The Management of Postpartum Haemorrhage

A Clinical Practice Guideline for Professionals involved in Maternity Care in Scotland

Pilot Edition

Guideline produced in June 1998 and valid until June 2000
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1. INTRODUCTION

1.1 Why a Clinical Practice Guideline on the Management of Postpartum Haemorrhage?

Obstetric haemorrhage remains one of the major causes of maternal death in both developing and developed countries. The most recent report on the UK Confidential Enquiries into Maternal Deaths (CEMD) reveals no consistent fall in deaths related to haemorrhage. In the 1991-93 triennium, 73% of haemorrhage-related deaths were judged to involve substandard care. Antepartum (APH) and postpartum haemorrhage (PPH) accounted for similar numbers of deaths (seven and eight respectively) in the 1991-93 triennium. However, as the report points out, most cases of APH also involved PPH. The eight cases classified as PPH are those where the PPH occurred de novo, without antecedent APH. The SOGAP Working Group has agreed to restrict the scope of this Guideline to ‘the management of PPH’, rather than ‘obstetric haemorrhage’ as a whole, in order to provide a more usable and readable document while acknowledging that, for many women, PPH will follow APH and the management recommendations provided here will apply to all these women.

Guidelines for the management of massive obstetric haemorrhage were provided in the 1988-1990 CEMD Report and were reiterated as a list of six bullet points in the 1991-1993 Report:

- Accurate estimation of blood loss.
- Prompt recognition and treatment of clotting disorders.
- Early involvement of a consultant haematologist.
- Involvement of a consultant anaesthetist in resuscitation.
- The use of adequately sized intravenous cannulae.
- The importance of monitoring central venous pressure.

In 1993, Hibbard undertook an audit of compliance with recommendations made in previous CEMD Reports by means of a survey of consultant-led obstetric units in the UK. This audit revealed a number of particular problems and deficiencies relating to practice in obstetric units in Scotland. Only 63% of obstetric units were located on the same site as an acute general hospital compared with 88% in England. This was reflected in only 54% and 79% respectively of Scottish units having an intensive therapy unit and a blood bank on site (compared with 79% and 88% respectively in England). Furthermore, only 62% of obstetric units in Scotland reported having a protocol for the management of massive haemorrhage compared with 89% in England.

Awareness that obstetric haemorrhage continues to be a cause of maternal mortality and morbidity (and that substandard care is identifiable in relation to the majority of fatalities) coupled with Hibbard’s audit evidence of specific problems in Scotland makes obstetric haemorrhage an appropriate choice as the topic for one of four evidence-based clinical practice guidelines being developed by SOGAP working groups.

1.2 Who has developed this guideline?

The guideline has been developed by a multi-disciplinary working group representing both teaching and district general hospitals throughout Scotland. Membership included representatives from obstetrics, haematology, transfusion medicine, anaesthesics and midwifery. A consumer representative, Ms. Nadine Edwards, kindly reviewed a draft of the guideline and made helpful suggestions. The guideline development group was convened by the project grantholders; the project was initially conceived by the Scottish Executive Committee of the RCOG and the topics for guideline development chosen by this body with input from the funding agency, the Clinical Resource and Audit Group (CRAG) of the SDoH.
1.3 For whom is this guideline intended?

This Guideline has been produced under the auspices of the Scottish Executive Committee of the RCOG and is aimed at all healthcare professionals who share in maternity care. In particular, it is hoped that fellows, members and diplomates of the RCOG and their trainees, midwives and obstetric anaesthetists will find it helpful.

1.4 What methods have been used in the development of this guideline?

The development of the guideline has drawn on methodology outlined in the CRAG publication ‘Clinical Guidelines’⁴, the SIGN publication ‘Clinical Guidelines: Criteria for Appraisal for National Use’⁵ and the NHS Executive’s ‘Clinical Guidelines’⁶.

In preparing the guideline, a systematic literature search was undertaken using CD plus Medline for the years 1986-1996 (principal search term: postpartum haemorrhage) and the Cochrane Pregnancy and Childbirth Database (CPCD) in order to identify evidence from randomised controlled trials (RCTs), other forms of clinical study, and expert opinion which is appropriate for translation into clinical practice in Scotland. Material identified from the searches was supplemented by references already known to group members and by scrutiny of the reference lists of identified publications for key references from earlier years. Protocols for the management of obstetric haemorrhage in use in individual hospitals were also provided by group members.

The development group particularly commends the content of the following documents and has drawn on them in the preparation of this guideline:

- the revised guidelines for the management of massive haemorrhage in the 1988-90 CEMD Report².
- the guidelines in the chapter on massive haemorrhage in Maternal mortality: the way forward⁷.
- the ACOG technical bulletin no. 143⁸.
- the Handbook of Transfusion Medicine of the Blood Transfusion Services of the UK⁹.
- the report on Investigation and management of haemorrhagic disorders in pregnancy prepared by the Haemostasis and Thrombosis Task Force of the British Society for Haematology¹⁰.

The recommendations within this guideline have been graded according to the levels of evidence on which they are based, using the scheme endorsed by SIGN⁵ and by the NHS Executive⁶. The scheme for grading of recommendations is reproduced here. (Table I).

Table I. Grading of recommendations

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Requires at least one randomised controlled trial as part of the body of literature of overall good quality and consistency addressing the specific recommendation</td>
</tr>
<tr>
<td>B</td>
<td>Requires availability of well-conducted clinical studies but no randomised clinical trials on the topic of recommendation</td>
</tr>
<tr>
<td>C</td>
<td>Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable studies of good quality.</td>
</tr>
</tbody>
</table>

The guideline development group met on three occasions and developed successive drafts of the guideline. The views of the development group were supplemented by views obtained from the 100
relevant healthcare professionals who discussed the content of the guideline at the SOGAP National Meeting held in Glasgow on 20/3/97. An advanced draft was then submitted for peer review to a panel of relevant professionals who had not been involved in the development process. The suggestions of the peer reviewers were incorporated in the final version prior to submission to the SIGN editorial board and the Scottish Executive Committee of the RCOG. Minutes of the guideline development process and copies of all publications quoted in the text are held at the SOGAP offices in Glasgow and Aberdeen.

Throughout the text of the guideline it has been made explicit which individual recommendations are based on evidence from RCTs (Grade A recommendations), other designs of clinical studies (Grade B recommendations) or the consensus view of the guideline development group, indicating an absence of relevant studies (Grade C recommendations).

| Grade A recommendations (those based on evidence from RCTs) are highlighted by means of a shaded text throughout. |

1.5 How will this guideline be implemented and reviewed?

Recommendations for audit

- Audit of the management of obstetric haemorrhage, using the dataset suggested in Appendix I, might be included in local audit programmes.
- The use of ‘O NEG’ blood in maternity units should prompt a ‘Critical Incident’ or ‘Risk Management’ enquiry locally.

This guideline was launched, in draft form, along with three other guidelines being developed by SOGAP, at a national meeting in March 1997 to which representatives of key disciplines from throughout Scotland were invited. SOGAP has now been incorporated within the Scottish Programme for Clinical Effectiveness in Reproductive Health (SPCERH). The new Programme has assumed responsibility for the dissemination and implementation of the four SOGAP guidelines. Dissemination has been accomplished by circulation of the guidelines to relevant professional groups within Scotland. Implementation will be undertaken in the context of formal studies designed to evaluate alternative implementation strategies.

It is suggested that local guidelines or protocols based on this national guideline might include specific, locally relevant guidance on the following issues, among others:

- Telephone numbers for haematologist, BTS, porters etc. and advice on the form of words to be used to convey an appropriate sense of urgency.
- Regimen for syntocinon infusion and equipment to be used.
- Instructions for protamine dosage, its location etc.
- Blood tests required on first venepuncture, location of correct tubes and ?partly completed request forms.
- Local policy on the circumstances in which compatible blood, rather than cross-matched blood, should be requested. Such a request gives the blood bank flexibility to respond to the request in the quickest way possible. In a dire emergency, it may be appropriate to allow the blood bank to issue Group ‘O’ Rh positive blood where the risk of exsanguination overwhelms the risks of Rh immunisation and there are insufficient local emergency holdings of ‘O’ Rh negative blood.
The impact of the SOGAP guidelines on the process and outcome of care will be monitored through the project’s audit component. A profile of pre-guideline practice is enclosed with this guideline. It is based on the results of a questionnaire survey of relevant professional groups (to assess the process of care) and on analysis of relevant data collected by the Information and Statistics Division (ISD) of the NHS in Scotland (to assess the outcome of care). In due course, a similar profile of post-guideline practice will be compiled, using the same methods, in order that any changes can be identified.

In addition to the audit component described here, it is suggested that clinicians might include audit of compliance with the recommendations contained in this guideline in their local audit programmes. A suggested minimum dataset which might be used for this purpose is included in this document (Appendix I). The SOGAP Group also suggests that those units who do not wish to undertake formal audit of all cases of PPH might like to adopt a system whereby the use of the labour ward supply of ‘O NEG’ blood invokes some form of critical incident, or risk management, enquiry.

This guideline is based on evidence and consensus views available at the time of final preparation (June 1998), and will be reviewed under the direction of the Scottish Executive Committee of the RCOG in June 2000 (or sooner if changing evidence requires it).

1.6 Declaration of Interests

Declarations of interests (personal, specific and non-specific; non-personal, specific and non-specific) as defined by SIGN have been obtained from all Guideline Development Group members. No conflicts of interest have been identified and copies of all declarations are held at the SOGAP offices in Glasgow and Aberdeen.
2. THE GUIDELINE

2.1 SCOPE OF THE GUIDELINE AND DEFINITIONS

Primary PPH is the most common cause of major obstetric haemorrhage. The official (WHO) definition of primary PPH is ‘the loss of 500mls. or more of blood from the genital tract within 24 hours of the birth of a baby’. The recommendations in this Guideline apply to women experiencing PPH of this order of magnitude, or greater.

2.2 PREVENTION OF PPH

Recommendations

- Prophylactic oxytocics should be offered routinely in the management of the third stage of labour as they reduce the risk of PPH by about 60%.
  (GRADE A)

- For most women, Syntometrine (ergometrine 0.5 mg plus oxytocin 5 iu) is the agent of choice for prophylaxis in the third stage of labour as, compared with oxytocin alone, it results in a further reduction in the rate of PPH of around a quarter. (However, this benefit is achieved at the expense of a five-fold increase in the incidence of vomiting.)
  (GRADE A)

- For those women and clinicians who favour oxytocin alone for third stage prophylaxis, the appropriate dose is 10 iu. The difference in effectiveness between oxytocin in this dose and Syntometrine is small.
  (GRADE A)

The introduction of ergometrine to control established bleeding was a major factor in reducing maternal deaths after the 1930s. Subsequently, this use of oxytocics was extended to prophylaxis and ‘active management’ of the third stage of labour, incorporating the use of a prophylactic oxytocic, is now the norm in most UK centres.

Prendiville and Elbourne have contributed a meta-analysis on ‘active vs conservative third stage management’ to the CPCD. This incorporated the results of five trials and concluded: ‘active management is associated with important reductions in clinically estimated postpartum blood loss, low haemoglobin levels postpartum and blood transfusion’. However, active management is also associated with an increased incidence of nausea, vomiting, headache and hypertension postpartum. In one trial, retained placenta and secondary PPH were also commoner in the active management group.

A further meta-analysis by Prendiville and Elbourne covered 11 trials comparing any prophylactic oxytocic versus none, regardless of other co-interventions. The conclusion was that oxytocics significantly reduce the risk of PPH by about 60% and the need for therapeutic oxytocics by about 70% and that ‘the current routine use of prophylactic oxytocics in the third stage of labour in the UK is justified’.

Further meta-analyses by the same authors have covered comparisons between various possible prophylactic oxytocic agents. The first of these included six trials comparing Syntometrine vs. oxytocin and concluded that Syntometrine was superior in that it reduced the odds of PPH by about a quarter when compared with oxytocin alone. This benefit was gained at the expense of increased side-effects, notably a five-fold increase in the incidence of vomiting.

The authors of one of the trials reviewed in Prendiville and Elbourne’s meta-analysis have recalculated the odds ratios for PPH separately for trials where the dose of oxytocin alone was 5 iu.
and where it was 10 iu\textsuperscript{19}. These authors concluded that for a dose of 10 iu oxytocin, the difference in incidence of PPH compared with Syntometrine prophylaxis was reduced to only 16%.

The remaining two meta-analyses\textsuperscript{17,18} compared Syntometrine vs. ergometrine (7 trials) and oxytocin vs. ergometrine (6 trials) and, taken together, suggest that ergometrine used alone is the least satisfactory of the possible prophylactic agents.

A final meta-analysis by Prendiville and Elbourne reviewed five trials comparing active vs. conservative third stage management for ‘low risk’ women only. The results were in line with those relating to active vs. conservative management overall, and suggest that active management reduces the risk of PPH by as much as two thirds.

On the basis of currently available evidence, the SOGAP group share the conclusions of Still\textsuperscript{11} that ‘the prophylactic use of oxytocics will reduce the incidence of PPH. Other components of the active management of the third stage have yet to be proven’. In terms of the optimal agent for third stage prophylaxis, there is good evidence that Syntometrine is more effective than oxytocin alone in reducing the risk of PPH. However, because this benefit is achieved at a cost of increased side-effects, women’s preferences should be taken into account in choosing a prophylactic agent. Where oxytocin alone is preferred, the dose should be at least 10 iu.

### 2.3 PREDICTION OF PPH

#### 2.3.1. Risk Factors Identifiable before the Onset of Labour.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Approximate odds ratio for PPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven abruptio placentae</td>
<td>13</td>
</tr>
<tr>
<td>Known placenta praevia</td>
<td>12</td>
</tr>
<tr>
<td>Multiple pregnancy</td>
<td>5</td>
</tr>
<tr>
<td>Pre-eclampsia/gestational hypertension</td>
<td>4</td>
</tr>
</tbody>
</table>

**GRADE B**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Approximate odds ratio for PPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparity</td>
<td>3</td>
</tr>
<tr>
<td>Previous PPH</td>
<td>3</td>
</tr>
<tr>
<td>Asian ethnicity</td>
<td>2</td>
</tr>
<tr>
<td>Obesity</td>
<td>2</td>
</tr>
</tbody>
</table>

**GRADE B**
Obstetric text books and reviews tend to perpetuate a list of numerous risk factors for PPH with no indication of the relative frequency or importance of the various factors. Recently however, authors from the US\textsuperscript{21}, the UK\textsuperscript{22} and Zimbabwe\textsuperscript{23} have applied statistical methods to data from case-control series in order to confirm and quantify the level of risk associated with various factors. The approximate odds ratios for PPH attributable to various risk factors given in the ‘Recommendations’ box are derived from the studies of Stones \textit{et al}\textsuperscript{22} and Combs \textit{et al}\textsuperscript{21}. The risk factors quoted were all associated with odds ratios (or risk ratios in Stones’ paper) which reached statistical significance and have been rounded to the nearest whole number.

Stones and Combs have used different definitions of PPH in their studies. Stones included all women with a recorded blood loss of $>1000$ mls in the 24 hours after delivery as cases of PPH. Using this definition, 498 of 37,497 (1.3\%) women studied suffered PPH. Combs included as ‘cases’, all women with a fall in haematocrit of $>10$ points between admission and post delivery plus all women receiving blood transfusion. On this basis, 374 of 9598 (3.9\%) women suffered PPH. Stones’ data relate to all deliveries whereas Combs’ exclude women with APH and do not, therefore, provide information on the level of risk associated with this.

Despite the differences and shortcomings of these published studies, they do provide a guide as to the level of risk associated with various clinical factors which can help clinicians in their discussions with women about the most appropriate setting for delivery.

2.3.2. Risk Factors Becoming Apparent During Labour/Delivery

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Approximate odds ratio for PPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery by emergency Caesarean section</td>
<td>9</td>
</tr>
<tr>
<td>Delivery by elective Caesarean section</td>
<td>4</td>
</tr>
<tr>
<td>Retained placenta</td>
<td>5</td>
</tr>
<tr>
<td>Mediolateral episiotomy</td>
<td>5</td>
</tr>
<tr>
<td>Operative vaginal delivery</td>
<td>2</td>
</tr>
<tr>
<td>Prolonged labour ($&gt;12$ hours)</td>
<td>2</td>
</tr>
<tr>
<td>Big baby ($&gt;4$ kg)</td>
<td>2</td>
</tr>
<tr>
<td>Pyrexia in labour</td>
<td>2</td>
</tr>
</tbody>
</table>

\textbf{(GRADE B)}

The studies of Stones \textit{et al}\textsuperscript{22} and Combs \textit{et al}\textsuperscript{21} also provide data on these problems, becoming apparent during labour/delivery. The nine-fold increase in risk over vaginal delivery associated with delivery by emergency Caesarean section identifies a patient warranting particular vigilance following delivery.
2.3.3. Treatment with Anticoagulant Drugs

**Recommendations**

- Women considered at high risk of thromboembolism may be receiving prophylaxis in the form of **Unfractionated Heparin** (UH) or **Low Molecular Weight Heparin** (LMWH) as enoxaparin (*Clexane*) or dalteparin (*Fragmin*) antenatally. Women with a lower level of increased risk of thromboembolism may be receiving aspirin (75 mg daily) antenatally and may begin intrapartum prophylaxis with the above agents. In prophylactic dosage, these agents do not present a haemorrhagic hazard and should be continued intrapartum.

- In the rare event of a woman coming to delivery fully anticoagulated on **warfarin**, Fresh Frozen Plasma (FFP) should be given rapidly to return the prothrombin time to normal. On delivery, the infant should be given Vitamin K and FFP and screened for internal haemorrhage (by ultrasound scan of head and abdomen).

- In the event of a woman coming to delivery while receiving **therapeutic heparin**, the infusion should be stopped. Heparin activity will fall to safe levels within an hour. Protamine sulphate will reverse activity more rapidly, if required.

- **Overdose of UH or LMWH** can present a significant haemorrhagic hazard at delivery. Infusions of protamine sulphate may reverse their effects.

- If concerned about treatment with any of the above, **DISCUSS WITH A CONSULTANT HAEMATOLOGIST**.

*(ALL GRADE C)*

Increasing use of anticoagulants to reduce the risk of venous thromboembolism around the time of delivery means that women may present for delivery while receiving such agents in prophylactic or therapeutic dosage, or even in overdosage. The management of these problems has recently been reviewed by Letsky and the recommendations above have been extracted from this review.

UH and LMWH in prophylactic dosage are not felt to present a haemorrhagic hazard. However, in overdosage there can be bleeding problems and protamine sulphate is less effective at reversing the effects of these agents (particularly LMWH) than of therapeutic heparin administered by infusion.

A formula for calculating the appropriate dose of protamine sulphate suitable for reversing the effects of all forms of heparin (taken from Letsky) is provided below: This formula should be used only in consultation with a haematologist and with the local laboratory responsible for undertaking measurement of plasma heparin concentration.

### FORMULA FOR CALCULATING DOSE OF PROTAMINE SULPHATE

<table>
<thead>
<tr>
<th>PLASMA HEPARIN CONC. (iu / ml) X PLASMA VOL. (calculated as 50 mls / kg body weight) X 0.01 = PROTAMINE SULPHATE (mg) REQUIRED</th>
</tr>
</thead>
</table>

**For example:** a woman with a plasma heparin concentration of 0.8 iu / ml and weighing 65 kg. would require:

0.8 X (50X65) X 0.01 = 26 mg of protamine sulphate.
2.3.4. Pre-existing Haemorrhagic Disorders

Recommendations

- The most common inherited bleeding disorders likely to be encountered in obstetric practice are: factor VIII deficiency (haemophilia A carrier), factor IX deficiency (haemophilia B carrier) and Von Willebrand’s disease.

- If women with these conditions present for preconceptual counselling, they should be tested for immunity against hepatitis B (in those units where this is not routine policy for all women) and immunised if required (as a safeguard should blood products be required at delivery). Immunisation during pregnancy is also safe.

- Women with these conditions should receive antenatal care supervised by a specialist obstetrician in collaboration with a haematologist in order that coagulation status can be monitored, particularly in the third trimester.

- Delivery of women with these disorders should be conducted by the most experienced staff available to minimise trauma, and the potential for haemorrhage, for both mother and infant (who may be affected by the haemorrhagic disorder).

- Depending on coagulation status at the time of delivery, mothers with these haemorrhagic disorders may require prophylactic blood product therapy. Carriers of haemophilia A are less likely to require such therapy than those with the other disorders as Factor VIII concentrations usually rise spontaneously during pregnancy. Decisions about such therapy should be made in consultation with a haematologist.

(ALL GRADE C)

These recommendations are extracted from the *Haemostasis and Thrombosis Task Force* document. This document also provides guidance on the management of less common inherited and acquired haemorrhagic disorders. Women with all these conditions are at increased risk of haemorrhage associated with delivery. Forward planning and minimisation of trauma at delivery are the cornerstones of management.
2.4 MANAGEMENT OF PRIMARY PPH

2.4.1. Definitions

Recommendations

- Primary PPH involving a perceived blood loss of 500 - 1000 mls (and in the absence of clinical signs of shock) should prompt basic measures (close monitoring, intravenous access, cross-matching) to facilitate resuscitation should it become necessary.
  (GRADE C)

- Primary PPH involving a perceived blood loss of > 1000 mls (or the presence of clinical signs of shock associated with a smaller perceived loss) should prompt a full protocol of measures to achieve resuscitation and haemostasis.
  (GRADE C)

Primary PPH is the most common cause of major obstetric haemorrhage\textsuperscript{11}. The ‘official’ WHO definition of primary PPH is: ‘the loss of 500 mls or more of blood from the genital tract within 24 hours of the birth of a baby’\textsuperscript{12,13}. It is acknowledged that most mothers can readily cope with a loss of blood of this order\textsuperscript{24,25} and a recent review suggests a perceived loss of >1000 mls as an appropriate cut-off for a definition of major PPH which should prompt the initiation of a protocol of emergency measures\textsuperscript{26}.

This guideline adopts a pragmatic approach whereby a perceived blood loss of 500 - 1000 mls (in the absence of clinical signs of shock) prompts basic measures of monitoring and ‘readiness for resuscitation’, whereas a perceived loss of >1000 mls OR a smaller loss associated with clinical signs of shock (hypotension, tachycardia, tachypnoea, oliguria or delayed peripheral capillary filling) prompts a full protocol of measures to resuscitate, monitor and arrest the bleeding.

2.4.2. Components of Management

Recommendation

- Once PPH has been identified, management may be considered to involve four components - all of which must be undertaken SIMULTANEOUSLY:
  ◊ Communication
  ◊ Resuscitation
  ◊ Monitoring and Investigation
  ◊ Arresting the Bleeding
  (GRADE C)

The practical management of PPH may be considered as having at least four components: communication with all relevant professionals, resuscitation, monitoring/investigation and measures to arrest the bleeding. Each of these components is discussed in turn in the guideline but, it must be emphasised, these components must be initiated and progressed simultaneously for optimal patient care.

The pattern of management presented in this guideline is dependent on the woman being in a specialist maternity unit with access to laboratory and blood bank facilities and with skilled obstetric and anaesthetic staff readily available. On occasions where PPH occurs in a woman delivering (by accident or design) in another setting, the role of the professionals on site should be to institute ‘first aid’ measures while arranging transport of the woman to a specialist maternity unit by the most expeditious means.
2.4.3. Communication

<table>
<thead>
<tr>
<th>Recommendations (ALL GRADE C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC MEASURES</strong> (minor PPH, blood loss 500 - 1000 mls, no clinical shock)</td>
</tr>
<tr>
<td>◊ Alert senior midwife</td>
</tr>
<tr>
<td>◊ Alert first-line medical staff</td>
</tr>
<tr>
<td><strong>FULL PROTOCOL</strong> (major PPH, blood loss &gt;1000 mls OR clinical shock)</td>
</tr>
<tr>
<td>◊ Call experienced midwife</td>
</tr>
<tr>
<td>◊ Call Obstetric Registrar and alert Consultant</td>
</tr>
<tr>
<td>◊ Call Anaesthetic Registrar and alert Consultant</td>
</tr>
<tr>
<td>◊ Alert haematologist on call</td>
</tr>
<tr>
<td>◊ Alert blood transfusion service</td>
</tr>
<tr>
<td>◊ Call porters for delivery of specimens/blood</td>
</tr>
</tbody>
</table>

Confidential Enquiries Reports have repeatedly highlighted cases of maternal death where care was judged to be substandard. The substandard care very frequently relates to failure to involve appropriate senior professionals at an early stage\(^1,2\). All existing guideline / consensus documents studied in the preparation of this guideline\(^2,7-10\) and all haemorrhage protocols from individual hospitals obtained by the SOGAP group emphasise the fundamental importance of early involvement of appropriate staff including laboratory specialists. It is suggested that clinicians and blood transfusion staff liaise at a local level to agree a standard form of words (eg **WE NEED COMPATIBLE BLOOD NOW**) to be used in cases of major obstetric haemorrhage which will initiate the provision of blood and blood products as rapidly as possible.

It is vital that junior obstetricians do not perceive the calling of senior colleagues as involving ‘loss of face’. Senior staff must be receptive to concerns expressed by juniors and by midwives. Readers are reminded of the recommendation, emphasised in the last two triennial reports on maternal deaths:

*“Placenta praevia, particularly in patients with a previous uterine scar, may be associated with uncontrollable haemorrhage at delivery and Caesarean hysterectomy may be necessary: the presence of a consultant at operation is essential.”*
### 2.4.4. Resuscitation

**Recommendations (ALL GRADE C)**

- **BASIC MEASURES**
  (minor PPH, blood loss 500 - 1000 mls, no clinical shock)
  - IV access (14 G cannula x 1)
  - Commence crystalloid (eg Hartmann's) infusion

- **FULL PROTOCOL**
  (major PPH, blood loss >1000 mls OR clinical shock)
  - IV access (14 G cannula x 2)
  - head down tilt
  - oxygen by mask at 8 litres / min
  - Transfuse blood ASAP

  Until blood available, infuse in turn (as rapidly, as required):
  - crystalloid (eg Hartmann's) maximum 2 litres
  - colloid (eg Gelofusine, Haemaccel, human albumin 4.5%) maximum 1.5 litres

  - If X-matched blood still unavailable once 3.5 litres of crystalloid/colloid infused:
    - Give ‘O’ NEG BLOOD OR
    - Give Un X-matched, own group blood as available

  - If bleeding is unrelenting and results of coagulation studies are still unavailable:
    - Give 1 litre Fresh Frozen Plasma
    - Give 10 units cryoprecipitate empirically

  - Use the best equipment available to achieve RAPID WARMed infusion of fluids

  - Do not use special blood filters: they slow infusions

  - Dextrans are hazardous and should not be used in obstetric practice.

The cornerstones of resuscitation following PPH are restoration of both blood volume and oxygen carrying capacity. Volume replacement must be undertaken with acknowledgement that blood loss is often grossly under-estimated. Compatible blood (supplied in the form of red cell concentrate) is the best fluid to replace blood loss and should be transfused as soon as available. The SOGAP group, in line with existing expert opinion documents, were of the view that 2 litres of crystalloid and 1.5 litres of colloid comprise the maximum that should be infused while awaiting compatible blood. The SOGAP group are unaware of data to indicate that any one of the colloids mentioned is more satisfactory than others for use in obstetric practice. However, the group wish to re-emphasise advice given elsewhere that dextrans are inappropriate in obstetric practice. Not only may they interfere with compatibility testing and platelet function but there are also reports of severe anaphylactic reactions associated with dextran use at the time of delivery resulting in death of the mother (or death of the fetus / long-term brain damage to the surviving infant, if used antenatally).

Concerns have been expressed about the possibility of transmission of Bovine Spongiform Encephalopathy (BSE) by the use of colloids such as Haemaccel or Gelofusine which are of bovine origin. The SOGAP group have been advised that a recent WHO working group, which will report in the near future, has addressed this issue and reached reassuring conclusions.
If fully X-matched blood is unavailable by the time 3.5 litres of clear fluid have been infused, then the best available alternative should be given. The most suitable alternative will vary depending on location and individual patient circumstances. Group ‘O’ Rh neg blood may be the safest way to avoid a mismatched transfusion in an acute emergency. However, for most women, the ABO and Rh groups will have been determined during pregnancy and the blood bank may prefer to issue uncrossmatched, own group blood rather than ‘O Neg’.

The SOGAP group were of the view that all delivery units, especially those small units without a blood bank on site, should maintain a supply of ‘O NEG’ blood as this might offer the only means of restoring oxygen carrying capacity within an acceptable timescale. The minimum number of units to be maintained on site should be agreed within local protocols and should reflect the likely period of delay in the arrival of further supplies should a dire emergency arise. Small delivery units remote from the nearest blood bank will require a larger minimum supply than those within a short distance of a blood bank.

While acknowledging the general principle that results of coagulation studies and the advice of a haematologist should be used to guide transfusion of coagulation factors, the SOGAP group supported the view of the Haemostasis and Thrombosis Task Force that up to 1 litre of fresh frozen plasma (FFP) and 10 Units of cryoprecipitate may be given empirically in the face of relentless bleeding while awaiting the results of coagulation studies. Clinicians should be aware that these blood products must be ordered as soon as a need for them is anticipated as there will always be a short delay in supply because of the need for thawing.

2.4.5 Monitoring and Investigation

<table>
<thead>
<tr>
<th>Recommendations (ALL GRADE C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC MEASURES</strong></td>
</tr>
<tr>
<td>(minor PPH, blood loss 500 - 1000 mls, no clinical shock)</td>
</tr>
<tr>
<td>◊ Venepuncture (20 mls) for:</td>
</tr>
<tr>
<td>* X-match (2 units)</td>
</tr>
<tr>
<td>* Full blood count</td>
</tr>
<tr>
<td>* Clotting screen</td>
</tr>
<tr>
<td>◊ Frequent pulse and blood pressure recording</td>
</tr>
<tr>
<td><strong>FULL PROTOCOL</strong></td>
</tr>
<tr>
<td>(major PPH, blood loss &gt;1000 mls OR clinical shock)</td>
</tr>
<tr>
<td>◊ Venepuncture (20 mls) for:</td>
</tr>
<tr>
<td>* X-match (6 units)</td>
</tr>
<tr>
<td>* Full blood count</td>
</tr>
<tr>
<td>* Clotting screen</td>
</tr>
<tr>
<td>◊ Continuous pulse and blood pressure recording (using oximeter, ECG and automated BP recording)</td>
</tr>
<tr>
<td>◊ Foley catheter to monitor urine output</td>
</tr>
<tr>
<td>◊ Central venous pressure monitoring (once appropriately experienced staff available for insertion)</td>
</tr>
<tr>
<td>◊ Consider transfer to intensive therapy unit</td>
</tr>
</tbody>
</table>

Initial resuscitation with crystalloid, colloid and blood as soon as available is aimed at restoring systolic blood pressure and oxygen carrying capacity. Subsequently, fluid replacement and the use of blood and blood products should be dictated by the results of full blood count (FBC) and clotting screen under the guidance of a haematologist and/or consultant in transfusion medicine.

The FBC will include estimation of haematocrit and platelet count. The clotting screen should include prothrombin time, thrombin time, partial thromboplastin time and fibrinogen assay. Fibrin degradation
products should also be measured. Interpretation of the results of these tests should be undertaken in collaboration with the haematologist and in the light of the physiological fall in prothrombin and partial thromboplastin times in the third trimester.

The Haemostasis and Thrombosis Task Force\textsuperscript{10} have suggested that obtaining appropriate specimens for X-matching, FBC and clotting studies in emergency situations may be facilitated by keeping available, in labour ward fridges, \textit{Emergency Packs} of all necessary sample tubes and forms. The SOGAP group support this practical suggestion.

As indicated above, the SOGAP group endorse the view of the Task Force that, in the face of relentless bleeding, clinicians might reasonably administer up to 1 litre of FFP and up to 10 units of cryoprecipitate on an empirical basis while awaiting the results of clotting studies. Thereafter, administration of FFP, cryoprecipitate and platelet concentrate should be guided by the haematologist. Cryoprecipitate may be indicated if fibrinogen falls to <0.8 g / litre and platelet concentrate if the platelet count falls to <50 x 10\textsuperscript{9} / litre\textsuperscript{10}.

The Task Force express the view that fibrinolytic inhibitors (eg tranexamic acid, aprotinin) seldom, if ever, have a place in the management of obstetric haemorrhage\textsuperscript{10}.

The Confidential Enquiry Reports\textsuperscript{1,2} have repeatedly emphasised the importance of central venous pressure (CVP) monitoring to guide volume replacement. The fundamental importance of CVP monitoring from an early stage is also emphasised in the guidelines in \textit{Maternal mortality: the way forward}, the \textit{Handbook of Transfusion Medicine}, the Task Force statement\textsuperscript{10} and a recent review in \textit{Drug and Therapeutics Bulletin}\textsuperscript{24}. Surprisingly, the ACOG Technical Bulletin\textsuperscript{8} states: ‘all patients with significant PPH should have a Foley catheter placed to monitor urine output. Invasive haemodynamic monitoring is usually neither necessary nor desirable.’ Presumably, this must be interpreted as indicating that the ACOG do not advocate early recourse to CVP monitoring. This view appears out of line with current thinking on this side of the Atlantic.

Early recourse to CVP monitoring requires early involvement of a senior anaesthetist who will usually take responsibility for this aspect of management.
### 2.4.6. Arresting the Bleeding

**Recommendations**

- The commonest cause of primary PPH is uterine atony. However, clinical examination must be undertaken to exclude other causes:
  - Retained products (placenta, membranes, clots)
  - Vaginal/cervical lacerations or haematoma
  - Ruptured uterus
  - Broad ligament haematoma
  - Extragenital bleeding
  *(GRADE C)*

- When uterine atony is perceived to be the cause of the bleeding, the following measures should be instituted, in turn, until the bleeding stops:
  - Uterine compression ('rubbing up the fundus') to stimulate contractions
  - Ensure bladder is empty (Foley catheter, leave in-situ)
  - Syntocinon 10 units by slow IV injection
  - Ergometrine 0.5 mg by slow IV injection
  - Syntocinon infusion (30 units in 500mls Hartmann’s at 125 mls / hr)
  - Carboprost (Haemabate) 0.25 mg IM (repeated at intervals of not less than 15 minutes to a maximum of 5 doses)
  *(GRADE B)*

- If conservative measures fail to control haemorrhage, initiate surgical haemostasis **SOONER RATHER THAN LATER.**
  The following interventions should be undertaken, in turn, until the bleeding stops:
  - At laparotomy, direct intramyometrial injection of Carboprost (Haemabate) 0.5 mg
  - Bilateral ligation of uterine arteries
  - Bilateral ligation of internal iliac (hypogastric arteries)
  - Hysterectomy
  *(GRADE C)*

- Resort to hysterectomy **SOONER RATHER THAN LATER** (especially in cases of placenta accreta or uterine rupture)
  *(GRADE C)*

The components of management of PPH, communicate, resuscitate, monitor / investigate and arresting the bleeding, are presented sequentially in this guideline. However, the Group emphasises the concept that, in practice, **these components of management must be implemented and progressed SIMULTANEOUSLY.**

Uterine atony is the most common cause of primary PPH. Management must, of course, be preceded by careful clinical examination to ascertain that the uterus is indeed atonic and that other sources of bleeding such as genital tract lacerations have been excluded.

We are unaware of any trials comparing ergometrine and oxytocin as first line agents for the treatment (rather than prevention) of PPH. It seems appropriate to use both agents although oxytocin is to be preferred initially, especially in women with prior hypertension or pre-eclampsia.

Similarly, we are unaware of any trials comparing the prostaglandin, carboprost (15 methyl prostaglandin F2\(_\alpha\)) with other uterotonic agents in the context of treatment of active PPH. However, two case series from the US\(^{34,35}\) comprising 26 and 237 cases respectively, report success in
controlling haemorrhage, without resort to surgical means, in 85% and 95% of cases. Two of the four failures in the smaller series were associated with placenta accreta.

However, randomised trials have been reported comparing carboprost with other oxytocics for third stage prophylaxis. A study from Egypt compared carboprost and ergometrine for prophylaxis after vaginal delivery and found carboprost to be the more potent uterotonic agent. However, two further trials which compared intramyometrial carboprost with intravenous and intramyometrial oxytocin for prophylaxis at elective Caesarean section found no differences in efficacy.

A case report has suggested that the prostaglandin E1 analogue, gemeprost, may also be effective in arresting PPH.

On the basis of current knowledge, prostaglandin should be used as an adjunct to the long-established uterotonics, oxytocin and ergometrine, in attempts to arrest PPH. Carboprost should currently be regarded as the prostaglandin of choice for this application and the use of other pharmacological agents should not delay recourse to surgery. If bleeding occurs at the time of Caesarean section, intramyometrial injection of carboprost should precede other surgical measures and, if laparotomy is undertaken following failure of pharmacological management, intramyometrial carboprost injection should be the first line measure once the uterus is exposed.

Maternal mortality: the way forward identified ‘too late a recourse to surgical haemostasis’ as one of the factors contributing to poor results in cases of obstetric haemorrhage. Once the decision is made to embark on surgical haemostasis, the most appropriate choice of procedure will depend, in part, on the experience and expertise of available staff. Publications from the US have advocated angiographic embolisation of pelvic vessels as an alternative to hysterectomy or internal iliac ligation. However, results from the SOGAP questionnaire relating to current practice indicate that only one obstetrician in Scotland claims to have any experience of such procedures. Angiographic embolisation cannot currently be viewed as a realistic treatment option in Scottish practice.

The protocol given in Maternal mortality: the way forward suggests that the following surgical measures be attempted, in turn, until bleeding is arrested: bilateral uterine artery ligation, internal iliac artery ligation and hysterectomy. A review from Saudia Arabia described the management of 64 patients requiring surgical intervention for PPH over a five year period. In this series, internal iliac artery ligation was the initial surgical approach in 29 women and was successful in 19 (65%) of these. The authors advocated internal iliac ligation as the initial surgical approach for all severe PPH. However, data from the SOGAP survey indicated that 90% of Scottish consultant/senior trainee obstetricians have personal experience of postpartum hysterectomy whereas only 40% have such experience of internal iliac ligation.

Early recourse to hysterectomy is recommended, especially where bleeding is associated with placenta accreta or uterine rupture, and where it is the procedure with which available staff are experienced. Burke and Duignan have reviewed the surgical management of massive obstetric haemorrhage and emphasise that hysterectomy should not be delayed until the patient is in extremis or while less definitive procedures with which the surgeon has little experience are attempted. These authors also express the view that subtotal hysterectomy is the operation of choice in most instances of PPH requiring hysterectomy. As they say, the risk of neoplasia developing in the cervical stump several years later is not relevant in the context of life-threatening haemorrhage.

Other measures which have been advocated in the management of PPH include uterine packing, balloon tamponade using a Sengstaken-Blakemore tube and external aortic compression as a resuscitative measure while organising subsequent treatment. The SOGAP survey indicates that 75%, 6% and 17% of Scottish obstetricians have direct experience with each of these procedures respectively. The figures serve to re-emphasise the view of Burke and Duignan that hysterectomy should not be delayed for the sake of less definitive procedures with which there is little experience.


2.5 RESUSCITATION IN WOMEN WHO REFUSE BLOOD TRANSFUSION

Recommendations (GRADE C)

**Antenatal preparation**
- A woman’s refusal to accept blood transfusion must be clearly documented in the antenatal record at the booking visit.
- Blood group and antibody status should be checked antenatally in the usual way.
- Haemoglobin level and serum ferritin should be checked regularly during pregnancy and haematinics given throughout pregnancy to maximise iron stores.
- Ultrasound placentography should be undertaken antenatally.
- Blood storage with a view to autotransfusion should not be suggested to pregnant women: the amounts that could be donated would be irrelevant in the face of massive obstetric haemorrhage.

**Labour**
- Prophylactic oxytocics should be given in the third stage of labour.
- Labour and delivery should be overseen by senior staff.

**Haemorrhage**
- If haemorrhage occurs, resuscitation and communication with professionals in other disciplines should be even more prompt than for other women.
- Initial resuscitation (as for other women) should use crystalloid and colloid solutions, avoiding dextrans.
- For severe haemorrhage, Vitamin K, desmopressin, methylprednisolone and fibrinolytic inhibitors may be of use. These agents should be used only after consultation with a haematologist.
- The patient should be kept informed and given every opportunity to change her mind about her previously agreed treatment plan.
- Timely resort to hysterectomy is even more important than for other women.
- When hysterectomy is undertaken, the uterine arteries should be clamped as early as possible, consideration should be given to internal iliac ligation and subtotal hysterectomy is usually quicker and safer.

**Aftercare**
- Subsequent management may include hyperbaric oxygen, erythropoetin, parenteral iron and adequate protein for haemoglobin synthesis.
- If the woman dies, relatives and involved staff should be offered every support.

These recommendations are abbreviated from those given in the 1991-93 Confidential Enquiries Report.¹
3. STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of medical care. Standards of medical care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns evolve.

These parameters of practice should be considered recommendations only. Adherence to them will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor in light of the clinical data presented by the patient and the diagnostic and treatment options available.

Significant departures from the local protocol should be fully documented in the patient’s case notes at the time the relevant decision is taken.

(A background paper on the legal implications of guidelines, prepared by Dr Pamela Abernethy of Simpson and Marwick W.S., is available from the SIGN secretariat.)
4. REFERENCES


6 Mann T. Clinical Guidelines: Using clinical guidelines to improve patient care within the NHS. NHS Executive. 1996


20 Letsky EA. Peripartum prophylaxis of thromboembolism. In: Greer IA, ed. Thromboembolic disease in obstetrics and gynaecology. 1997;


31 Rosay H, Sgro C, Lancon JP, et al. [Fetal distress after use of dextran for peridural anesthesia in a cesarean program]. Annales Francaises d Anesthesie et de Reanimation 1989;89;8:R67


5.  **APPENDIX 1**

**SUGGESTED MINIMUM DATASET FOR AUDIT OF THE MANAGEMENT OF WOMEN WITH PRIMARY PPH**

**Applicable patients:** All women with a recorded blood loss of >1500 mls at the time of delivery. *(The guideline suggests that a full management protocol be initiated when perceived blood loss exceeds 1000 mls. The choice of a cut-off of 1500 mls for audit purposes means that the audited sample will comprise women for whom the guideline recommendations should, unquestionably, have been acted upon.)*

1. Patient identifier eg unit number.
2. Final diagnosis of cause of bleeding:
   a) atony
   b) retained placenta/placental fragments
   c) vulvar/vaginal lacerations/haematoma
   d) cervical laceration
   e) uterine rupture
   f) broad ligament haematoma
   g) other, specify
3. Documented that consultant obstetrician informed? *(Yes / No)*
4. Venous access: no of peripheral lines sited *(0 / 1 / 2 / >2)*
5. Central venous pressure line sited? *(Yes / No)*
6. Total units of blood X matched *(nn)*
7. Total units of blood transfused *(nn)*
8. Platelet transfusion? *(Yes / No)*
9. Fresh Frozen Plasma transfused? *(Yes / No)*
10. Cryoprecipitate transfused? *(Yes / No)*
11. Documented that relevant professionals involved in management?
   a) Anaesthetist *(Yes / No)*
   b) Haematologist *(Yes / No)*
   c) Blood Transfusion specialist *(Yes / No)*
   d) Intensive Care team *(Yes / No)*
12. Continuous BP recording (eg Dinamap) used? *(Yes / No)*
13. Pulse oximeter used? *(Yes / No)*
14. Blood for full blood count taken before transfusion? *(Yes / No)*
15. Blood for clotting studies taken before transfusion? *(Yes / No)*
16. Foley catheter insitu during management? *(Yes / No)*
17. Treatment modalities used:
   a) IV syntocinon ≥10 units *(Yes / No)*
   b) IV ergometrine ≥500 ug *(Yes / No)*
   c) Syntocinon infusion *(Yes / No)*
   d) IM carboprost (Hemabate) *(Yes / No)*
   e) Intramyometrial carboprost *(Yes / No)*
   f) Ligation of uterine arteries *(Yes / No)*
   g) Ligation of internal iliac arteries *(Yes / No)*
   h) Hysterectomy *(Yes / No)*
   i) Other, specify *(Yes / No)*