

**CIRCULAR**

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**FRAMEWORK FOR PREVENTION, EARLY RECOGNITION AND MANAGEMENT  
OF POSTPARTUM HAEMORRHAGE (PPH)**

This framework for prevention, early recognition and management of postpartum haemorrhage (PPH) was prepared by the High Risk Obstetric Advisory Group of the NSW Pregnancy & Newborn Services Network (NSW PSN). It has been endorsed by the NSW Maternal and Perinatal Committee and is now issued as policy by NSW Health.

Using this Framework as a guide, all hospitals are required to develop written protocols for the prevention, early recognition and management of PPH. These protocols must include a clear local plan of action for all clinical and laboratory staff to follow with appropriate early involvement of senior consultants in obstetrics, anaesthetics, haematology and intensive care, should the preventive measures outlined in this document fail.

Any woman whose pregnancy is complicated by PPH should be able to obtain a full explanation of events in accord with the recommendations of the Australian Council for Safety and Quality in Health Care national Open Disclosure of Adverse Events Project<sup>1</sup>.

Robyn Kruk  
**Director-General**

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## KEY POINTS

### PREVENTION

- Active management of the third stage of labour is recommended for all women
- Synthetic oxytocin (Syntocinon) is the current drug of choice for active management of the third stage of labour
- All women should be fully informed antenatally of the current evidence regarding benefits and harms of active and physiological management of the third stage of labour. This includes the means available such as oxytocin for prevention of PPH and associated side effects and risks. Every woman should be encouraged to consider and to incorporate prevention and management of primary and secondary PPH into her birth plan. This includes women planning a Birth Centre birth or a home birth, early discharge and women who cannot receive blood products for religious or other reasons<sup>2</sup>
- Local policies should be in place for physiological management of third stage for those women who choose physiological management after being fully informed of the benefits and possible harms of active management

### EARLY RECOGNITION

- Routine observation of all postpartum women for blood loss, fundal tone, BP and pulse. This is especially important during the first 4 hours post delivery. The most important single warning of diminishing blood volume and mild shock is tachycardia, which often precedes a fall in blood pressure. Weakness, sweating and tachycardia<sup>3</sup> may accompany this. See Table 1: *Clinical findings in PPH*
- Early discharge programs should include mechanisms for identifying secondary PPH and for monitoring incidence<sup>4</sup>

### MANAGEMENT

- CALL FOR HELP, commence resuscitation, identify cause of bleeding and give directed therapy according to cause of bleeding (Tone, Tissue, Trauma, Thrombin). See Table 3: *A stepwise approach to management of PPH*, and Table 4: *Drug therapy for management of PPH*
- Delay can lead to further complications requiring comprehensive emergency obstetric and intensive care services available only at a Tertiary Perinatal Centre. Intractable bleeding requires a multidisciplinary team approach and individualised management, with replacement of blood and clotting factors and ongoing monitoring. Surgery may be required should these measures fail

### A CLEAR LOCAL PLAN OF ACTION, WITH

- Contact information for key personnel and an agreed communication strategy
- Measures to ensure the availability of appropriate equipment and drugs (including Carboprost Prostaglandin F<sub>2</sub> alpha and misoprostol) in case of severe PPH
- Measures to ensure all staff providing birthing services are familiar with the principles of prevention, recognition and management of PPH
- Measures to ensure all staff are familiar with their local plan of action and are able to act as a team in an emergency situation
- Measures at hospital level to record the number of women with PPH for reporting to Morbidity and Mortality meetings, to ensure system problems are identified early and rectified quickly<sup>4, 5</sup>
- Annual evaluation and reporting by Area Health Services to the NSW Health Maternal & Perinatal Committee on the incidence of PPH, according to the outcome measures described at 5.0 *Monitoring incidence of PPH*

## 1. Background and definitions

- 1.1 Postpartum haemorrhage (PPH) is a potentially life-threatening complication of vaginal and caesarean delivery. With an incidence of 5 -15% worldwide, it remains one of the main causes of maternal mortality in Australia and internationally<sup>6,7,8</sup>.
- 1.2 PPH can result in significant maternal morbidity. Possible complications include iron deficiency anemia, prolonged hospital stay, delay or failure of lactation due to pituitary effects, pituitary infarction, exposure to blood products, haemorrhagic shock and hypotension, coagulopathy, acute tubular necrosis, coma, the need for surgical intervention and in cases of intractable PPH, the need for hysterectomy and resultant permanent sterilisation to control bleeding<sup>9</sup>.

### 1.3 Definition of postpartum haemorrhage (PPH)

**PPH is defined as blood loss of 500mL or more during and after childbirth;  
severe PPH is defined as blood loss of 1000mL or more**

**OR**

**any amount of blood loss postpartum that causes haemodynamic compromise<sup>6,9,10</sup>**

**A primary PPH occurs within the first 24 hours following delivery and a secondary PPH occurs between 24 hours and 12 weeks postpartum<sup>7,8,11</sup>**

- Generally, the degree of haemodynamic compromise or shock parallels the amount of blood lost, but some women will become compromised with a relatively small blood loss. This may include women with pregnancy-induced hypertension, women with anaemia, and women of small stature<sup>11</sup>
- Haemodynamic changes of pregnancy may sustain a woman's circulatory status at near normal levels (initially there may even be a small rise in BP) despite large blood loss, until such time as a critical level is reached and there is a sudden and profound change in blood pressure and pulse to indicate shock
- Manual removal of the placenta at elective or emergency caesarean section is associated with a clinically important and statistically significant increase in maternal blood loss and increased risk of infection<sup>12,13</sup>

***NOTE: The incidence of PPH may be underestimated by up to 50%, due to the clinical difficulty in accurately estimating blood loss<sup>3</sup>***

## 1.4 Table 1: Clinical findings in PPH<sup>3</sup>

	Degree of Shock			
	Compensation	Mild Shock	Moderate Shock	Severe Shock
<b>Blood loss</b>	500-1000 ml 10–15%	1000-1500 ml 15–25%	1500-2000 ml 25-35%	2000-3000 ml 35-45%
<b>Blood Pressure change (systolic pressure)</b>	none	Slight fall (80-100 mmHg)	Marked fall (70-80 mmHg)	Profound fall (50-70 mmHg)
<b>Signs and Symptoms</b>	palpitations dizziness tachycardia	weakness sweating tachycardia	restlessness pallor oliguria	collapse air hunger anuria

## 2. Risk factors for PPH

- 2.1 Table 2 sets out the main antenatal and intrapartum risk factors for PPH. In some cases, extra precautions may be necessary for delivery such as IV access, coagulation studies, crossmatching of blood and anaesthesia backup. It may also be advisable to obtain early advice from a Tertiary Perinatal Centre<sup>6,15</sup>.
- 2.2 ***NOTE: Prophylactic therapy and classification of patients according to antenatal and intrapartum risk factors is not a substitute for prevention and for close observation of every woman for PPH post delivery. Since two thirds of cases of PPH cannot be predicted, the risk of submitting a woman to unnecessary interventions and subsequent iatrogenic disease must also be weighed against the individual's risk of PPH<sup>3,6</sup>***

### 2.3 Table 2: Antenatal and intrapartum risk factors<sup>3,9,16,17,18</sup>

Cause	Etiology Process	Clinical Risk Factors
<b>Abnormalities of uterine contraction (Tone)</b> <b>70%</b>	<ul style="list-style-type: none"> <li>atonic uterus</li> </ul>	<ul style="list-style-type: none"> <li>physiological management of third stage</li> <li>prolonged 3<sup>rd</sup> stage (more than 30 min)</li> </ul>
	<ul style="list-style-type: none"> <li>over distended uterus</li> </ul>	<ul style="list-style-type: none"> <li>polyhydramnios</li> <li>multiple gestation</li> <li>macrosomia</li> </ul>
	<ul style="list-style-type: none"> <li>uterine muscle exhaustion</li> </ul>	<ul style="list-style-type: none"> <li>rapid or incoordinate labour</li> <li>prolonged labour (1<sup>st</sup> or 2<sup>nd</sup> stage)</li> <li>labour dystocia</li> <li>high parity</li> <li>labour augmented with syntocinon</li> </ul>
	<ul style="list-style-type: none"> <li>intra amniotic infection</li> </ul>	<ul style="list-style-type: none"> <li>pyrexia</li> <li>prolonged ROM (more than 24 hours)</li> </ul>
	<ul style="list-style-type: none"> <li>drug induced hypotonia</li> </ul>	<ul style="list-style-type: none"> <li>magnesium sulphate, nifedipine, salbutamol</li> <li>general anaesthetic</li> </ul>
	<ul style="list-style-type: none"> <li>functional or anatomic distortion of the uterus</li> </ul>	<ul style="list-style-type: none"> <li>fibroid uterus</li> <li>uterine anomalies</li> </ul>
<b>Genital tract trauma (Trauma)</b> <b>20%</b>	<ul style="list-style-type: none"> <li>episiotomy or lacerations (cervix, vagina or perineum)</li> </ul>	<ul style="list-style-type: none"> <li>labour induced</li> <li>labour augmented with syntocinon</li> <li>labour dystocia</li> <li>malposition</li> <li>precipitous delivery</li> <li>operative delivery (vacuum or forceps)</li> </ul>
	<ul style="list-style-type: none"> <li>extensions, lacerations at caesarean section</li> </ul>	<ul style="list-style-type: none"> <li>malposition</li> <li>deep engagement</li> </ul>
	<ul style="list-style-type: none"> <li>uterine rupture</li> </ul>	<ul style="list-style-type: none"> <li>previous uterine surgery</li> </ul>
	<ul style="list-style-type: none"> <li>uterine inversion</li> </ul>	<ul style="list-style-type: none"> <li>strong cord traction in 3<sup>rd</sup> stage, especially with fundal placenta</li> <li>short umbilical cord</li> <li>high parity</li> <li>relaxed uterus, lower segment &amp; cervix</li> <li>placenta accreta, especially fundal</li> <li>congenital uterine weakness or anomalies</li> <li>antepartum use of magnesium sulphate or oxytocin</li> </ul>
<b>Retained products of conception (Tissue)</b> <b>10%</b>	<ul style="list-style-type: none"> <li>retained products</li> <li>abnormal placenta</li> <li>retained cotyledon or succenturiate lobe</li> </ul>	<ul style="list-style-type: none"> <li>incomplete placenta at delivery</li> <li>placenta accreta or percreta</li> <li>previous caesarean or other uterine surgery</li> <li>high parity</li> <li>abnormal placenta on U/S</li> </ul>
<b>Abnormalities of coagulation (Thrombin)</b> <b>1%</b>	<ul style="list-style-type: none"> <li>retained blood clots</li> </ul>	<ul style="list-style-type: none"> <li>atonic uterus</li> </ul>
	<ul style="list-style-type: none"> <li>coagulation disorders acquired in pregnancy</li> <li>Idiopathic Thrombocytopenic Purpura (ITP)</li> <li>Von Willebrand's disease</li> <li>Haemophilia or carrier</li> <li>Thrombocytopenia with pre-eclampsia</li> <li>Disseminated Intravascular Coagulopathy (DIC)</li> <li>pre-eclampsia</li> <li>dead fetus in utero</li> <li>severe infection</li> <li>abruption</li> <li>amniotic fluid embolus</li> </ul>	<ul style="list-style-type: none"> <li>bruising</li> <li>elevated BP, HELLP</li> <li>fetal death</li> <li>pyrexia, WBC</li> <li>antepartum haemorrhage (current or previous)</li> <li>sudden collapse</li> </ul>
	<ul style="list-style-type: none"> <li>therapeutic anti-coagulation</li> </ul>	<ul style="list-style-type: none"> <li>history of blood clot</li> </ul>

### **3. Prevention of postpartum haemorrhage**

- 3.1 Healthy, non-anaemic women can be severely affected by major blood loss and maternal morbidity will be even greater in women with moderate or severe anaemia in pregnancy. Antenatal detection and correction of anaemia is therefore an important preventive process<sup>8,19</sup>.
- 3.2 *Active management* of third stage of labour is the most effective means of preventing PPH. Compared to *physiological (or expectant) management*, active management has been shown to reduce by more than 50% the risk of PPH, low haemoglobin levels postpartum, and the use of blood transfusion<sup>2,10,14</sup>.
- 3.3 Active management combines administration of a prophylactic oxytocic drug as the anterior shoulder delivers with early cord clamping, cutting, and controlled cord traction with uterine stabilisation<sup>3,9,14</sup>.
- 3.4 *Physiological or expectant management* employs none of the above interventions. The placenta is delivered by maternal effort aided by gravity or nipple stimulation and the cord is clamped when pulsation ceases. All birth attendants should ensure that women who choose physiological management of the third stage are fully informed of the higher risk of PPH due to uterine atony<sup>2</sup>.
- 3.5 In developed countries, two per cent of postnatal women are admitted to hospital with secondary or delayed PPH, half of them undergoing uterine surgical evacuation<sup>11</sup>. As subacute PPH is easily underestimated<sup>7,8</sup> prevention and management of secondary postpartum haemorrhage should be included in routine discharge advice and factored into obstetric early discharge decisions and programs.

#### **3.6 Prophylactic oxytocic drugs**

- 3.6.1 The risk of PPH can be reduced by 50% with routine administration of oxytocic drugs as part of active third stage management. Routine prophylaxis can result in a 70% reduction in the need for therapeutic oxytocics to treat excessive postpartum bleeding<sup>2,14</sup>.
- 3.6.2 These significant benefits of routine oxytocic use must be weighed against its potential disadvantages<sup>2</sup> and the rare but serious morbidity associated with some oxytocics such as ergometrine<sup>14</sup>.
- 3.6.3 *In cases of multiple pregnancy, all fetuses must be delivered prior to administration of oxytocic drugs to avoid intrauterine asphyxia.*
- 3.6.4 *Oxytocin* (Syntocinon) is the current drug of choice for prevention of PPH<sup>20,21</sup>. The main advantages are rapid onset of action and the lack of side effects such as elevated blood pressure or tetanic contractions. Oxytocin does not increase the risk of retained placenta or the duration of the third stage of labour and it can be administered after delivery of the anterior shoulder. The usual prophylactic dose is 5 -10 units IM or 5 units IV slowly if intravenous access is already established for other reasons (eg epidural block or Group B Strep prophylaxis)<sup>3,9,22</sup>.
- 3.6.5 *Syntometrine* (ergometrine maleate; oxytocin) is associated with a small but statistically significant reduction in the risk of PPH compared to oxytocin where blood loss is less than 1000ml. However, this advantage needs to be weighed against the adverse effects of nausea, vomiting, abdominal pain, headache, dizziness, rash, hypertension, cardiac arrhythmias and chest pain associated

with the use of syntometrine<sup>21</sup>. The usual prophylactic dose is 1mL IM following placental expulsion. Each mL of Syntometrine contains ergometrine maleate 0.5mg, oxytocin 5 units<sup>23</sup>.

### **Other oxytocic drugs**

3.6.6 *Misoprostol*, an oral prostaglandin E1 analogue, is not currently recommended for routine prevention and control of PPH. In a recent WHO multicentre double blind randomised trial comparing misoprostol and oxytocin for prophylaxis of PPH, more women receiving misoprostol had a measured blood loss of 1000 mL or more and more required additional uterotonics. This study found that 10 units oxytocin (intravenous or intramuscular) is more effective in the active management of the third stage of labour in hospital settings where active management is the norm<sup>24</sup>.

3.6.7 *Ergometrine maleate* is not recommended for use as first line preventive therapy due to significant adverse effects<sup>14, 25</sup>.

### **3.7 Other components of third stage active management**

3.7.1 Studies have yet to identify which elements of third stage management, other than oxytocics, contribute most to the differences in rates of PPH between active and expectant management<sup>2</sup>. Until further evidence is available, active management of the third stage should therefore also include early cord clamping and controlled umbilical cord traction as described at 3.7.3<sup>14</sup>.

3.7.2 *Early cord clamping and cutting*. Prompt clamping and cutting of the umbilical cord before beginning controlled cord traction should be continued until there is definitive evidence about the timing of cord clamping on the frequency of PPH<sup>14</sup>.

3.7.3 *Controlled umbilical cord traction in the presence of oxytocin*. This involves palpation of the fundus to confirm uterine contraction followed by gentle cord traction, balanced by upward pressure just above the symphysis pubis. The placenta will deliver spontaneously or may be found at the cervix with gentle digital examination and can then be lifted from the vagina. If neither occurs readily, IV oxytocin may be given<sup>14</sup>.

3.7.4 *Retained placenta* is an important cause of PPH. Retained placenta is defined as a placenta that is not expelled within 30 minutes of the baby's delivery<sup>9,16,17,19</sup>.

3.7.5 Local policies should include measures for management of retained placenta with and without haemorrhage. These include stimulating uterine contraction and ensuring the bladder is empty<sup>19</sup>.

3.7.6 If the placenta is not expelled by maternal effort following these measures and no oxytocics have been administered, give oxytocin 10 units IM. Do not give ergometrine as it causes tonic uterine contraction which may delay placental expulsion. Controlled cord traction can be attempted if the placenta is still undelivered 30 minutes after administration of oxytocin, provided the uterus is contracted<sup>19</sup>.

3.7.7 If controlled cord traction is unsuccessful, manual removal of the placenta may be necessary, as the incidence of postpartum haemorrhage and other complications begins to rise progressively once the third stage exceeds 30 minutes<sup>16,17</sup>. This should be carried out in the operating theatre with intravenous access and adequate anaesthesia. It is also important to ascertain haemoglobin, blood group and antibody screen. Cross match may also be advisable<sup>26</sup>.

- 3.8 *Fundal massage*. Following delivery of the placenta continued uterine contraction should be confirmed using fundal palpation. Fundal massage may sometimes be necessary to maintain uterine tone<sup>14</sup>.
- 3.9 *Check the placenta and membranes* for completeness.
- 3.10 *Assess for trauma*. The lower genital tract should be carefully examined for lacerations and/or signs of haematoma. Following operative delivery, visualise the cervix and upper vagina to exclude laceration / haematoma. Haematoma or uterine rupture (eg. into the broad ligament) should be suspected where signs and symptoms of excessive blood loss are inconsistent with visible blood loss. Classic symptoms of rupture into the supporting ligaments of the uterus, such as shoulder tip pain, should be specifically assessed.

#### **4. Management of established PPH**

- 4.1 Early recognition of PPH, followed by systematic evaluation and treatment and prompt fluid resuscitation are essential to minimise morbidity and mortality. Treatment consists of general management of excessive bleeding and maternal resuscitation for prolonged bleeding or massive blood loss<sup>9</sup>.
- 4.2 The main causes of morbidity and mortality secondary to PPH are delayed and inappropriate correction of hypovolaemia, delay in recognizing coagulation failure and a delay in controlling traumatic bleeding<sup>27</sup>. Underestimation of the total blood lost may also be exacerbated if haemorrhage is concealed in the uterine cavity, the abdominal cavity, or retroperitoneally.
- 4.3 Rapid and appropriate fluid replacement to correct hypovolaemia may be lifesaving and can gain time to control bleeding and obtain blood for transfusion should this become necessary<sup>19</sup>.
- 4.4 To restore circulating (intravascular) volume, infuse crystalloids (normal saline or Hartman's) in a volume at least three times the measured volume lost<sup>19</sup>. A recent Cochrane Review of colloid and crystalloid solutions for fluid resuscitation in critically ill patients found no improvement in survival associated with colloids, including albumin or plasma protein fraction, and given their greater expense questioned their continued use outside the context of randomised controlled trials<sup>28</sup>. Research evaluating the use of colloid and crystalloid solutions for fluid resuscitation is continuing.
- 4.5 Blood is the ideal replacement fluid in PPH as it not only replaces lost volume but also the lost oxygen-carrying capacity. This will generally mean giving blood whenever the measured volume lost is greater than about 2 litres or at a lesser threshold if the bleeding is ongoing or there are signs of shock. Decisions to transfuse should take into account current NHMRC guidelines for appropriate clinical use of blood and blood components as well as the benefits and risks for the individual woman<sup>29,30,31</sup>.
- 4.6 Appropriate consultation regarding invasive monitoring should be considered in patients with intractable PPH<sup>32</sup>.
- 4.7 It is vital to institute measures to identify the source of bleeding in tandem with fluid resuscitation, to monitor coagulation status regularly and to consider early haematology consultation<sup>27</sup>.

## 4.8

**Table 3: A Stepwise approach to the management of postpartum haemorrhage<sup>3,19,26</sup>**

<b>Step 1 – Initial assessment and Treatment</b>			
<i>Early recognition, prompt resuscitation, identify cause of bleeding, baseline lab tests</i>			
<b>Resuscitation</b> <ul style="list-style-type: none"> <li>CALL FOR HELP</li> <li>two large bore IV (16G)</li> <li>oxygen by mask</li> <li>monitor BP, pulse, respiration, urine output, other symptoms (eg pain)</li> <li>+/- catheter</li> <li>+/- oxygen saturation</li> </ul>	<b>Assess Etiology</b> <ul style="list-style-type: none"> <li>abdominal assessment of uterus (tone, tissue)</li> <li>explore lower genital tract (trauma)</li> <li>review history (thrombin)</li> <li>observe clots</li> </ul>	<b>Laboratory Tests</b> <ul style="list-style-type: none"> <li>FBC</li> <li>coagulation screen</li> <li>ABO group and cross match</li> </ul>	
<b>Step 2 – Directed Therapy</b>			
<i>Treat cause, massage / compress uterus, oxytocic for atony, evacuate clots or retained products, repair trauma, reverse coagulation defects</i>			
<b>“Tone”</b> <ul style="list-style-type: none"> <li>uterine massage</li> <li>bi-manual compression</li> <li>oxytocic drugs</li> <li>Carboprost</li> <li>Prostaglandin F2 Alpha</li> <li>Misoprostol (rectal)</li> </ul>	<b>“Tissue”</b> <ul style="list-style-type: none"> <li>manual removal</li> <li>curettage</li> </ul>	<b>“Trauma”</b> <ul style="list-style-type: none"> <li>correct inversion</li> <li>repair laceration</li> <li>identify rupture</li> <li>haematoma</li> </ul>	<b>“Thrombin”</b> <ul style="list-style-type: none"> <li>reverse anticoagulation</li> <li>replace factors</li> </ul>
<b>Step 3 – Intractable PPH</b>			
<i>Multidisciplinary team, compression / packing / vasopressin / angiographic embolization, fluid &amp; blood components to maintain haemodynamic &amp; coagulation status</i>			
<i>Individualised management according to situation, medical experience, and the facilities and personnel available. Ongoing monitoring, replacement of blood &amp; clotting factors</i>			
<b>Get Help</b> <ul style="list-style-type: none"> <li>2nd obstetrician / gynae surgeon experienced in management of massive, intractable PPH</li> <li>anaesthetist</li> <li>coagulation team</li> <li>OT, lab and ICU staff</li> </ul>	<b>Local Control</b> <ul style="list-style-type: none"> <li>bi-manual compression</li> <li>+/- pack uterus / vagina to allow adequate replacement of volume, blood &amp; clotting factors prior to definitive surgery</li> <li>+/- vasopressin</li> <li>+/- embolization</li> </ul>	<b>BP and Coagulation</b> <ul style="list-style-type: none"> <li>crystalloid</li> <li>blood products</li> </ul>	
<b>Step 4 – Surgery</b>			
<i>An experienced gynaecological surgeon to locate the source and stem bleeding / peripartum hysterectomy</i>			
<ul style="list-style-type: none"> <li>Examination under anaesthetic</li> <li>Repair lacerations</li> </ul>	<ul style="list-style-type: none"> <li>An experienced gynaecological surgeon will carry out the most appropriate procedure to reduce blood supply to the uterus</li> </ul>	<ul style="list-style-type: none"> <li>Hysterectomy. This may be the safest option for a less experienced surgeon, or when vascular ligation fails</li> </ul>	
<b>Step 5 – Post Hysterectomy Bleeding</b>			
<i>If consumptive coagulopathy present with continued widespread bleeding</i>			
<ul style="list-style-type: none"> <li>Abdominal Packing</li> </ul>		<ul style="list-style-type: none"> <li>Angiographic Embolization</li> </ul>	

#### 4.9 Drug therapy for management of PPH

Postpartum haemorrhage can be treated with Syntocinon, Syntometrine and Ergometrine as per Table 4. Additional drugs are listed below at 4.9.2, 4.9.3 and 4.9.4.

4.9.1 If the cause is uterine atony and bleeding continues, the choice of an additional agent and route of administration will be determined by the experience of the clinician and the urgency with which administration is required. For example, the intramuscular route would be preferred in settings where there may be a delay in establishing IV access. In the presence of

shock where there might be concern about adequate absorption, the IV route would be preferred to the intramuscular route. The following additional drugs can be used:

- 4.9.2 *Carboprost (Hemabate)*. This is a synthetic analogue of prostaglandin currently awaiting approval for use in Australia. When available, Carboprost is preferred to Prostaglandin F<sub>2</sub> alpha, as it does not have to be given intramyometrially. After intramuscular injection, the onset of action is within 5 minutes, with duration of action of approximately one hour. The recommended dose is 250 micrograms by deep intramuscular injection. This dose may be repeated at an interval of not less than 15 minutes, to a maximum total dose of 2mg. Side effects include hypertension due to smooth muscle vasoconstriction, dyspnoea, bronchospasm, pulmonary oedema, nausea, vomiting, diarrhoea, and transient pyrexia. Carboprost should be used with caution in patients with asthma, hypertension and renal and hepatic disease<sup>33</sup>. Further product information can be obtained from Pharmacia on 1300 362 486 following approval and release of Carboprost.
- 4.9.3 *Prostaglandin F<sub>2</sub> alpha* is used to control severe PPH caused by uterine atony that is not responsive to oxytocin, ergometrine or uterine massage<sup>34</sup>. Studies have not yet established which preparation, dose, or route of administration is most effective<sup>14</sup>. Prostaglandin F<sub>2</sub> alpha should be used with caution in women with asthma, hypertension, active cardiac, renal or hepatic disease and hypersensitivity. Side effects include nausea, vomiting, diarrhoea, headache, flushing, pyrexia, uterine rupture and cardiac arrest<sup>35</sup>. The usual dose is 0.5mg (1mL) of a 5mg/mL solution diluted with 9mL normal saline. The Medical Officer injects this transabdominally into the myometrium on each side of the fundus or 1mg (2mL of prepared solution) into the uterine fundus. This can be repeated if atonia persists at the doctor's discretion, to a maximum dose of 3 mg. Alternatively, a transcervical injection at 9 and 3 o'clock can be given to help contract the uterine arteries.
- NOTE:** *Ensure an IV line, cardiac monitoring, and oxygen therapy are in place before administration of Prostaglandin F<sub>2</sub> alpha. Resuscitation equipment should be available and an anaesthetist on standby.*
- 4.9.4 *Misoprostol* is a prostaglandin analogue that is not approved for use in pregnancy<sup>36</sup>. Use of 800 micrograms of misoprostol rectally has been reported in a small randomized controlled trial to control primary PPH due to uterine atony more effectively than a combination of IV syntocinon and IM syntometrine<sup>37</sup>. Misoprostol is contraindicated in women with a known sensitivity to prostaglandins and should be used with caution in women with asthma. Side effects include diarrhoea and abdominal pain, shivering and fever<sup>38</sup>.
- 4.9.5 **NOTE:** *Prior to using any drug for an unapproved (off-label) indication, approval should be sought from the local hospital or Area drug committee and informed patient consent obtained<sup>39</sup>. In the context of this Circular, this means that any drug approvals required should be sought prior to an emergency - i.e. at the time of developing local hospital policies for prevention, recognition and management of PPH.*

4.9.6 Table 4: Drug therapy for management of PPH<sup>2,6,19,20,22,25,27,28</sup>

Drug	Dose & Route	Side effects	Contraindications
<p><b>Syntocinon</b> (Synthetic oxytocin)</p> <p>(Pregnancy Category A)</p>	<ul style="list-style-type: none"> <li>IM Syntocinon 10 Units</li> </ul> <p><b>If Syntocinon has been given and the placenta is out, start two IV infusions (16G cannulas)</b></p> <p>A) 40 units of Syntocinon in 1 litre of Hartmanns' at 250 mls/hr</p> <p>B) IV Hartmanns' or 0.9% Sodium Chloride 1 litre</p> <p><b>NB. Do not administer Syntocinon IV in a 5% dextrose solution.</b> Use an isotonic electrolyte solution (e.g. 0.9% Sodium Chloride)</p>	<ul style="list-style-type: none"> <li>usually none</li> <li>facilitates lactation</li> <li>painful contractions</li> <li>nausea, vomiting (water intoxication)</li> <li>transient vasodilation &amp; hypotension if undiluted IV doses</li> <li>high doses or prolonged administration in electrolyte-free fluids can cause water intoxication from antidiuretic effect</li> </ul>	<ul style="list-style-type: none"> <li>Hypersensitivity to drug</li> </ul>
<p><b>Syntometrine</b> (Ergometrine maleate 0.5mg; Oxytocin 5IU per mL)</p> <p>(Pregnancy Category C)</p>	<ul style="list-style-type: none"> <li>IM Syntometrine 1 mL following expulsion of placenta, or when bleeding occurs</li> <li>Repeat dose of 1 mL after no less than two hours if necessary</li> </ul> <p><b>The total dose given in 24 hours should not exceed 3 mL</b></p>	<ul style="list-style-type: none"> <li>nausea, vomiting</li> <li>uterine hypertonicity &amp; abdominal pain</li> <li>headache, dizziness</li> <li>skin rashes</li> <li>hypertension</li> <li>bradycardia</li> <li>cardiac arrhythmia</li> <li>chest pain</li> <li>anaphylactoid reactions</li> </ul>	<ul style="list-style-type: none"> <li>any suspicion of retained placenta</li> <li>exclude twin pregnancy</li> <li>hypersensitivity to ergometrine, other ergot alkaloids or any ingredients in the preparation</li> <li>history of hypertension</li> <li>eclampsia</li> <li>pre-eclampsia or current diastolic equal to or greater than 90mmHg</li> <li>severe or persistent sepsis</li> <li>heart disease</li> <li>peripheral vascular disease</li> <li>impaired hepatic or renal function</li> </ul>
<p><b>Ergometrine maleate</b></p> <p>(Pregnancy Category C)</p>	<p>Ergometrine 250 micrograms IM</p> <p><b>OR</b></p> <p>Ergometrine 250 micrograms IV. This should be <b>injected slowly</b> over one minute <b>or diluted</b> to a volume of 5 mL with sodium chloride 0.9% before administration to prevent serious side effects</p> <p>Do not add ergometrine to IV flasks containing other drugs<sup>21</sup></p>	<ul style="list-style-type: none"> <li>nausea, vomiting</li> <li>abdominal pain</li> <li>headache</li> <li>dizziness</li> <li>rash</li> <li>peripheral vasoconstriction</li> <li>hypertension</li> <li>cardiac arrhythmias</li> <li>chest pain</li> <li>anaphylactoid reactions</li> </ul>	<ul style="list-style-type: none"> <li>any suspicion of retained placenta</li> <li>exclude twin pregnancy</li> <li>hypersensitivity to ergometrine, other ergot alkaloids or any ingredients in the preparation</li> <li>history of hypertension</li> <li>eclampsia</li> <li>pre- eclampsia or current diastolic equal to or greater than 90mmHg</li> <li>severe or persistent sepsis</li> <li>heart disease</li> <li>peripheral vascular disease</li> <li>impaired hepatic or renal function</li> </ul>

**Table 4: Drug therapy for management of PPH (cont)**

<p><b>Carboprost (Hemabate)</b></p>	<ul style="list-style-type: none"> <li>• 250 micrograms by deep IM injection</li> <li>• repeat if necessary at intervals of not less than 15 minutes, to a maximum total dose of 2mg</li> <li>• Further product information available from Pharmacia Pty Ltd on 1300 362 486 when Carboprost is released</li> </ul>	<ul style="list-style-type: none"> <li>• nausea, vomiting, diarrhoea</li> <li>• hypertension</li> <li>• dyspnoea</li> <li>• bronchospasm</li> <li>• pulmonary oedema</li> <li>• transient pyrexia</li> </ul>	<ul style="list-style-type: none"> <li>• caution in women with asthma, hypertension, renal or hepatic disease</li> </ul>
<p><b>Prostaglandins (Prostin F2 alpha)</b></p> <p><i>(Pregnancy Category C)</i></p>	<ul style="list-style-type: none"> <li>• 5mg/ml diluted in 9mL normal saline. Inject 0.5mg (1mL) transabdominally into the myometrium on each side of the fundus, or 1mg (2mL of prepared solution) into the uterine fundus (Medical officer). <b>This can be repeated if atonia persists at the doctor's discretion to a maximum dose of 3 mg</b></li> <li>• Transcervical injection at 9 and 3 o'clock to help contract the uterine arteries</li> </ul> <p>Ensure an IV line, cardiac monitoring, and oxygen therapy are in place prior to administration. Resuscitation equipment should be available and an anaesthetist on standby</p>	<ul style="list-style-type: none"> <li>• nausea, vomiting, diarrhoea,</li> <li>• headache, flushing, pyrexia,</li> <li>• cardiac arrest</li> <li>• relative risks include pelvic infections or previous caesarean</li> <li>• uterine rupture</li> </ul>	<ul style="list-style-type: none"> <li>• caution in women with asthma, hypertension, active cardiac, renal, pulmonary or hepatic disease</li> <li>• hypersensitivity</li> </ul>
<p><b>Misoprostol (Cytotec)</b></p> <p><i>(Pregnancy Category X)</i></p>	<ul style="list-style-type: none"> <li>• 1000 micrograms rectally if treatment with oxytocin and carboprost is unsuccessful and Prostaglandin F2 alpha is not available</li> </ul>	<ul style="list-style-type: none"> <li>• diarrhoea</li> <li>• abdominal pain</li> </ul>	<ul style="list-style-type: none"> <li>• known allergy to prostaglandins</li> <li>• caution in women with asthma</li> </ul>

**Explanation of Pregnancy Categories (MIMS Annual):**

- Pregnancy Category A Drugs which have been taken by a large number of pregnant women and women of childbearing age without any proven increase in frequency of malformations or other direct or indirect harmful effects on the fetus having been observed
- Pregnancy Category C Drugs that, owing to their pharmacological effects, have caused or may be suspected of causing harmful effects on the human fetus or neonate without causing malformations. These effects may be reversible. Accompanying text within products monographs appearing in MIMS Annual should be consulted for further details
- Pregnancy Category X Drugs that have such a high risk of causing permanent damage to the fetus that they should not be used in pregnancy or where there is a possibility of pregnancy

**5. Monitoring the incidence of PPH**

5.1 At hospital level, the number of women with PPH should be regularly reported to and discussed at Morbidity and Mortality meetings to ensure system problems are identified early and rectified quickly<sup>4, 40,41,42,43</sup>. Area Health Services should annually evaluate the incidence of PPH and provide a report to the NSW Health Maternal & Perinatal Committee. (See 5.3 and 5.4 below for monitoring method)

5.2 Various surgical procedures may be performed to reduce blood supply to the uterus and these should be identified in the medical record and used for monitoring incidence. If these surgical procedures are not successful, an emergency hysterectomy may be performed as a last resort to control PPH. This is usually in circumstances where there has been severe damage to the cervix or uterine wall associated with placenta praevia, uterine atony, uterine rupture, retro-peritoneal haematoma and cervical laceration. Hysterectomy after PPH is a sentinel indicator of very serious obstetric complications and major maternal morbidity<sup>5,44</sup>.

5.3 The incidence of PPH should be monitored at hospital and Area level using ICD-10 codes for:

*“PPH and (any procedure performed to reduce blood supply to the uterus after delivery)”  
or “PPH and (abdominal or vaginal hysterectomy)”*

ICD-10	PPH	AND	OR
072.0	Third stage haemorrhage	ICD-10 codes for any procedure performed to reduce blood supply to the uterus after delivery	Abdominal hysterectomy - all ICD-10 codes from block [1268]
072.1	Other immediate PPH		
072.2	Delayed and secondary PPH		Vaginal hysterectomy – all ICD-10 codes from block [1269]
072.3	Postpartum coagulation defects		

5.4 To enable incidence to be accurately coded and monitored, hospitals should ensure that all staff providing birthing services know that every occurrence of PPH as defined in this Circular must be documented in the medical record by an obstetrician/clinician/midwife. Where blood loss is less than 500ml but a woman is haemodynamically compromised, it is the responsibility of the obstetrician/clinician/midwife to ensure PPH is documented in the medical record<sup>45</sup>.

**Due for review:** two years from date issued, by the NSW Pregnancy & Newborn Services Network

**This Circular should be read in conjunction with:**

- Circular No 2002/92: *Management of fresh blood components*
- Circular No 2001/94: *Reporting of maternal deaths to the NSW Department of Health*
- Circular No 99/86: *Maternity emergencies*
- Circular 99/71: *Policy for emergency obstetric and neonatal referrals*
- Circular 99/16: *Patient information and consent to medical treatment*
- NSW Midwives Association Inc. *Maternity Emergency Guidelines for Registered Nurses*. I Coonan, A Grieve, M Williamson (Eds). Sydney 1998

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