority of the existing research on PPH focuses on the prevention of PPH, while evidence regarding the safety and efficacy of treatments for primary PPH is more varied and controversial.[61] The subsequent discussion of the management of PPH is based primarily on established protocols that have been developed based on the experience of clinicians. While in some cases the clinical benefits of interventions are clearly apparent, there is room for further research on the efficacy of various components of the emergency measures commonly used in response to PPH.

Following careful identification of risk factors, and the use of active management of the third stage, the third key aspect in preventing PPH is early recognition of blood loss. Careful assessment in the immediate postpartum and prompt intervention when indicated can help to reduce blood loss. Post delivery, the fundus should be assessed at regular intervals. Signs and symptoms that are associated with PPH include visible bleeding, pallor, rising pulse rate, falling blood pressure, altered level of consciousness, restlessness, or enlarged uterus. Table 3 outlines the clinical findings associated with varying degrees of shock.

The three main principles of management of PPH are:

- Stop the bleeding,
- Treat shock, and
- Obtain help.

Table 4 shows a clinical pathway for management of PPH. When PPH is identified, the likely cause must be determined so that appropriate action may be taken. Subsequent actions should take place as simultaneously and as quickly as possible. While the uterus and genital tract are explored to identify cause of bleeding, measures such as monitoring vital signs, catheterization, administering oxygen and placing an IV, may be commenced.[9] The order in which steps are taken may vary depending on the specific circumstances and the resources available.

Table 3: Clinical findings with various degrees of shock

	Blood Loss	Systolic Blood Pressure Change	Signs and Symptoms
Compensation	500 to 1000 ml	None	Palpitations, dizziness, tachycardia
Mild	1000 to 1500 ml	Slight fall (80 to 100 mmHg)	Weakness, sweating, tachycardia
Moderate	1500 to 2000 ml	Marked fall (70 to 80 mmHg)	Restlessness, pallor, oliguria
Severe	2000 to 3000 ml	Profound fall (50 to 70 mmHg)	Collapse, Air hunger, Anuria,

(Source: In SOGC Alarm manual from ACOG Bulletin #235)

Recommendation #8: When PPH occurs, the cause of bleeding should be identified and directed treatment undertaken promptly. (III)

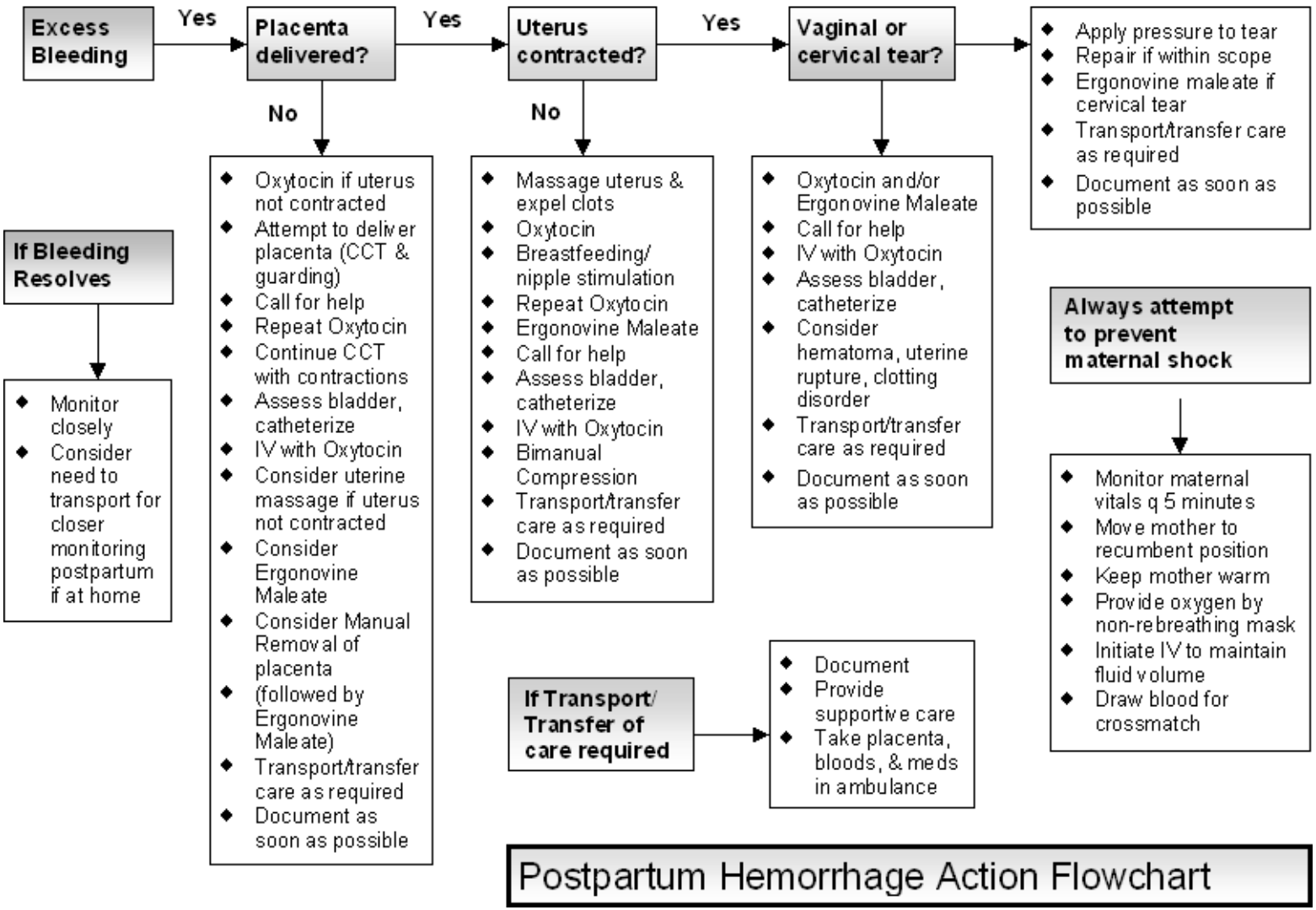
Prompt decision making and communication are the cornerstones of management of PPH.[62] Informing the woman, her partner and other health care providers assisting the midwife of the situation initially and in an ongoing manner is an important aspect of management.

Recommendation #9: In addition to controlling bleeding, the initial steps in treatment of PPH include treating shock and communicating with the client and other health care providers assisting the midwife. (III)

Options for treatment of PPH include drugs to increase uterine contraction and surgical techniques.[61] Treatment is directed based on the identification of the cause of hemorrhage. The most common cause of PPH is uterine atony which can be treated by uterine massage and/or

compression and administration of uterotonics.[9] It is within the midwife's pharmacopeia to give oxytocin, ergonovine and carboprost for the treatment of PPH. See Table 5 for a summary of these medications. Current research shows promising developments in the potential use of rectal misoprostol as a first line drug for the treatment of primary PPH; however, more research is needed.[42,61]

Table 4


Excess Bleeding
Yes
Placenta delivered?
Yes
Uterus contracted?
Yes
Vaginal or cervical tear?
Apply pressure to tear
Repair if within scope
Ergonovine maleate if cervical tear
Transport/transfer care as required
Document as soon as possible
No
Oxytocin if uterus not contracted
Attempt to deliver placenta (CCT & guarding)
Call for help
Repeat Oxytocin
Continue CCT with contractions
Assess bladder, catheterize
IV with Oxytocin
Consider uterine massage if uterus not contracted
Consider Ergonovine Maleate
Consider Manual Removal of placenta
(followed by Ergonovine Maleate)
Transport/transfer care as required
Document as soon as possible
No
Massage uterus & expel clots
Oxytocin
Breastfeeding/ nipple stimulation
Repeat Oxytocin
Ergonovine Maleate
Call for help
Assess bladder, catheterize
IV with Oxytocin
Bimanual Compression
Transport/transfer care as required
Document as soon as possible
Oxytocin and/or Ergonovine Maleate
Call for help
IV with Oxytocin
Assess bladder, catheterize
Consider hematoma, uterine rupture, clotting disorder
Transport/transfer care as required
Document as soon as possible
If Bleeding Resolves
Monitor closely
Consider need to transport for closer monitoring postpartum if at home
Always attempt to prevent maternal shock
Monitor maternal vitals q 5 minutes
Move mother to recumbent position
Keep mother warm
Provide oxygen by non-rebreathing mask
Initiate IV to maintain fluid volume
Draw blood for crossmatch
If Transport/ Transfer of care required
Document
Provide supportive care
Take placenta, bloods, & meds in ambulance
Postpartum Hemorrhage Action Flowchart

Hemorrhage unresponsive to these actions requires the immediate assistance of a physician with obstetric surgical skills. As with any emergency, careful attention to communication and documentation is required. Uterine packing, artery ligation, x-ray guided embolization, hysterectomy and the use of blood replacement products are all further interventions in the management of PPH that may be performed by an obstetrician.[9,14]

Table 5: Properties of uterotonic medications

Drug	Mechanism of Action	Dose	Side Effects	Other
Oxytocin	Increases basal tone of myometrium, causes contractions	10 IU IM, 5-10 IU IV push, 20-50 IU IV/L	Rare, occasionally nausea and vomiting	Onset is 3 min
Ergonovine	Enhances muscle tone, contracts lower uterine segment	0.25 mg IM, 0.125 mg IV	Nausea, vomiting, hypertension, peripheral vasospasm	Onset 7min IM 45 sec IV Max dose 1.25 mg
Hemabate (Carboprost)	Uterotonic, causes strong contractions (PGF2 analogue)	.25 mg IM .25 mg IMM	GI disturbances fatigue, dizziness, flushing, diaphoresis	Can be given q15 up to 2mg.

ADDITIONAL MIDWIFERY IMPLICATIONS

The topic of third stage management should be discussed with each client during the course of her prenatal care. Women need to be informed of the benefits and risks of management options and made aware of any factors particular to their situation worthy of consideration. Access to previous obstetrical records and continuing evaluation of risk factors will help midwives to identify women to whom active management should be recommended. Midwives should endeavour to minimize any existing barriers to the implementation of active management.

One concern for midwives is the storage of ergonovine, carboprost and oxytocin for women planning homebirths. Storage and refrigeration is essential to the efficacy of ergometrine. Ergometrine loses 21-27% of active ingredients after 1 month and 90% after 1 year of storage exposed to light and at 21-25 degrees Celsius. For most effective long-term storage, ergonovine must be kept between 2-8 degrees Celsius and protected from light.[43] Similarly, carboprost must also be stored at between 2-8 degrees Celsius.[62] Oxytocin is ideally stored between 15-30C and should be protected from freezing.[27] Midwives should not store these drugs in their cars where large temperature fluctuations can adversely affect their efficacy.

It is important to acknowledge that there is variation in the preferences of both midwives and women regarding third stage management. Woman and midwives who participated in the Bristol trial on active management of third stage both regarded the longer length of third stage with physiologic management as a negative feature,[63] and research suggests there is a tendency to favour active management.[29] Others favour physiologic management because it is "less interventive," though it has been suggested that the label of interventive medicine should be removed from the evidence based practice of active management.[64] Midwives are in a position to preserve choice by respecting that some women neither want or need active management while presenting evidence based information to all clients.[20,65] It is the role of midwives simultaneously to support birth as a natural physiological practice and to acknowledge the research that supports interventions such as active management in decreasing postpartum blood loss.

When a primary PPH occurs, early recognition, communication, and attention to resuscitative measures and cause of bleeding[66] will assist the midwife in managing this rare but potentially life threatening situation. With careful management, third stage can remain an anti-climatic and uneventful part of one of the most important days of a woman's life.

RECOMMENDATIONS

1. Identification of risk factors for PPH should occur in an ongoing manner throughout the course of care. (III-B)

2. Active management should be offered to all pregnant women. (I-A)

3. Active management is strongly recommended for women with an identified increased risk of postpartum hemorrhage. (I-A)

4. When active management is employed, prophylactic oxytocin (given as 10 IU IM or 5 IU IV slow push) should be given after delivery of the anterior shoulder within up to one minute after delivery of the infant. (I-B)

5. When active management is employed, clamping of the cord can occur immediately after delivery of the infant or when pulsation ceases. (I-C)

6. Controlled cord traction may be used to decrease blood loss, and should be used in combination with counter traction above the pubic bone on a contracted uterus. (I-B)

7. Either expectant management or the Brandt-Andrews manoeuvre is an acceptable option for women who decline active management. (III)

8. When PPH occurs, the cause of bleeding should be identified and directed treatment undertaken promptly. (III)

9. In addition to controlling bleeding, the initial steps in treatment of PPH should include treating shock and communicating with the client and the second midwife.(III)

THE LEVEL OF EVIDENCE AND QUALITY OF RECOMMENDATIONS ARE BASED ON THE CANADIAN TASK FORCE PERIODIC HEALTH CARE

Recommendations Grades for Specific Clinical Preventive Actions

A The CTF concludes that there is **good** evidence to recommend the clinical preventive action.

B The CTF concludes that there is **fair** evidence to recommend the clinical preventive action.

C The CTF concludes that the existing evidence is **conflicting** and does not allow making a recommendation for or against use of the clinical preventive action; however other factors may influence decision-making.

D The CTF concludes that there is **fair** evidence to recommend against the clinical preventive action.

E The CTF concludes that there is **good** evidence to recommend against the clinical preventive action.

I The CTF concludes that there is **insufficient** evidence (in quantity and/or quality) to make a recommendation, however other factors may influence decision-making.

The CTF recognizes that in many cases patient specific factors need to be considered and discussed, such as the value the patient places on the clinical preventive action; its possible positive and negative outcomes; and the context and /or personal circumstances of the patient (medical and other). In certain circumstances where the evidence is complex, conflicting or insufficient, a more detailed discussion may be required.

Levels of Evidence - Research Design Rating

I Evidence from randomized controlled trial(s).

II-1 Evidence from controlled trial(s) without randomization.

II-2 Evidence from cohort or case-control analytic studies, preferably from more than one centre or research group.

II-3 Evidence from comparisons between times or places with or without the intervention; dramatic results in uncontrolled experiments could be included here.

III Opinions of respected authorities, based on clinical experience; descriptive studies or reports of expert committees.

Levels of Evidence - Quality (Internal Validity) Rating

Good A study (including meta-analyses or systematic reviews) that meets all design-specific criteria* well.

Fair A study (including meta-analyses or systematic reviews) that does not meet (or it is not clear that it meets) at least one design-specific criterion* but has no known "fatal flaw."

Poor A study (including meta-analyses or systematic reviews) that has at least one design-specific* "fatal flaw," or an accumulation of lesser flaws to the extent that the results of the study are not deemed able to inform recommendations.

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