

**A Monograph of the Management of
Postpartum Haemorrhage**

A Monograph of the Management of Postpartum Haemorrhage

National Department of Health
South Africa



ORGANISERS

© 2010

National Committee on Confidential Enquiries
into Maternal Deaths in South Africa

National Department of Health
South Africa

United Nations Population Fund

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system, without prior permission in writing from the publishers.

ISBN 978-1-86840-706-4

Editor in Chief: S. Fawcus, Associate Professor
Department of Obstetrics and Gynaecology,
University of Cape Town

Co-Editor: J. Moodley, Professor Emeritus,
Womens Health and HIV Research Group,
Nelson R Mandela School of Medicine,
University of KwaZulu-Natal

Illustrator: Ann Westoby
Layout and Production: Rockbottom graphic&design

CONTENTS

PREFACE (J.Moodley).....	ix
1. OVERVIEW (S.Fawcus).....	8
Problem of PPH globally	
Definitions of PPH	
Causes of PPH	
PPH in South Africa: maternal mortality, causes, and avoidable factors for PPH deaths in SA	
2. PREVENTION OF PPH and DEATHS FROM PPH (S. Fawcus).....	8
Detection and treatment of anaemia antenatally	
Detection of at risk woman to deliver at hospital	
Maternity waiting shelters	
Early detection and management of prolonged labour	
Cautious use of oxytocic agents in labour	
Active management of third stage of labour (AMTSL)	
Vigilant post delivery and post C section monitoring so PPH can be detected early	
Identification and management of women who decline the use of blood products	
3. PRACTICAL ALGORITHMS FOR DETECTION, AND COMPREHENSIVE MANAGEMENT OF PPH (S.Fawcus).....	16
Communication with patients and relatives	
Flow diagrams for comprehensive management of: PPH after vaginal delivery	
PPH during and after Caesarean section	
PPH at home with no skilled attendant	
Transfer of patients with PPH	
Telephonic advice networks	

4.	ASSESSING AND MANAGING BLOOD LOSS	29
	<i>(E.Langenegger / C.Rout)</i>	
	Resuscitation for haemorrhagic shock	
	Principles of fluid and blood replacement	
	Anaesthetic considerations	
5.	MEDICAL TREATMENT OF PPH (<i>GJ.Hofmeyr</i>).....	37
	Uterotonic agents	
	– Oxytocin	
	– Ergometrine	
	– Misoprostol	
	– Prostaglandin F2 alpha	
	Tranexamic acid	
	Recombinant factor V11 A	
	Recommended care pathway for uterotonic agents	
6.	SURGICAL MANAGEMENT OF PPH (<i>G.Theron</i>).....	45
	Management of retained placenta	
	Suture of vaginal, perineal and cervical tears	
	Balloon tamponade	
	Laparotomy- uterine compression sutures	
	Laparotomy- uterine artery and other vessel ligations	
	Laparotomy- additional surgical procedures	
	Management of uterine inversion	
7.	THE MIDWIFE’S APPROACH TO PPH (<i>N.Mbombo</i>).....	64
	The role of the midwife in PPH	
	Resuscitation	
	Stopping the bleeding	
	Basic nursing care and observations	
	Scope of practice	
	Prevention of PPH	

8.	<i>THE ROLE OF MANAGEMENT IN PPH</i>	74
	<i>(M.Schoon)</i>	
	Key role players	
	Sustainable blood supply and safe use of blood	
	Sustainable supply of drugs and consumables	
	Access to transport	
	Patient safety	
9.	<i>BE PREPARED: TRAINING AND ONGOING EDUCATIONAL INITIATIVES FOR PPH</i>	82
	<i>(B.Pattinson)</i>	
	Improving knowledge	
	Improving skills	
	Improving team work	
	ESMOE training program (Essential Steps in the Management of Obstetric Emergencies)	
10.	<i>COMMUNITY APPROACH TO PPH</i>	91
	<i>(D.Nyasulu, S. Engelbrecht)</i>	
	Context of community based interventions	
	Community partners, including traditional birth attendants	
	Community mobilisation, education and transport	
	Prevention and treatment of PPH at community level	

Sources and References from which

<i>The Guidelines in this Monograph are Derived</i>	102
--	------------

Acknowledgements

- Chapter authors: Professor J. Moodley (*Chair NCCEMD*)
Professor S. Fawcus
(*Dept. Obs/Gyn, Uni. Cape Town*)
Dr E. Langenegger
(*Dept. Obs/Gyn, Uni. Stellenbosch*)
Professor C. Rout
(*Dept. Anaesthetics, Uni. KwaZulu-Natal*)
Professor J. Hofmeyr
(*Dept. Obs/Gyn E. London Hospital Complex and
Uni. Witwatersrand*)
Professor G. Theron
(*Dept. Obs/Gyn, Uni. Stellenbosch*)
Professor N. Mbombo
(*Dept. Nursing Sciences, Uni. Western Cape*)
Dr M. Schoon
(*Director of Clinical Services, Free State Dept.
Health*)
Professor R Pattinson
(*Dept Obs/Gyn, Uni. Pretoria*)
D.Nyasulu (*PATH. Durban*)
S.Engelbrecht (*PATH. Durban*)

NCCEMD
Department of Health South Africa
UNFPA

Preface

Aim: to provide relevant evidence based practical information and guidelines for all grades of health worker at all levels of care who manage women with postpartum haemorrhage.

This monograph arises from the deliberations of the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) on how best to minimise maternal deaths from postpartum haemorrhage (PPH) in South Africa. It was thought that it might be appropriate to provide a monograph on PPH which includes algorithms and offers new practical perspectives in medical and surgical treatment.

Postpartum haemorrhage is a major direct cause of maternal deaths and morbidity in South Africa. Deaths from PPH can be minimised by identifying women with risk factors and ensuring that such women are delivered in health facilities by skilled attendants providing quality health care. In addition, in recent years, new techniques have been developed which show clear advantages over emergency hysterectomy, in particular, and how to deal with blood loss due to complications at the time of or following caesarean section. This is of great importance in view of increasing caesarean section rates at all levels of health care in South Africa.

Contributions covering a wide range of practical topics on PPH, have been made by members of the NCCEMD and national experts. Deaths from PPH can only be reduced by all role players in maternal health,

women and their families, managers of health facilities and health care givers (doctors and midwives). Therefore this monograph will be issued to all managers, interns, community service doctors and nurses who provide service at first contact in hospitals providing maternity care.

It is hoped that health professionals will find the monograph useful to reduce maternal mortality and morbidity from PPH.

Chapter one

Overview of PPH as a Problem Globally and in South Africa

S.Fawcus

Postpartum Haemorrhage (PPH) is a major cause of maternal mortality globally, especially in under-resourced settings. World Health Organisation (WHO) estimates that at least 166,000 deaths annually are due to PPH accounting for 28% of direct maternal deaths (1). It is a leading cause of maternal death and severe morbidity in Sub-Saharan Africa, the continent with the highest maternal mortality rates in the world (2).

It is also a major cause of severe acute maternal morbidity in well-resourced settings. For example in Scotland which has an ongoing audit of severe acute maternal morbidity, obstetric haemorrhage accounted for 50% of all severe morbidity during 2003-2004 (3).

PPH seriously tests the functioning of the health system and the skills of health workers, because it is often unpredicted and patients deteriorate very rapidly after onset. Patients often do not survive referral to another level of care. Effective management including resuscitation needs to be available at the first point of contact, often the district hospital.

In many countries of Sub-Saharan Africa many women deliver at home and many maternal deaths occur at home which are unreported. Deaths from PPH feature prominently in this group since there are many barriers to accessing emergency care from home. In South Africa there are no good home based estimates of maternal mortality, but it is possible that there are mortalities from PPH in rural areas of those provinces where there are many home deliveries.

Definition of Postpartum Haemorrhage

Primary PPH is excessive blood loss from the genital tract during the first 24 hours after delivery. It is recognised that estimating blood loss is often subjective and not easily measured accurately.

The following categories of severity are described:

PPH -- -- ----- blood loss \geq 500mls

Severe PPH -- blood loss \geq 1000mls

Massive blood loss -- blood loss \geq 2500mls.

Secondary PPH is excessive blood loss following delivery after 24 hours and up to 6 weeks following delivery. Whilst being an important management problem, secondary PPH is less common and less frequent as a cause of maternal death than Primary PPH.

PPH occurs in approximately 10.5% of all births.

WHO estimates that globally there are 13.8 million cases of PPH annually, with a case-fatality rate of over 1% in some settings.

Causes of Postpartum haemorrhage

Uterine atony

Genital tract trauma – Lacerations or tears of the vagina, perineum, and cervix.

– Ruptured uterus

Retained placenta – whole placenta or placental tissue

Inverted uterus

Bleeding following APH due to abruptio placenta

Bleeding following APH due to placenta praevia

Maternal bleeding disorders.

- NB:
1. There can be more than one cause for PPH in an individual patient
 2. All causes can be complicated by a coagulopathy (bleeding disorder) which results from massive blood loss
 3. PPH can occur at and after Caesarean section as well as following vaginal delivery.

Postpartum haemorrhage as a problem in South Africa

The Saving Mothers Reports produced every three years by the National Committee for Confidential Enquiry into Maternal Deaths (NCCEMD) since 1998 show that obstetric haemorrhage (mostly PPH) is one of the BIG FIVE causes of maternal deaths in South Africa (4).

Saving Mothers Report 2005-2007: PPH

- Accounted for 491 maternal deaths in South Africa during 2005 – 2007.
- It was the third most common cause of maternal death, accounting for 12.4% of the total (3959) maternal deaths. (Non-pregnancy related infections mostly due to HIV / AIDS accounted for 43% of all deaths and Pregnancy Hypertension 15%.)

South Africa: comparisons with a well resourced country

- MMR from obstetric haemorrhage in SA (2005-2007) was 18.8 deaths per 100,000 live births; there were 491 deaths in three years (4).

- MMR due to obstetric haemorrhage in UK (2003-2005) was 0.8 per 100,000 maternities; there were 17 deaths in three years (5).

South Africa: Deaths due to Haemorrhage are not decreasing.

The MMR (number maternal deaths per 100,000 live births) due to obstetric haemorrhage was 13.6 in 1999-2001, 19.5 in 2002-2004 and 18.8 in 2005-2007

Maternal Age over 35yrs was a Risk Factor for APH and PPH

Place and timing of death

- Over 75% of haemorrhage deaths occur at level 1 and level 2 hospitals.
- 43% of PPH deaths occurred at level one hospitals
- Several women arrived at health facilities “in extremis” or “died en route”.
- The majority of women died within 24hrs from onset of haemorrhage. Many died within 6hrs

Conditions causing obstetric haemorrhage in South Africa 2005-2007

CAUSE	Number deaths	%
Abruptio placentae	48	9.8
Placenta Praevia	13	2.6
APH - unspecified	47	9.6
Retained placenta	88	17.9
Uterine atony	67	13.6
Ruptured uterus	80	16.3
Bleeding at/after CS and genital tract trauma	141	20.4
Inverted uterus	7	1.4
TOTAL	491	

Abruptio placentae accounted for most of the 108 APH deaths and the majority died from postpartum bleeding. Of the 383 deaths from postpartum haemorrhage, there were 4 main groups of primary causes, all of which should be easily preventable by basic referral obstetric care. 88(17.9%) of deaths were from retained placenta, only a small proportion of which were thought to be morbidly adherent. 67 (13.6%) were due to uterine atony, either from prolonged labour or over distension of the uterus. 80 (16.3%) were due to uterine rupture. Of these 37 were in women with a previous Caesarean Section (CS) and, of particular concern, 43 occurred in women with no previous CS. The remaining major cause of PPH was 'other uterine trauma', accounting for 141 (20.4%) of deaths. This subcategory is the largest and has increased markedly from the previous triennium. Deaths in this subcategory group were predominantly due to bleeding during and after CS, and frequently overlapped with other causal subcategories. It also included small numbers due to serious vaginal trauma, cervical trauma and secondary PPH. The large number of deaths due to CS associated bleeding raises concern about technical skills, particularly at district hospitals.

Prolonged and obstructed labour was an important contributory factor to many of the causes of PPH.

Hypovolaemia was the final cause of death in 78.7% of APH deaths and 88.3% of PPH deaths.

Avoidable factors for PPH deaths

APH & PPH were the causes of death most likely to be assessed as '*Clearly Avoidable*' by assessors: 68.5% for APH and 80% for PPH.

In terms of **Patient related** avoidable factors problems identified included non attendance for antenatal care and *delay in seeking help*.

Administrative related avoidable factors included: *delay in transport* between institutions (mostly from level one); *lack of specific health*

facilities (mostly lack of functioning theatres at level one hospitals and Intensive Care Units at other levels); *lack of sufficient blood* (showing a marked increase as a problem from the previous triennium); and *lack of sufficient staff* to both monitor patients and provide the necessary surgical expertise. These administrative problems severely limited the ability of health workers to provide the required quality of care.

Considering **health worker related factors** more than 50% of cases had avoidable factors, related to health workers at each level of care. There was *inadequate problem recognition* e.g. PPH was recognised too late usually due to *inadequate monitoring* post delivery or post CS.

In addition there was a problem with *incorrect diagnosis* with conditions such as ruptured uterus often not recognized prior to collapse or death. However *substandard care*, as in previous reports, remained the major problem contributing to over 40% of deaths for every level of care. Substandard care included failure to carry out essential steps of prescribed protocols or serious delays in doing so. Also failure to recognize and intervene timeously for prolonged labour resulted in ruptured uterus and uterine atony which otherwise could have been prevented

Problems with restoring circulation in bleeding patients was a serious concern, this was often due to the *severity of haemorrhage not being initially assessed adequately* and the *resuscitation not being aggressive enough*.

Importance of this monograph

The 2005 – 2007 report revealed that the majority of PPH deaths were preventable and revealed major deficiencies in access to and the functioning of the health system at all levels. Patients with PPH require **IMMEDIATE** treatment and often do not survive referral to another level of care. It is vital that all levels of care can deal with the emergency management of PPH and also are aware of the factors required to prevent

it. This requires sufficient facilities, supplies and skilled staff. The aim of this monograph is to give clear guidelines to doctors, midwives and paramedics as to how to prevent and manage women with massive PPH in order to reduce this unnecessary and tragic mortality.

Major improvements in the functioning of the health system and appropriate training of doctors and midwives at all levels of care are essential if deaths from this preventable cause of maternal mortality (postpartum haemorrhage) are to be reduced.

References

1. Maternal Mortality in 2000; Estimates Developed by WHO, UNICEF, UNFPA. Geneva; World Health Organisation, 2004.
2. Tracking Progress in Maternal, Newborn and Child Survival. *The 2008 report*. UNICEF.
3. Penney G. Bracel V. 'Near misses' and severe maternal morbidity; the Scottish experience. In: Lewis G, editor. *Why Mothers Die 2000-2002*. London: RCOG Press; 2004.p267-271.
4. Saving Mothers 2005-2007. *Fourth report of the National Committee for Confidential Enquiry into Maternal deaths*, Dept of Health, South Africa, Pretoria.
5. Confidential Enquiry into Maternal and Child Health. *Saving Mothers Lives 2003-2005. Seventh Report on Confidential Enquiries into Maternal Deaths in the United Kingdom*. London: CEMACH; 2006.

Chapter two

Prevention of PPH and Deaths from PPH

S.Fawcus

There are some interventions that can prevent the occurrence of PPH by addressing factors that lead to PPH and by appropriate management of the third stage of labour. In addition the consequences of PPH for an individual woman can be lessened by adequate iron stores and nutrition prior to delivery. The outcome of PPH is also improved by early detection of excessive bleeding and the women being in a facility where there are adequate skills and facilities to manage the PPH.

These factors are addressed below

Antenatal detection and treatment of anaemia.

- One aim of antenatal care should be to ensure that all pregnant women commence labour with a Haemoglobin (HB) level \geq 11gms/dl, so as to lessen the impact of possible PPH.

- Women who commence pregnancy with a low HB, and women with chronic diseases such as Tuberculosis (TB) and HIV / AIDS, are at increased risk of being anaemic at the onset of labour. In particular, women on Zidovudine and other antiretroviral drugs are at particular risk of becoming anaemic during pregnancy.
- It is routine practice at booking for antenatal care to measure the haemoglobin (HB) and to provide iron and folate supplementation to all pregnant women in order to prevent anaemia developing during pregnancy.
- Women with HB less than 8gms/dl at booking should be referred for further investigation at a doctor's high risk clinic.
- HB should be re-checked for all women at 32-34 weeks, and referral organized if HB < 8gms/dl.
- HB should be checked in all women at the onset of labour. If less than 10gms/dl, they should be referred to continue labour in the referral hospital where blood is available on site.
- Women with HB of < 8gms/dl at the onset of labour will require to be in a facility where cross matched blood can be obtained.

Identification of 'at risk' women to deliver in hospital

Unfortunately, PPH is a complication that for many women cannot be predicted.

There are, however, some conditions that are known to be associated with PPH and these women should be identified for planned hospital rather than clinic delivery (1). The following are risk factors for PPH:

Detected antenatally

- Previous PPH
- Previous CS
- Age > 35yrs
- Parity > 5

- Obesity; BMI>35
- Large baby (Estimated Fetal Weight >4kgms)
- Multiple pregnancy
- Known placenta praevia
- Pre-eclampsia
- Abruptio placentae
- Severe anaemia (HB<8gms/dl)

Detected / occurring during labour

- All the above
- Anaemia at onset of labour (HB<10gms/dl)
- Pyrexia in labour/ chorioamnionitis
- Induction of labour
- Prolonged labour >12hours
- Prolonged second stage of labour
- Assisted vaginal delivery (forceps and vacuum)
- Shoulder dystocia
- Caesarean section

If women identified at risk for PPH can be identified antenatally or intrapartum so that they can be referred for a hospital delivery, then they will be in the appropriate facility with the necessary level of skills, with available theatre and blood in case of PPH.

Certain women are very high risk for massive haemorrhage and it would be ideal if they could be referred to a regional (secondary) or tertiary hospital for delivery (eg previous CS plus anterior placenta praevia where the risk of morbidly adherent placenta is very high, major placenta praevia, abruptio placenta with IUD and coagulopathy).

The above recommendations for risk assessment and planned delivery in hospital require

- (a) the woman has transport to get to the referral hospital in labour.
It is very important during antenatal care that her transport plan for how she will get to hospital when labour starts is discussed.
- (b) emergency transport must be available from clinic to hospital and between hospitals when referral in labour is required for 'at risk' women.

As indicated earlier, unfortunately many PPHs are unpredicted and also, despite a system of antenatal risk assessment, many women with risk factors will arrive at a clinic and deliver there with a PPH before referral can occur. Therefore all clinics and level one hospitals have to be prepared for emergency management of PPH.

Maternity waiting shelters

These are facilities where pregnant women near term who live far from a referral hospital and who have risk factors requiring hospital delivery can stay to await the onset of labour. They are not facilities where medical care is provided but rather nearby accommodation. Women will have to arrange their own food and often bedding and have to make arrangements for their family at their own home to be cared for. Maternity waiting shelters or lodges attached to district or regional hospitals have been shown to be valuable in enabling pregnant women with risk factors to be near the appropriate facility when they go into labour, thus reducing the 'first delay' in accessing care.

Partogram to prevent prolonged labour

Prolonged labour is associated with PPH due to uterine atony. In addition prolonged labour is often associated with chorioamnionitis which also predisposes towards PPH. If obstructed, prolonged labour

may be associated with uterine rupture and associated catastrophic haemorrhage.

Therefore appropriate care and monitoring of women in labour using the Partogram, referring appropriately from primary care clinics intervening definitively in the hospital setting will all help reduce the incidence of PPH. In the particular case of women having labour after one caesarean section (VBAC), careful monitoring of the progress of labour with the Partogram is important to prevent scar dehiscence/ uterine rupture.

Precautions in use of Oxytocin and Misoprostol in Multi gravida.

Injudicious use of oxytocin and misoprotol for induction of labour; using excessive doses and persisting in the presence of adequate uterine activity can lead to uterine rupture. Also inappropriate use of oxytocin for augmentation when there are already signs on CPD or a malpresentation can lead to uterine rupture.

Active management of third stage of labour.

Active management of the third stage of labour (AMTSL) is associated with a reduced incidence of subsequent PPH and should be practiced, where possible, by all health workers who perform deliveries (2).

The essential elements of AMTSL are:

- Oxytocin 10 iu im after delivery of the baby
- Clamping of the cord – delayed unless there has been intrapartum fetal distress and bleeding
- Controlled cord traction
- Massaging of the uterus

NB. Early latching of the baby at the breast and the mother massaging her own uterus can also assist with reducing PPH.

Considering the appropriate uterotonic agent for AMTSL, syntometrine one amp (a combination of 5iu oxytocin and 0.5mgms ergometrine) can be given instead of oxytocin unless the mother is hypertensive or cardiac.

Misoprostol (600ugms orally) is an alternative medication for AMTSL but is inferior to oxytocin and syntometrine for reducing PPH. However it may be used if there is no oxytocin available especially in situations where there is no cold chain or fridge. For example, traditional birth attendants in some countries performing home deliveries, have administered misoprostol for the third stage of labour with reduced incidence of PPH.

At CS, after delivery of the baby, iv oxytocin 2.5 iu should be administered for the third stage of labour (higher doses can cause hypotension). Following this "stat iv dose" an oxytocin infusion (10 iu in one litre fluid) can be commenced.

Monitoring in first 2 hours after birth, including after Caesarean section

Early detection of postpartum haemorrhage before blood loss has become severe, will result in earlier initiation of resuscitation and definitive treatment to arrest haemorrhage, thus reducing the morbidity from the PPH.

Following vaginal delivery all women should be observed in the labour ward area for at least one hour for monitoring of blood loss, blood pressure and pulse rate. They should only be sent to a postnatal ward if there is no PPH. Similarly following CS women should be observed for at least 30mins in a recovery area before being sent to the ward.

In addition, where women are at particular risk for PPH due to

antepartum, intrapartum or delivery risk factors, it is advisable to observe and monitor these women in a high care area for at least 4 hours after delivery for signs of PPH, before sending them to a postnatal ward.

It is also important to note that whereas most PPH is revealed bleeding vaginally, in certain circumstances bleeding may be concealed eg vaginal haematoma or intra-abdominal bleeding post CS.

Identification of women who decline blood transfusion.

Some women decline the use of blood products for religious reasons (eg. women who are from the Jehovah's Witness religious group) and for safety reasons. In the event of severe PPH, non use of blood products can lead to severe morbidity and sometimes maternal death. While respecting the adult woman's autonomy to make such a decision, all steps must be made to minimize possible morbidity and mortality.

It is very important that such women are identified during the antepartum period by history taking. Attention should be directed towards preventing anaemia and optimizing iron stores with haematinics. Specialist advice should be sought telephonically about such women. Antenatal care and delivery should ideally be conducted in a level 2 or 3 hospital with specialist supervision. Counselling is required to ascertain the woman's precise instructions in the event of severe PPH and to document them. If she declines blood products under any circumstances, advice must be sought from a specialist centre and haematology department about the availability of Haemopure (a blood analogue) and the availability of cell salvage techniques. These options should also be discussed with the woman.

All attempts must be made to prevent haemorrhage, detect it early and prevent it becoming massive by aggressive use of uterotonic agents and early recourse to surgical measures to arrest haemorrhage.

References

1. Prevention and Management of Postpartum Haemorrhage. *RCOG Green-top Guideline* no 52. May 2009
2. Prendiville WJP, Elbourne D, McDonald SJ. Active vs expectant management in the third stage of labour. *Cochrane Database Syst Reviews* 2000;(3): CD000007
3. Currie J et al. Management of women who decline blood and blood products in pregnancy. *The Obstetrician and Gynaecologist* 2010;12:13-20

Chapter three

Practical Algorithms for Management of Postpartum Haemorrhage

S.Fawcus

Introduction

This chapter presents algorithms/flow charts for the *management of PPH*

- (a) *after vaginal delivery in an institution*
- (b) *associated with Caesarean section and*
- (c) *after vaginal delivery at home with an unskilled birth attendant.*

These algorithms can be displayed in poster form and are essentially flow charts indicating in time sequence what needs to be done to prevent, recognise, establish the cause, resuscitate and arrest the haemorrhage.

All labour wards should display such a poster and in addition theatres should include diagrams of additional procedures that may be necessary to arrest bleeding.

Referral to another level of care will be needed depending on the capacity of the institution where the bleeding occurs. Consultation with and advice from the referral institution is often important. Therefore this chapter has a section (d) *Transfer of patients with PPH* and (e) *Telephonic advice networks*.

In order to execute the comprehensive management outlined in these algorithms and described in this chapter, the following is necessary:

- Implementation of strategies to prevent PPH, including Active Management of Third Stage of Labour (AMTSL) (Ch 2).
- Knowledge and practical skills in fluid and blood resuscitation (Ch 4).
- Knowledge and skills of medical measures to arrest bleeding, particularly from uterine atony (Ch 5).
- Knowledge and skills for surgical procedures that can be used to stop haemorrhage from several different causes (Ch 6).
- The particular contribution of the midwife who is at the 'coal face'; often the first person to identify the bleeding (Ch 7).
- Accessible well managed and appropriately staffed facilities with adequate blood, supplies and medications (Ch 8).
- Being prepared for the emergency by regular scenario training and audit of PPH cases (Ch 9).
- Community awareness and mobilization around PPH (Ch 10).

The algorithms presented in this chapter are schematic and for further information on interventions listed the above chapters can be consulted.

Communication with Patient and her Relatives

NB. Applies to all algorithms

It is very frightening for a patient and her relatives to experience PPH. The anxiety and stress of the health workers managing the patient can exacerbate the patient's fear.

It is very important for health workers to work quickly and in as calm a manner as possible. At all times there must be one team member, usually the attending midwife or lead clinician, to explain to the patient what is happening and what procedures the health workers are performing. After any major procedure it is important to inform relatives who may be waiting in the hospital or need to be contacted at home.

PPH Management after vaginal delivery

The algorithm on the next page, available in poster form, summarises a stepwise approach to the prevention, detection, establishing the cause and management of PPH.

It is designed for use in a health facility and particularly refers to bleeding after vaginal delivery.

The poster is designed to show that the two pillars of management: Fluid Resuscitation and Arresting Bleeding have to occur **AT THE SAME TIME** (concurrently). This is why it is so important to **CALL FOR HELP** when PPH occurs.

The algorithm is also designed to show a stepwise approach where preliminary treatment and resuscitation measures then lead to more complex measures for ongoing bleeding.

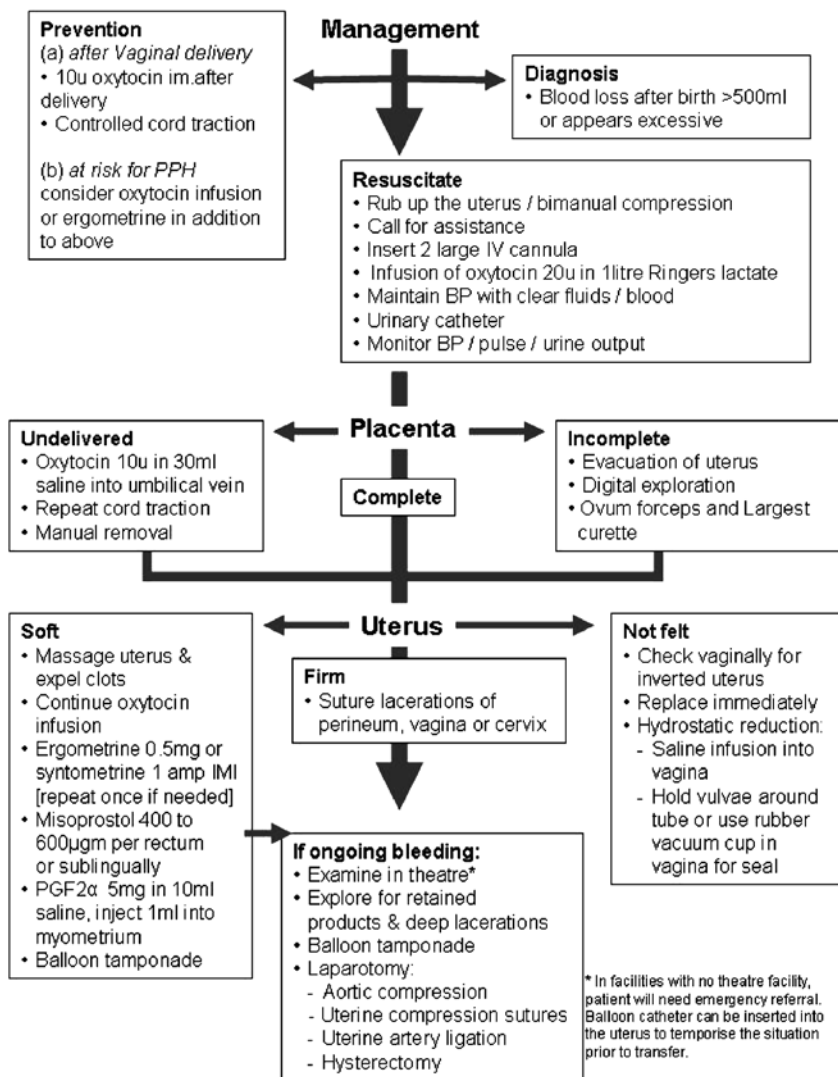
Arresting the bleeding involves initially **ESTABLISHING THE CAUSE OF BLEEDING**. This is first done by noting whether the placenta has been delivered or not. If retained then the management follows along the retained placenta route in the algorithm.

If the placenta is out, the most common cause is uterine atony, diagnosed by palpation of a poorly contracted uterus. Perineal tears will be diagnosed on routine inspection after vaginal delivery.

If no response to oxytocin infusion (the first line treatment for uterine atony), additional oxytocic agents should be given as indicated in the algorithm. Midwives may administer ergometrine and misoprostol but intramyometrial PGF₂alpha requires a doctor to administer. However at this stage, in the presence of persisting bleeding, it is very important to exclude another cause such as deep vaginal lacerations, cervical tears and/or retained fragments of placenta or membranes.

Algorithm (a)

Postpartum Haemorrhage (PPH) after vaginal delivery



Further exploration can be done in the labour ward but if bleeding is ongoing, it will require to be done under anaesthesia in a theatre. Up to now all procedures can be done by midwives in a primary care clinic. Once theatre exploration is required it needs to be done in a hospital with a functioning theatre so referral will be necessary. Balloon tamponade may be inserted at this stage to reduce bleeding during transfer or Non pneumatic Anti Shock Garment (NASG) could be applied. This is currently not available in SA (see comments on transfer of patients; section d).

Bimanual compression is an important temporizing measure whilst awaiting availability of more skilled assistance or theatre (see chapter 7,fig 8)

Initial measures in theatre involve exploration of the uterus for retained products, deep vaginal tears and/or cervical tears.

If all are excluded and bleeding is ongoing despite use of available oxytocic agents for uterine atony, a laparotomy is essential.

Aortic compression may be a useful temporising measure to reduce blood loss while trying to secure haemostasis. As an alternative, some practitioners tie a uterine tourniquet (eg a foley's catheter) around the lower part of the uterus to reduce bleeding while attempts are being made to control the bleeding, in a similar way to when performing myomectomy.

Vertical uterine compression sutures, the Hayman sutures, (see ch 6) are then needed to treat persisting uterine atony. If unsuccessful, balloon tamponade can be inserted, or stepwise uterine devascularisation can be performed. All these surgical steps should be within the scope of practice of a medical officer and COSMO. Subtotal hysterectomy (STAH) is the definitive treatment and usually requires a more experienced medical officer or obstetric specialist. The decision to do this must not be made too late and time must not be 'wasted' with conservative measures if the patients condition is deteriorating rapidly and these measures are not arresting the haemorrhage. In particular for conditions such as a major uterine rupture which is irreparable or placenta increta /percreta, it is usually necessary to proceed immediately to hysterectomy.

Bleeding associated with Caesarean Section

- (i) Detected during the CS
- (ii) Diagnosed in the postoperative period

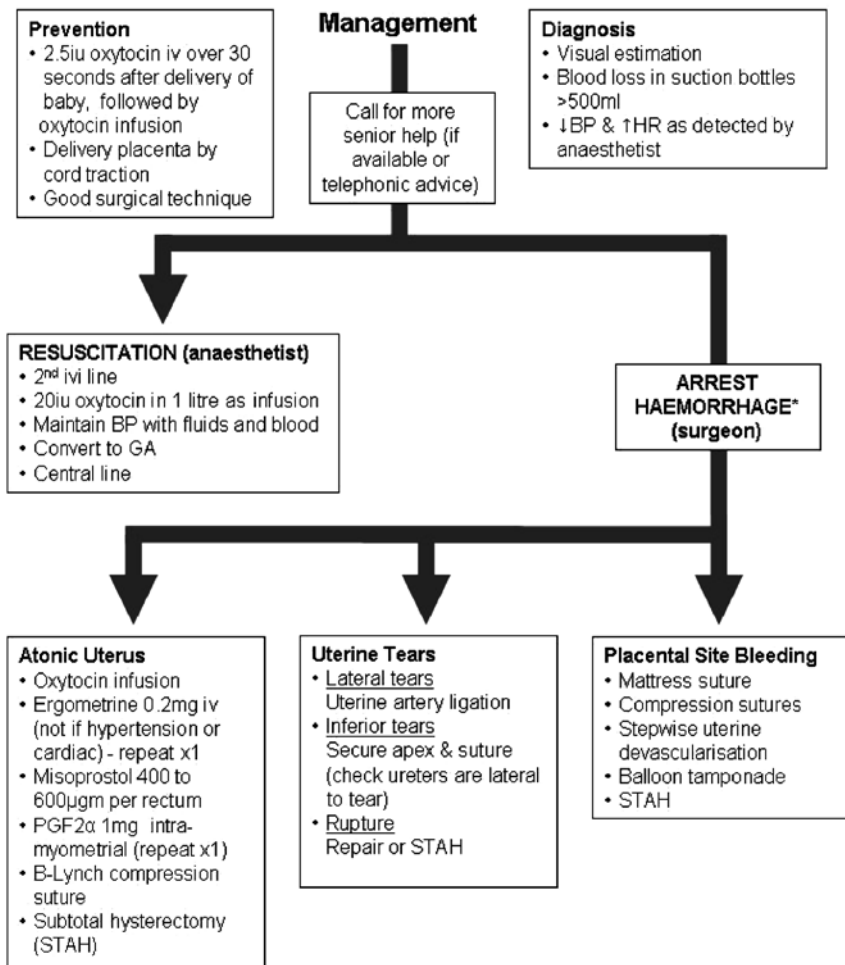
“Be Prepared”: If excessive blood loss is anticipated make sure the most experienced doctor does the CS

- : If suspect major placenta praevia +/- increta, arrange for the CS to be performed in a regional or tertiary hospital’
- : If patient is anaemic ie HB < 10, ensure blood is available if required and if < 8gms/dl it is cross matched and in the theatre.

Although it is advisable for all the above to happen, unfortunately this ‘ideal situation’ may not occur because events may evolve very fast. For example: a patient arrives in a level one hospital with a low HB in advanced labour with 2 previous CS and fetal distress; she requires urgent surgery to save her and the baby by whoever is available at the time and at that level of care.

Algorithms (bi)

Bleeding At Caesarean Section



NB. Proceed immediately to STAH if: uterine rupture that is irreparable
placenta increta or percreta

The following stepwise modalities of treatment can be used :

- Atonic uterus- oxytocics, B lynch compression suture
- Lateral tears into broad ligament – bilateral and stepwise uterine artery devascularisation
- Tears down lower segment of uterus – haemostatic sutures, ensure get apex of tear, check ureteric path if tear goes lateral.
- Bleeding from placental bed – individual haemostatic sutures and uterine artery ligation, balloon tamponade
- If morbidly adherent placenta – as previous, consider use of Baum’s curette

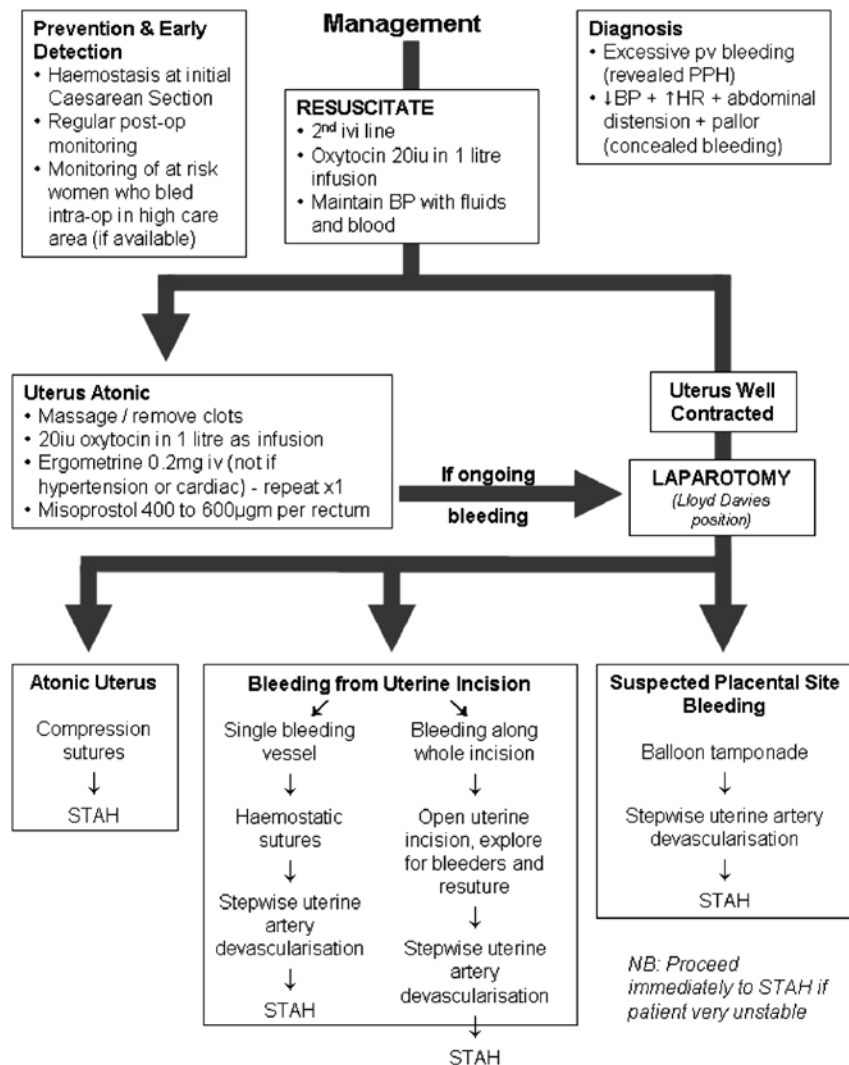
NB: proceed straight to hysterectomy if placenta percreta, ruptured uterus which is irreparable, or when above conservative measures are unsuccessful

A subtotal hysterectomy (STAH) is usually sufficient to control the bleeding unless there are tears going down into the cervix or in some cases of lower segment bleeding following a major placenta praevia, in which case the cervix will also need to be removed.

If haemostasis is not satisfactory after STAH, a suction drain can be left in situ. If coagulopathy is evident after the STAH/TAH, then consider abdominal packing to tamponade the abdominal cavity. At least 5 paediatric swabs followed by abdominal swabs can be used. The patient will need to be kept ventilated and the packs removed after 48hours.

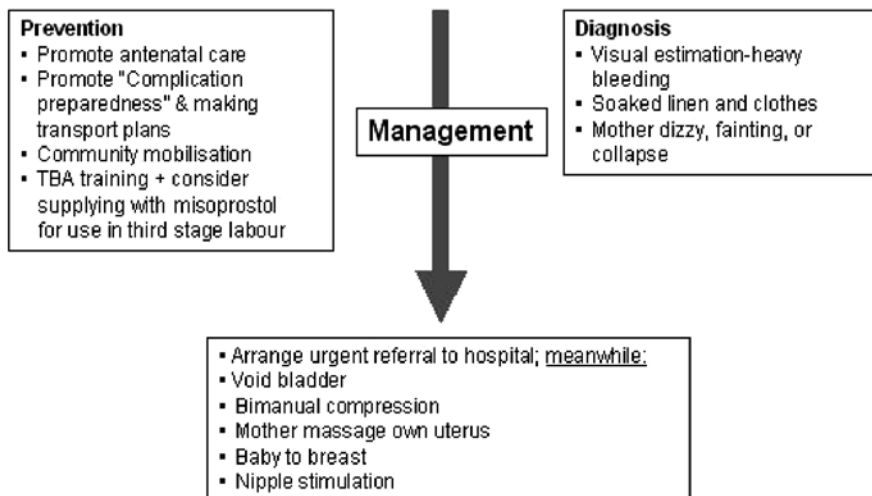
Algorithms (bii)

Bleeding After Caesarean Section



Algorithms (c)

PPH following VAGINAL DELIVERY at home (non-skilled birth attendant)



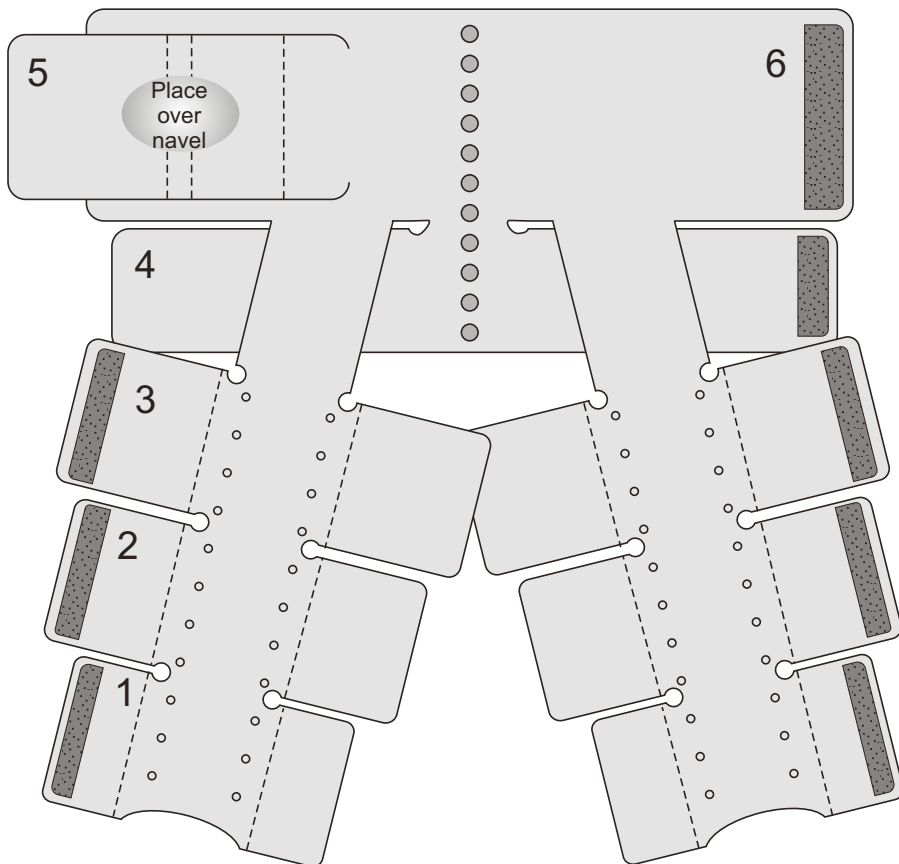
(d) Transfer of Patients with PPH between Institutions

It is unwise to transfer a haemodynamically unstable patient. Unfortunately, this is often done in South Africa where staff at the rural hospital feel they have done all they can and the patient must get to the next level of care for the expertise available there. Patients frequently die during transit in this situation or arrive 'in extremis' at the next level of care. If the patient is haemodynamically unstable and you are unsure what to do, phone the on call obstetrician at your regional hospital for advice (whose direct number you should have; see section e)

Before transfer:

1. Ensure that all possible has been done to arrest the haemorrhage or reduce it. This would include (a) adequate oxytocic therapy which must continue during transit (b) balloon tamponade of an unresponsive atonic uterus (c) B lynch suture, clamping and packing if the bleeding is poorly controlled at CS etc.
2. Ensure adequate resuscitation is in process (crystalloids, colloids and/or blood as available at referring institution) and the ambulance attendants are aware of the need to maintain the resuscitation during transit
3. If distances are far and there is availability of air transport, consider this mode of transfer. It is the medical manager of the facility's responsibility to be able to organize this, if such services are in place in that province.
4. Non-Pneumatic Anti-Shock Garment (NASG). This is a compression suit with 5 panels secured with Velcro tags which, after application, compress the 4 limbs and abdomen. It appears to improve venous return, maintain blood pressure and improve signs of shock. These garments are currently not available in South Africa. They are reusable and are currently being field tested in Zambia and Zimbabwe for use during transit from peripheral clinics. If shown to be of value in improving outcomes they should be acquired for South Africa.

Chapter 3. Figure 1. Non-pneumatic anti-shock garment.



(Adapted from: Hensleigh PA. BJOG 2002;109:1377)

(e) Telephonic Advice Networks

For doctors who find themselves working at distant hospitals in the earlier years of their medical career and who may not have acquired much experience with major obstetric haemorrhage, it is useful for them to ensure a direct telephonic link with an obstetrician at their referral hospital or elsewhere. Such a direct line, to a mobile phone if the 'supervisor' is willing, would enable the inexperienced doctor to obtain advice as an emergency is unfolding or if, for example having difficulty getting haemostasis at CS. It may be of value for the peripheral rural hospital to receive regularly the on call duty rosters for the specialists at the regional hospital so they can always have access to advice in the same way as junior doctors in the regional hospital.

References *from which algorithms devised / Further useful reading*

1. Saving Mothers. *Report of Confidential Enquiries into Maternal deaths in South Africa 2005-2007*. Ch 4. DOH, Pretoria, South Africa 2010.
2. Prevention and Management of Postpartum Haemorrhage. *RCOG Green-top Guideline no 52*. May 2009
3. Schuurman N, Mackinnon C, Lane C, Etches D. *Prevention and Management of Postpartum Haemorrhage*. *J Soc Obstet Gynaecol Can* 2000;22:271-281
4. *WHO guidelines for the management of postpartum haemorrhage and retained placenta*. World Health Organisation, Geneva 2009

Chapter four

Assessing and Managing Blood Loss

E. Langenegger / C. Rout

Initial Resuscitation of Haemorrhagic Shock

- HELP:** Call for assistance
- AIRWAY:** Support if necessary using oral or nasal airway
Intubate the deeply unconscious
- BREATHING:** If patient not breathing, use assisted ventilation.
If breathing, give O₂ (40% mask, 8 – 10 l/min)
- CIRCULATION:** If no pulse (or you are unsure) **Start CPR**
- Stop Bleeding:** Bimanual compression of uterus
Oxytocin infusion or syntometrine

Fluid Resuscitation (Restore volume, cardiac output) **2 large bore cannulae** (at least 18 g. via the antecubital fossa, external jugular, or venous cut-down).

Send blood for emergency cross-matching

Rapid fluid bolus over 10 minutes: (pressure bag or BP cuff)
2litres crystalloid (Ringers / Plasmalyte / 0.9%NaCl / Balsol)

Reassess at 10 minutes. If SBP<100, pulse>110 **500ml colloid** (starch e.g. **Voluven**), **repeat twice if necessary** (1.5 L crystalloid if no colloid available)

Use warm fluids (38°C) if possible

Reassess again. If SBP<100, pulse >110, 3.5 L of clear fluids have been given and cross-matched blood is unavailable **commence transfusion of O negative blood 2 units.**

Commence transfusion of cross-matched or type-specific blood as soon as it is available.

Comments on initial resuscitation

Estimation of blood loss can be difficult. Loss is usually underestimated as it may remain unobserved or concealed (e.g. broad ligament haematoma). Also, physiological changes of pregnancy may *mask* its severity. A pregnant patient may lose large volumes of blood without showing any clinical signs (masked shock). Table 1 is as good a guide as any.

Table 1. Estimation of Blood Volume lost by Haemorrhage

	Mild	Moderate	Severe
Blood loss	500-1000ml	1000-2000 ml	>2000ml
Systolic Blood pressure	Normal or slight decrease, worse on sitting	Decreased, (80-100 mm Hg)	Marked fall (<80 mm Hg)
Heart rate	Increased < 100	100-120	>120
Breathing	Normal	Mild increase 20-25/min	Increased > 25/min
Conscious level	Normal	Restless	Confused or depressed
Perfusion	Cold peripheries	Cold	Cold and clammy
Urine output*		oliguria	anuria

- A urinary catheter should be placed as soon as possible, the initial volume measured then discarded, and further urine output monitored at 15 minute intervals.

The principles of management are:

- **STOP THE BLEEDING**
- **Restore circulating blood volume**

Table 1 should be regarded as physiological staging of shock rather than a diagnosis of severity. Without effectively eliminating the cause of the bleeding, the patient will inevitably progress from mild to severe. Thus the goal of initial resuscitation is to achieve sufficient circulating blood volume to enable transfer of the patient to a site where effective treatment can occur (assuming a simple measure, such as uterine compression or medical treatment has not been successful). The degree of initial volume

resuscitation will depend on circumstances. For example, if PPH occurs in the theatre recovery area the patient can be returned to the operating theatre immediately and surgical correction undertaken while resuscitation continues. If the event occurs in an outlying hospital or clinic, resuscitation must be more complete if the patient is to survive ambulance transfer. If resuscitation is to continue during transfer, an advanced life support unit with the capability of blood transfusion should be used. If necessary the patient must be accompanied by an experienced member of staff. Air transport should be requested if the event occurs in an isolated community hospital.

If blood-loss has stopped, the end-points of initial resuscitation are to normalise blood pressure and to reduce heart rate to 110 beats per minute or less. Complete normalisation of heart rate is unlikely. At the same time recovery of conscious level, breathing and peripheral perfusion should also occur. These goals should have been achieved within 30 minutes, 1 hour at most, and represent equivalent replacement of the initial volume lost. As a rough guide colloid solutions and blood can replace volume lost on a 1 to 1 basis, whereas 3 volumes of crystalloid are required to replace 1 volume of blood lost.

Although urine output is a fairly useful guide to assessment of severity of shock and should be monitored, it should not be used as an end-point to resuscitation. Renal function is often slow to return and the initial insult may have caused acute renal failure. Use of urine output as an end-point to initial resuscitation may lead to excessive volume administration and pulmonary oedema.

Haemoglobin (Hb) and haematocrit (Hct) are of little or no value in the initial resuscitation of acute haemorrhage. Central venous cannulation (if available) is also of little value in the initial stages unless peripheral venous access proves impossible.

Oxygen therapy should be continued, even if the patient is breathing normally. Hb saturation should be monitored continuously (pulse oximetry).

Active management of body temperature should be maintained throughout. Use warm fluids and a forced air warmer or warmed blankets.

Continued Resuscitation

Note: volume replacement is guided by the patient's response to initial therapy, not solely by the initial classification category.

Failure to achieve a response to resuscitation implies continued bleeding, which must be identified and treated whilst resuscitation continues.

Following initial resuscitation, insertion of a central venous catheter and withdrawal of blood for laboratory investigations are appropriate if available. Check:

- Haemoglobin
- Arterial blood gas analysis
- Platelet count
- Coagulation parameters
- Urea and electrolytes

Haemoglobin: Haemoglobin is invariably overestimated during resuscitation of ongoing haemorrhage. Although the main goal is adequate circulating blood volume and cardiac output, **maintain Hb above 8 g/dL.**

Arterial blood gas analysis: Acidosis ($\text{pH} < 7.35$) is associated with inadequate perfusion. Treatment is by further volume resuscitation. Rising lactate concentrations also indicate inadequate tissue perfusion.

Platelet count and coagulation parameters: Clotting and platelet abnormalities are common following prolonged resuscitation, and in the case of PPH following abruption placentae or sepsis. Blood should be

administered as component therapy, with a ratio of 1PRBC to 1 FFP/ FDP after the first 2PRBC; this is associated with better survival. If blood loss continues following surgical correction of the source of bleeding, give platelet concentrate if the platelet count is $< 50,000/\mu\text{L}$ and correct abnormal coagulation - activated partial thromboplastin time (aPTT) and thrombin time (PT) - with plasma concentrate. If the patient is resuscitated and not bleeding there is no need to correct either.

Urea and electrolytes: Electrolyte studies are not usually helpful during acute resuscitation. Administration of large volumes of blood can cause hyperkalaemia or hypocalcaemia that may need correction. Acute renal failure is best monitored using urine output; urea and creatinine do not increase significantly until later.

Central Venous Pressure: This is a very poor indicator of blood volume and should never be used alone to guide volume replacement. Check its position as soon as possible with a portable chest X-Ray, and exclude pneumothorax.

Inotropes: If facilities exist for adequate monitoring (ECG, Hb saturation, CVP and arterial line) and the patient remains shocked despite adequate volume resuscitation (no further bleeding, CVP 10cm or greater, mean arterial pressure < 65 mmHg) then inotropic support is appropriate. The only inotrope infusion that should be used in this setting is adrenaline (initially at a concentration of 20 microg. per mL).

Blood transfusion complications:

The commonest complications of resuscitation with large volumes of red cells are hypothermia, acidosis, and coagulation abnormalities. The most important aspect of management that can be applied at all levels of care is to keep the patient warm and administer warm (38 – 40°C) fluids.

Table 2. Major Complications of Blood Transfusion

Volume	– Pulmonary oedema
Temperature (cold)	– Hypothermia
Metabolic and Electrolytes	– Acidosis – K, Na, Ca, Mg abnormalities
Clotting Abnormalities	
Transfusion Reactions	– Acute haemolytic transfusion reaction – Anaphylaxis – TRALI (transfusion related acute lung injury)
Infections	– Viral and bacterial – TAI (transfusion associated immunomodulation)

Pulmonary oedema, whether caused by over-transfusion or TRALI is best managed by tracheal intubation and intermittent positive pressure ventilation (IPPV).

Anaesthetic Considerations

There is no place for the single-handed operator-anaesthetist (i.e. a doctor performing both the anaesthetic and the surgery). If two doctors are available, one must be solely responsible for the anaesthetic.

Do not use regional anaesthesia in an actively bleeding patient. If significant bleeding occurs during a procedure under regional anaesthesia

consider early conversion to general anaesthesia, tracheal intubation and IPPV.

The effects of anaesthesia (both regional and general) counteract the masking effects of pregnancy. Hypotension occurs much earlier. Monitor blood loss assiduously and replace volume early. Ensure that blood is sent for cross-matching early. Insert an additional wide-bore cannula early.

Use warm i.v. fluids.

At Caesarean section commence oxytocin with delivery of the baby's shoulder (NB beware multiple pregnancy and breech).

Ensure oxytocin infusions are continued in recovery and during transport to the ward. Never discharge a patient from recovery with an unexplained tachycardia or hypotension. Always check that the uterus is contracted and look under the blankets before discharge to the ward.

Recommended further reading:

1. M. Foley. *Obstetric Intensive Care Manual*. Post partum Haemorrhage. McGraw-Hill 2004
2. Marino P. The ICU Book. *Haemorrhage and Hypovolaemia*. 2007 Lippincot-Williams&Wilkinson
3. Creasy RK, *Maternal Foetal Medicine, Principles and Practice*, 5th edition; Intensive care monitoring in the critically ill Pregnant patient. Saunders 2004.
4. Hardcastle TC: *Massive transfusion in trauma: practicalities and management of complications*. Specialist Forum May 2006; 6(5): 23 – 29
5. Prevention and Management of Postpartum Haemorrhage. *RCOG Green-top Guideline* no 52. May 2009

Chapter five

Medical Treatment of PPH

G.J. Hofmeyr

Introduction

Although there are recognised risk factors for postpartum haemorrhage (PPH), PPH may occur unexpectedly in any woman who has given birth. All birth attendants must have the skills and knowledge to manage PPH, and labour wards must have the necessary drugs and equipment readily available.

Because there are several causes for PPH and the cause is often not apparent, management involves a stepwise approach of interventions for all possible causes applied in rapid sequence until the bleeding stops.

This chapter deals with the drugs used to promote contraction of the uterus and to enhance coagulation. The use of drugs must be seen as one element in the holistic management, including:

- Active management of 3rd stage including routine oxytocin (Chapter 2)
- Vigilance for PPH (Chapter 2)
- Resuscitation and volume replacement (Chapter 4)
- Surgical measures (Chapter 6)

The National Department of Health's "Guidelines for maternity Care in South Africa" recommend the following steps:

- Rub up the uterus / bimanual compression
- Infuse oxytocin 20u in 1litre Ringers lactate at 120-240 mL/hour
- Insert a urinary catheter

If the uterus remains soft:

- Ergometrine 0.5mg or syntometrine 1 amp IMI [repeat once if needed]
- Misoprostol 400 to 600µgm per rectum or sublingually
- Prostaglandin F2 α 5mg in 10ml saline, inject 1ml into myometrium

"Rubbing up" the uterus (uterine massage) is performed by firmly massaging the uterus through the mother's abdominal wall. It is thought to promote contraction by stimulating release of prostaglandins from decidual lysosomes. When oxytocin is not available, suckling or nipple stimulation may be tried, as it stimulates the release of endogenous oxytocin from the posterior pituitary gland.

Two drugs have been used to enhance coagulation in cases of PPH unresponsive to routine management: Tranexamic acid and recombinant factor VIIa

This chapter will discuss the use of all the above drugs in more detail.

The WHO has published guidelines for the management of PPH based on a review of the evidence by an expert panel in November 2008. This chapter will be based on the WHO recommendations as the evidence reviewed by the panel included several large randomized trials not published to date.

Uterotonic drugs

Most use of uterotonic drugs for the treatment of PPH is based on extrapolation from evidence of effectiveness for the prevention of PPH, in the absence of direct evidence from trials of the treatment of PPH.

For prevention of PPH, syntometrine compared with oxytocin is associated with a trend to reduced blood loss >1000ml (odds ratio (OR) 0.78, 0.58-1.03); no difference in blood transfusion (OR 1.37, 0.89 to 2.10), and less use of additional uterotonics (risk ratio (RR) 0.83, 0.72-0.96), but more side effects, particularly hypertension (RR 2.40, 1.58-3.64).¹

Oxytocin compared with ergometrine is associated with no statistically significant difference in blood loss >1000ml (RR 1.09, 0.45-2.66) and use of additional uterotonics (RR 1.02, 0.67-1.55); and fewer adverse side effects: vomiting (RR 0.09, 0.05-0.16); elevated blood pressure (RR 0.01, 0.00-0.15). There were insufficient data to compare the outcome blood transfusion.^{2, 3}

There were no clear benefits for the use of carbetocin⁴, intramuscular prostaglandins⁵ or sulprostone^{6, 7} over oxytocin and/or ergometrine.

For prevention of PPH, misoprostol (400 to 800 mcg) compared with injectable uterotonics is associated with increased blood loss of ≥ 1000 ml (RR 1.32; 95% CI 1.16-1.51), but no statistical difference in the incidence of severe morbidity, including maternal death (RR 1.00, 95% CI 0.14-7.10)⁵

Recommendation

Based on this indirect evidence, for the management of PPH the WHO strongly recommended:

- Oxytocin rather than ergometrine or syntometrine as first line
- Ergometrine or syntometrine as second line
- A prostaglandin as third line

Review of direct evidence of the effectiveness of misoprostol for treatment of PPH (including unpublished trials) found the following:

- For women who had received oxytocin during the third stage of labour, adjunctive use of misoprostol compared with placebo had no significant effect on additional blood loss ≥ 500 mls (RR: 0.83, 95% CI: 0.64-1.07), additional blood loss ≥ 1000 mls (RR: 0.76, 95% CI: 0.43-1.34) and blood transfusion (RR: 0.96, 0.77-1.19).^{8, 9, 10, 11}
- For women who had not received oxytocin during the third stage of labour, misoprostol 800 μg sublingually compared with oxytocin 40 IU IV had an increased risk of additional blood loss ≥ 500 mls (RR: 2.84 (95% CI: 1.63-5.01) and receiving additional therapeutic uterotonics (RR: 1.98, 95% CI: 1.31-2.99); and a trend to more blood transfusion (RR: 1.58, 95% CI: 0.98-2.55). In terms of side effects 66/488 women receiving misoprostol experienced temperature above 40°C compared to 0/490 with oxytocin. Most of the high temperature cases occurred in Ecuador. There were seven cases of delirium in women with high temperature.¹²

Recommendation

Based on this direct evidence, the WHO strongly recommended that oxytocin alone should be used for the treatment of PPH in preference to adjunct misoprostol.

The panel recognized that there may be settings where oxytocin is not available. It encouraged health-care decision-makers in these settings to strive to make oxytocin available. However, because the use of an uterotonic is deemed essential for the treatment of PPH due to atony, it recommended that misoprostol may be used until such time that oxytocin can be made available for this indication. There was lack of consensus as to whether 800 mcg sublingually or a lower dose should be recommended as the maximum safe dose

Prostaglandin F2 α

Prostaglandin F2 α intramyometrially has been used empirically as a last resort when all else has failed, though there is no direct evidence for its effectiveness. Because of the risk of dangerous adverse effects if given intravenously, a very small dose (1ml of a solution of 5mg in 10ml saline) is injected transabdominally into the myometrium, taking care to draw back to ensure that the needle is not in a blood vessel.

Tranexamic acid

Tranexamic acid is an anti-fibrinolytic agent used in surgery to reduce blood loss and the need for blood transfusion. The WHO panel found that a systematic review of randomized controlled trials showed that in surgical patients tranexamic acid reduced the risk of blood transfusion by 39%.¹³ Another Cochrane review showed that tranexamic acid reduced heavy menstrual bleeding without increase in side-effects.¹⁴

Subsequent to the WHO consultation, a systematic review of tranexamic acid for postpartum bleeding identified three randomised controlled trials involving 461 participants. Tranexamic acid compared with no treatment reduced blood loss by 92 ml (95%CI 76 to 109). However, in all three trials, allocation concealment was either inadequate or unclear.¹⁵

A recent randomized trial found that tranexamic acid compared with placebo reduced post-caesarean section blood loss by 9.1ml and increased the 24 hour haemoglobin level by 0.8g/dl. No complications or side effects were reported in either group.¹⁶

Recommendation (weak):

- Tranexamic acid may be offered as a treatment for PPH if uterotonic options have failed, or trauma is thought to be contributing to the bleeding. Further research is needed.

Recombinant Factor VIIa

There is limited evidence regarding the effectiveness of recombinant factor VIIa for treatment of PPH. In two observational studies, women treated with recombinant factor VIIa after receiving conventional treatments had a trend to reduced risk of death (OR 0.38, 95% CI 0.09-1.60).^{17,18}

A high rate of thrombotic events has been reported in patients receiving off-label use of recombinant factor VIIa.¹⁹

Recommendation:

There is not enough evidence to make any recommendation regarding the use of recombinant FVIIa for the treatment of PPH. It is prohibitively expensive.

Summary

The following sequence of drugs may be used as part of the management of postpartum haemorrhage

Used by midwife:

1. If not recently given as prophylaxis and drip not yet up, oxytocin 10u im
2. Iv infusion oxytocin 20u in 1000ml Ringers lactate or saline at 120-240 mL/hour
3. Ergometrine 0.5mg or syntometrine 1 amp IMI provided no hypertension or cardiac disease [repeat once if needed]

Used by medical officer:

4. In women with hypertension or cardiac disease who continue to bleed with atonic uterus despite oxytocin, the risks versus benefits of ergometrine need to be weighed up. An empirical compromise is to give very small doses im and repeat if needed while monitoring the blood pressure. Dilute 0.5mg ergometrine to 10ml or 0.2mg to 4ml and give 1ml (=0.05mg) im at a time

5. Prostaglandin F2 α 5mg in 10ml saline, inject 1ml into myometrium, checking carefully that not injecting into a blood vessel
6. Cyclokapron 1g slowly intravenously

Misoprostol is much less effective than oxytocin and has dose-related side-effects including hyperpyrexia. Once oxytocin has been used an additional benefit of misoprostol is unlikely.

Misoprostol 400 μ g sublingually or 600 μ g per rectum may be considered in the following circumstances:

1. When no oxytocin or ergometrine is available (eg unplanned home birth)
2. When all other methods have failed

References

1. McDonald S, Abbott JM, Higgins SP. Prophylactic ergometrine-oxytocin versus oxytocin for the third stage of labour. *Cochrane Database of Systematic Reviews*, 2004 (1):CD000201.
2. Cotter A, Ness A, Tolosa J. Prophylactic oxytocin in the third stage of labour. *Cochrane Database of Systematic Reviews*, 2001 (4):CD001808.
3. Orji E, et al. A randomized comparative study of prophylactic oxytocin versus ergometrine in the third stage of labour. *International Journal of Gynaecology and Obstetrics*, 2008, 101(2):129-32.
4. Su LL, Chong YS, Samuel M. Oxytocin agonists for preventing postpartum haemorrhage. *Cochrane Database of Systematic Reviews*, 2007 (3):CD005457
5. Gülmezoglu AM, et al. Prostaglandins for preventing postpartum haemorrhage. *Cochrane Database of Systematic Reviews*, 2007 (3):CD000494.
6. Poeschmann RP, Doesburg WH, Eskes TK. A randomized comparison of oxytocin, sulprostone and placebo in the management of the third stage of labour. *British Journal of Obstetrics and Gynaecology*, 1991, 98(6):528-30.

7. Van Selm M, Kanhai HH, Keirse MJ. Preventing the recurrence of atonic postpartum hemorrhage: a double-blind trial. *Acta Obstetrica Et Gynecologica Scandinavica*, 1995, 74(4):270-4.
8. Walraven G, et al. Misoprostol in the treatment of postpartum haemorrhage in addition to routine management: a placebo randomized controlled trial. *British Journal of Obstetrics and Gynaecology*, 2004, 111(9):1014-7.
9. Hofmeyr GJ, et al. Misoprostol for treating postpartum haemorrhage: a randomized controlled trial [ISRCTN72263357]. *BMC Pregnancy Childbirth*, 2004, 4(1):16.
10. Zuberi NF, et al. Misoprostol in addition to routine treatment of postpartum hemorrhage: a hospital-based randomized-controlled trial in Karachi, Pakistan. *BMC Pregnancy Childbirth*, 2008;8:40.
11. WHO-Gynuity Study , unpublished
12. Winikoff B, Dabash R, Durocher J, et al. Treatment of post-partum haemorrhage with sublingual misoprostol versus oxytocin in women not exposed to oxytocin during labour: a double-blind, randomised, non-inferiority trial. *Lancet* 2010; **375**: 210–16.
13. Henry, DA, et al. Anti-fibrinolytic use for minimising perioperative allogeneic blood transfusion. *Cochrane Database of Systematic Reviews*, 2007 (4): CD001886.
14. Lethaby, A, C Farquhar, and I Cooke. Antifibrinolytics for heavy menstrual bleeding. *Cochrane Database of Systematic Reviews*, 2000 (4): CD000249.
15. Ferrer P, Roberts I, Sydenham E, Blackhall K, Shakur H. Anti-fibrinolytic agents in post partum haemorrhage: a systematic review. *BMC Pregnancy Childbirth* 2009 Jul 15;9:29.
16. Sekhavat L, Tabatabaai A, Dalili M, Farajkhoda T, Tafti AD. Efficacy of tranexamic acid in reducing blood loss after cesarean section. *J Maternal Fetal Neonatal Medicine*. 2009 Jan;22(1):72-5.
17. Ahonen J, Jokela R, Korttila K. An open non-randomized study of recombinant activated factor VII in major postpartum haemorrhage. *Acta Obstetrica Et Gynecologica Scandinavica*, 2007, 51(7):929-936.
18. Hossain N, et al. Use of recombinant activated factor VII for massive postpartum haemorrhage. *Acta Obstetrica Et Gynecologica Scandinavica*, 86(19): 1200-1206.
19. O'Connell KA et al Thromboembolic adverse events after use of recombinant human coagulation factor VIIa. *JAMA: The Journal of the American Medical Association*, 2006, 295(3):293-8.

Chapter six

Surgical Management of Postpartum Haemorrhage

GB. Theron

Management of a retained placenta

A retained placenta is diagnosed if the placenta has not been delivered after 30 minutes. A retained placenta increases the risk of postpartum haemorrhage (PPH) 8 to 12 fold.

A vaginal examination must be done:

If the placenta or part of the placenta is palpable in the vagina or lower segment of the uterus, this confirms that the placenta has separated. By pulling on the umbilical cord with one hand, while pushing the fundus of the uterus upwards with the other hand (i.e. the Brandt-Andrews method of controlled cord traction), the placenta can be delivered.

If the placenta or part of the placenta is not palpable in the vagina or lower segment of the uterus and only the umbilical cord is felt, then the placenta is still in the upper segment of the uterus and a diagnosis of retained placenta must be made.

Commence an intravenous infusion with 20 units of oxytocin and make sure that the uterus is well contracted. This will reduce the risk of postpartum haemorrhage.

Manual removal of the placenta

While waiting for the operating theatre or transferring the patient, check continuously whether the uterus remains well contracted and for excessive vaginal bleeding. The blood pressure and pulse must be measured and recorded every 15 minutes.

If the patient is at a clinic or a level 1 hospital without an operating theatre, she must be transferred to a level 2 or 3 hospital, for manual removal of the placenta under general anaesthesia. Keep the patient 'nil per mouth'.

A vaginal examination must be done just before taking the patient to theatre. If the placenta or part of the placenta is palpable in the vagina or lower segment of the uterus, this confirms that the placenta has separated. The placenta can be delivered with controlled cord traction.

A spinal anaesthetic could be used, provided the patient is well resuscitated, has a normal blood pressure and pulse rate and is not bleeding actively. Gloves with long sleeves should preferably be used. The intravenous infusion with 20 units of oxytocin must run rapidly during the procedure.

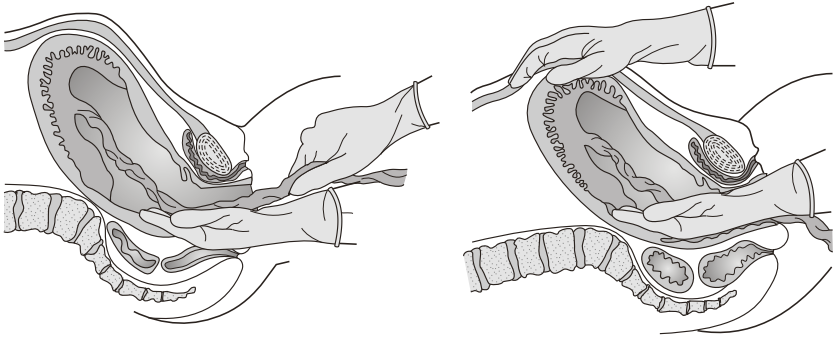
Step 1

The procedure is done with the patient in the Lithotomy position.
Empty the bladder.

Step 2 (Figure 2)

A hand is inserted in to the uterus and a placental edge identified in the uterus. The dorsum of the hand is turned against the uterine wall and the placenta peeled off the uterine wall. While inserting a hand in the uterus and manipulating inside the uterus the other hand is placed on the abdominal wall to stabilize the uterus. Once the placenta is completely removed the placenta is grabbed and removed from the uterus.

Chapter 6. Figure 2. Technique for manual removal of placenta.



(Adapted from: Van den Broek N. Life Saving Skills Manual. Essential obstetric and newborn care. Module 5, p33. RCOG press 2007)

Step 3

Check whether the placenta has been completely removed. If cotyledons or a piece of placental tissue is missing, the uterus must again be explored manually. If the missing placental tissue cannot be found the uterus must be emptied using the large ovum forceps followed by light curettage with the biggest available sharp curette (the Baum's curette). Trans-abdominal ultrasound in theatre is of value to confirm that the uterus is empty.

Step 4

Rub the uterus up thoroughly and make sure the uterus remain well contracted. Insert an Auvard or Sims speculum and take a few minutes to observe whether a more than normal amount of bleeding is present before taking down the patients legs. Use this opportunity to check for vaginal and cervical tears.

Thesamesteps will berequired for a morbidly adherent placenta. All patients that required a manual removal of the placenta must be observed continuously for PPH by appropriately trained staff for at least 4 hours after returning from theatre. During this time continue with an intravenous infusion with 20 units of oxytocin. A five day course of oral broad spectrum antibiotics is indicated following manual removal of placenta.

While waiting for the operating theatre or transferring the patient, check frequently whether the uterus remains well contracted and for excessive vaginal bleeding.

Umbilical vein injection of oxytocin (Pipingas technique) to facilitate removal of retained placenta.

This may be attempted if the patient is haemodynamically stable and there is delay in accessing theatre. Cut the clamped umbilical cord about 5 cm outside the introitus. Insert a number 10 infant nasogastric feeding tube through the umbilical vein (the biggest of the three vessels seen on the cut surface of the umbilicus). When resistance is encountered the tube is with drawn 5 cm. Inject a mixture of 50 units of oxytocin and 30 ml of sterile water through the feeding tube. The tube can be removed and the cord again clamped. Further attempts at delivery of the placenta with controlled cord traction can be made. If the placenta cannot be delivered a manual removal of the placenta in theatre must be done.

There is no consensus on the recommended dose of oxytocin with many practitioners using smaller doses such as 10-30 iu oxytocin.

(NB: where as initial studies suggested efficacy from this intervention, the RELEASE study, published in 2010, a randomised controlled trial comparing intra-umbilical vein injection of oxytocin with placebo showed no advantage).

Suturing of perineal, vaginal or cervical tears

Following the third stage of labour the perineum and lower third of the vagina should routinely be inspected by the person that conducted the delivery by gently splaying the vagina open using the fingers of both hands. Any tears that cause bleeding or that involve the muscle layers below the skin or vaginal epithelium need to be sutured.

Any patient having more than normal vaginal bleeding must be examined for tears higher up in the vagina and cervical tears. This can be done in the same room where the delivery was conducted. To do this will require:

- A good light source
- Lithotomy poles
- A cervical suturing pack that includes a vaginal retractor, Sims speculum and at least 2 swab holders
- An assistant

Step 1

The procedure is done with the patient in the Lithotomy position. Using the Sims speculum and vaginal retractor the upper two thirds of the vagina is carefully inspected for tears.

Step 2

The Sims speculum is now inserted posterior into the vagina and the vaginal retractor is used to elevate the anterior vaginal wall to enable visualisation of the upper half of the vagina and the cervix. The assistant helps to hold the specula in place. Vaginal tears that

involve the muscle layers below the vaginal epithelium need to be sutured.

Step 3

Subsequently the cervix must be inspected attaching one swab holder to the cervix at 12 and the other one at 3 o'clock. The portion between the two swab holders is inspected for a cervical tear. The swab holder at 12 o'clock is now released and attached to the cervix at 6 o'clock. Again the portion between the two swab holders is inspected for a cervical tear. Continue step by step until the whole circumference of the cervix has been inspected.

Step 4

A postpartum cervix will have numerous superficial tears. A cervical tear will stretch from the epithelium into the deeper muscular layers of the cervix. Once a cervical tear has been identified a swab holder is placed on each side of the tear. Downward traction is used to see if the top part (apex) of the tear can be seen. If the apex is seen proceed directly with suturing. Continuous sutures with chromic O in a round bodied needle are used.

Step 5

If the apex could not be seen, the patient is taken to theatre. An experienced person is called to theatre. The vaginal procedure is repeated in theatre. If the apex of the tear cannot be identified, proceed with a laparotomy. The patient is draped in the lithotomy position with the legs angled slightly downwards at about 30 degrees (Lloyd-Davis position). In some cases combined abdominal followed by vaginal suturing may be possible. In most cases a total abdominal hysterectomy will be necessary

Continuing oozing of blood from multiple vaginal tears following suturing could be managed by gentle packing of the

vagina with a vaginal plug, following careful ruling out bleeding from the uterus. If the tampon becomes soaked with blood, it must be removed and the vagina again inspected. Once convinced that the bleeding is the result of oozing from repaired vaginal tears and friable vaginal tissue, balloon tamponade as explained below can be used, placing the balloon in the vagina. A Foley's catheter must be inserted following plugging or tamponade of the vagina.

Any patient having more than normal vaginal bleeding must be examined for tears higher up in the vagina and cervical tears.

Balloon tamponade

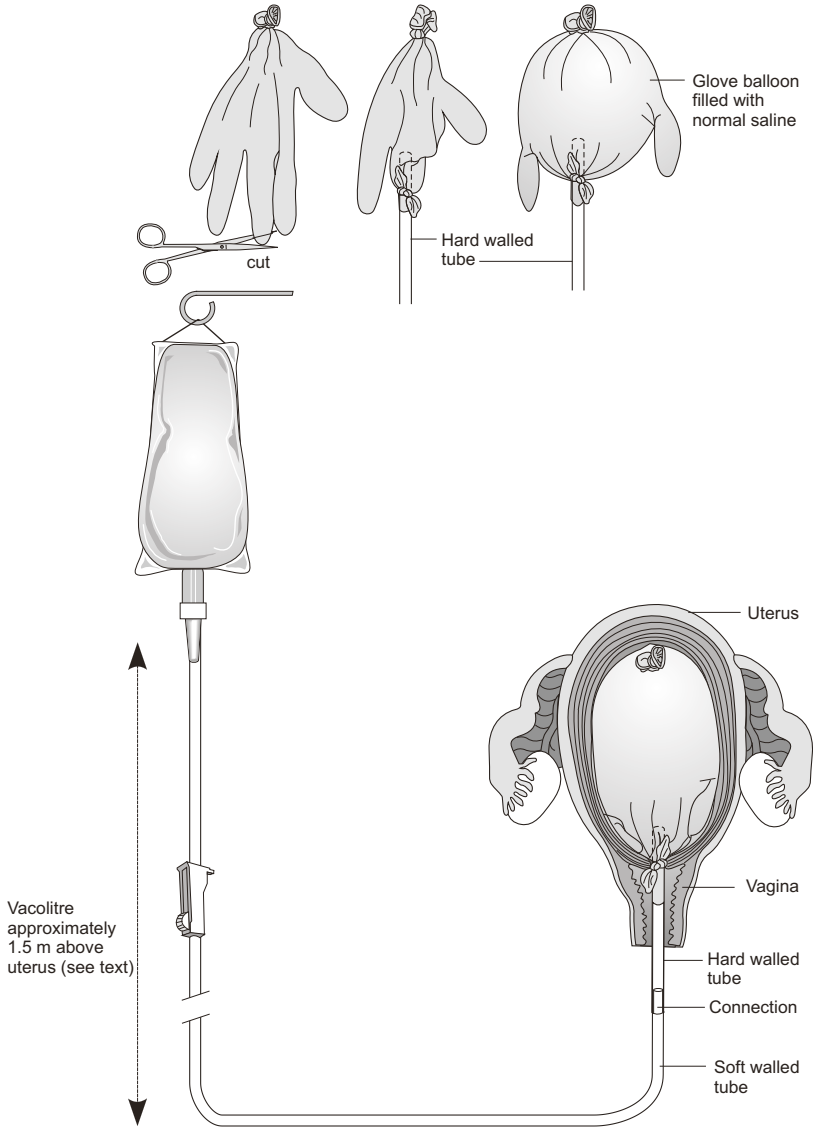
This method should be attempted once medical treatment for PPH due at an atonic uterus has failed (Chapter 5). This method should also be used with PPH following complete removal of a placenta praevia or partially removing a morbidly adherent placenta. A laparotomy and subtotal hysterectomy should be the procedure of choice for patients of higher parity and with a person available with the skills to perform the procedure. Cooke, Bakri or Rusch catheters can be used if available for uterine tamponade, but are expensive and not generally available. Balloon tamponade for the uterus can be done less expensively by using a condom catheter system or a surgical glove catheter balloon system. The latter is preferred by the author and demonstrated in Figure 3.

Preparation of a glove-balloon tamponade system

Requirements

- A sterile plastic tube with a large bore (FG 16 nasogastric tube)
- Sterile latex gloves.
- A drip set
- A liter of normal saline
- A sterile towel
- Scissors

Ch 6 Figure 3. Glove Balloon Uterine Tamponade system



(The method combines the thoughts of JG Hofmeyr, C Cluver, DR Hall and the author)

The preparation is done on the sterile towel with the operator wearing sterile gloves. To create the glove-balloon cut open the middle finger of a loose sterile latex glove close to the tip. The tip of the plastic catheter is inserted through the hole on the finger for about 8 cm. Secure the glove to the catheter by tying the ring and index finger sections over the catheter. Following the first knot the fingers must be stretched considerably and several more knots tied to ensure a water tight closure. The sleeve of the glove must also be knotted tightly.

Air is removed from the glove-balloon, the administration set filled with saline and inserted into the wide end of the catheter. The newly created glove-balloon is now inserted through the cervix into the uterus and the tap of the administration set opened. Remove your fingers from the uterus once the glove has filled up with saline.

The blood pressure is determined. The systolic pressure multiplied by 13[#] is used to determine the height of the bag of saline above the supine patient. If the systolic blood pressure is 120 mmHg the height of the bag should be 1.56 meter above the patient. If a calibrated drip stand is not available, the bag is secured 1.5 meter above the patient by judging the height. The tap of the administration set is left completely open. The pressure of the column of water will be sufficient to stop bleeding from the placental bed. Once the uterus starts contracting the water will push back into the saline bag. The balloon will not prevent uterine contraction and retraction.

The specific gravity of mercury is 13.

The systolic pressure multiplied by 13 is used to determine the height of the bag of saline above the supine patient. The tap of the administration set is left completely open. The pressure of the column of water will be sufficient to stop bleeding from the placental bed.

Further management will depend on whether:

The PPH has reduced considerably – the balloon is kept in place for 8 hours and the patient closely observed for bleeding and signs of shock. If the balloon is deflated after 8 hours and bleeding resumes, the balloon is inflated again and kept in the uterus for a maximum of 24 hours. If a balloon is required for 8 hours a single prophylactic dose of antibiotics is sufficient and if 24 hours the patient should receive a 5 days course of antibiotics.

If the PPH has NOT reduced considerably – the patient needs to be resuscitated and taken to theatre for a laparotomy. The further management will be as described in the next section.

The further management of postpartum haemorrhage due to an atonic uterus if the initial management fails

If the uterus continues to relax, the patient needs to be taken to theatre. Four units of blood and a person with the skills to do an emergency hysterectomy need to be available if required. While waiting for theatre bi-manual compression of the uterus should be applied to reduce further blood loss.

Laparotomy

In theatre a vaginal examination under general anaesthetic is done as explained above. If the bleeding persists following examination for tears and ensuring that the uterus is empty, a laparotomy (midline incision) is required.

If the patient has completed her family or is of high parity, proceed directly with a total or subtotal abdominal hysterectomy.

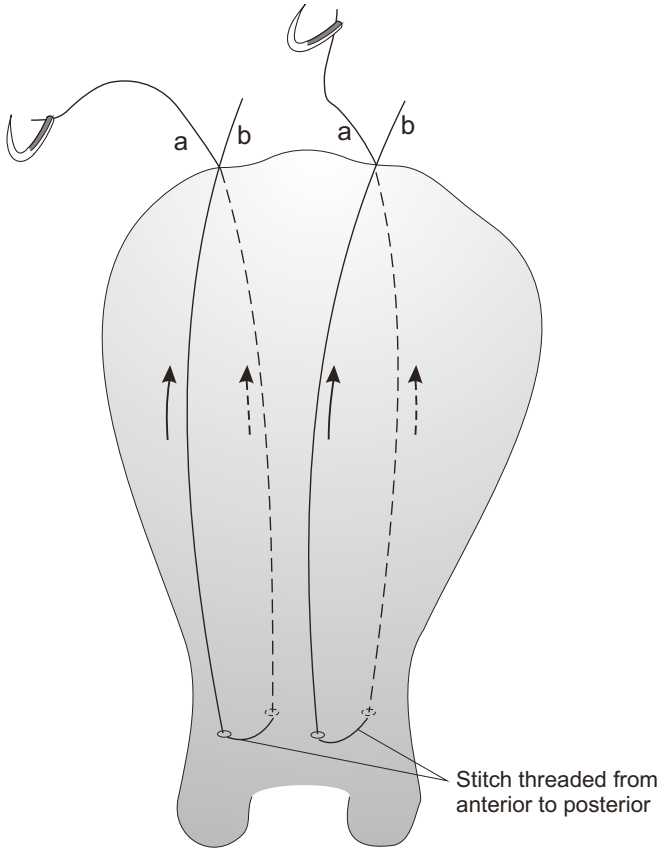
If the patient is primiparous or of low parity, the following steps could be followed:

The patient is draped in the Lloyd-Davis position. This will allow immediate inspection to assess the result of intra-abdominal measures to reduce blood loss.

Uterine compression sutures

If bimanual compression controls the PPH, Hayman uterine compression sutures are inserted (Figure 4). The bladder peritoneum is opened. A chromic 1 suture on a round bodied needle is passed through the lower segment 2–3 cm from the lateral border of the uterus. Both sutures are first inserted and then tied as tight as possible on top for the uterus 3–4 cm medial to the uterine cornu. An assistant must bimanually compress the uterus to be as small as possible while the sutures are tied.

Ch 6. Figure 4. Vertical uterine compression sutures (no uterine incision present).

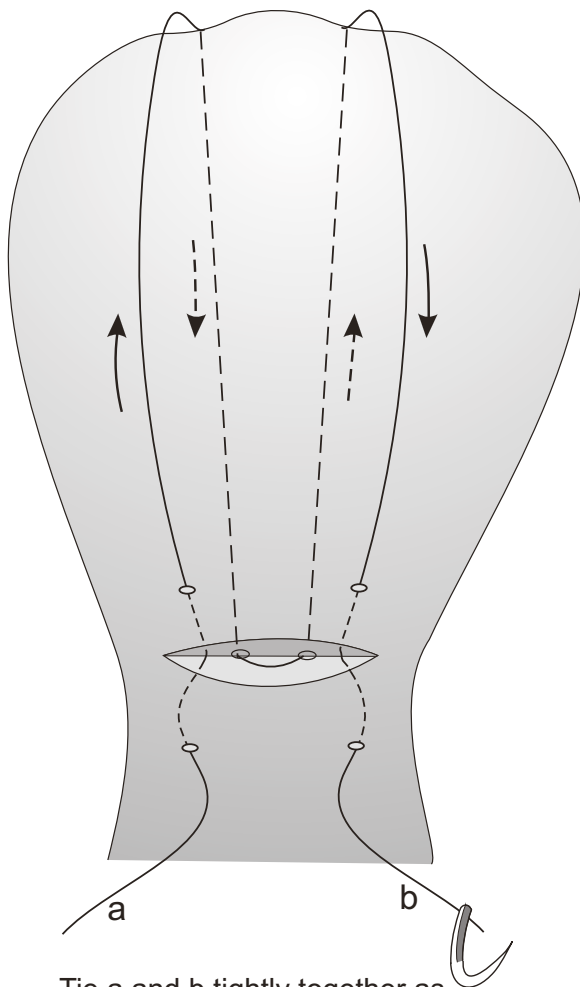


Tie a and b tightly together as assistant compresses uterus

(Adapted from: A textbook of postpartum haemorrhage. Ed B Lynch C et al. Ch 21, p181. Sapiens publishing 2006)

If the patient has a persistent atonic uterus at caesarean section, a B-Lynch suture can be inserted as illustrated (Figure 5). Bimanual compression by the assistant should also be applied when the knot is tied.

Ch 6, Figure 5. B Lynch uterine compression suture.



Tie a and b tightly together as assistant compresses uterus

(Adapted from: A textbook of postpartum haemorrhage. Ed B Lynch C et al. Ch 21, p181. Sapiens publishing 2006)

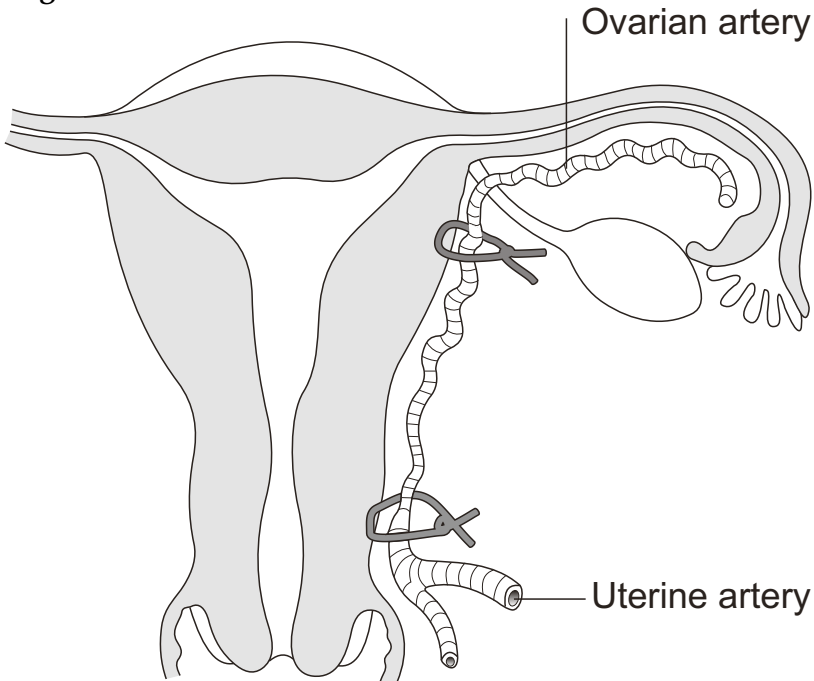
Uterine compression sutures plus tamponade

If the bleeding persists balloon tamponade of the uterus should be attempted following compression or B-Lynch sutures. Counter pressure from inside the uterus will often arrest the PPH.

Uterine vessel ligation (Figure 6)

If the PPH has not been arrested systematic devascularisation of the uterus is required. A Chromic 1 catgut suture on a round bodied needle can be used.

Ch 6, Figure 6. Technique of uterine and ovarian vessel ligation.



(Adapted from : A textbook of postpartum haemorrhage. Ed B Lynch C et al. Ch 21, p180. Sapiens publishing 2006)

First, ligate the uterine artery. A suture is inserted through full thickness myometrium just above the deflection of the broad ligament on the pelvic floor (Figure 6). This will be at the level of the internal os of the cervix. The anterior entry and posterior exit point of the needle will be 2 cm medial to the lateral insertion of the broad ligament. Pass the needle back from posterior to anterior through an avascular portion of the broad ligament and tie a tight knot. If bleeding persists a similar suture is inserted on the other side of the uterus.

If bleeding persists the anastomosis of the ovarian and uterine artery is ligated with a similar suture inserted just below the level of the insertion of the ovarian ligament to the uterus and below the uterine tube (Figure 6). Both anastomoses need to be ligated with persistent bleeding.

If bleeding persists proceed with a hysterectomy as a life saving procedure. A less experienced surgeon should perform a subtotal hysterectomy, by amputating the uterus above the cervix following the ligation of the uterine arteries.

As a general principle the decision to do a hysterectomy must not be postponed too long. Continued blood loss requiring the transfusion of 5 or more units of blood compromise blood clotting and increase the risk of a maternal death. Oozing of blood from raw surface areas following a hysterectomy could be contained by packing the true pelvis tightly with abdominal swabs. The swabs must be removed after 48 hours, giving enough time to correct blood clotting defects.

Level of care

Uterine compression sutures, balloon tamponade, and uterine artery ligations are all procedures that need to be learnt by any doctor trained to perform caesarean section and are procedures that can be done in a level one hospital with emergency blood available. The skill to perform subtotal hysterectomy may not be available at this level, but should be available at all level two and level three hospitals which, in the ideal

situation, are the more appropriate level of care to manage patients with massive haemorrhage.

Other measures

Internal iliac ligation could be considered if fertility needs to be preserved and a hysterectomy is indicated. However, an experienced person is required and a success rate of 50% needs to be kept in mind. Some tertiary institutions may have the radiological equipment and skills to perform uterine artery embolisation. This will be the procedure of choice if available, but requires a well resuscitated patient. Keep in mind that internal iliac ligation rules out the possibility of embolisation.

Management of uterine inversion

This is a serious complication which causes severe postpartum haemorrhage and shock. The uterus turns inside out during the delivery of the placenta

Diagnosis

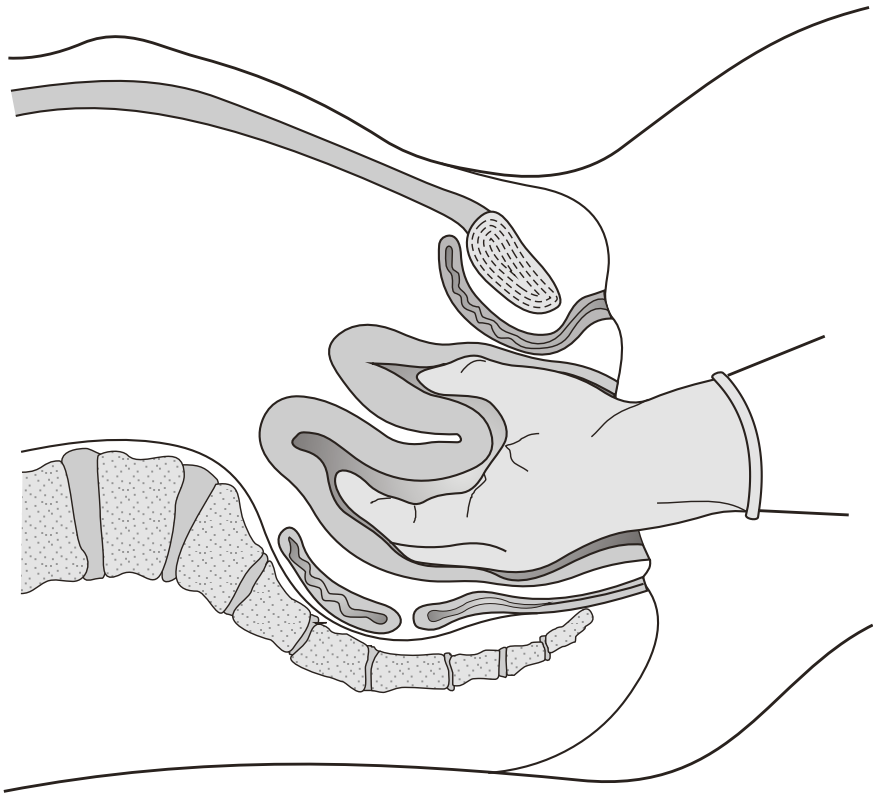
The diagnosis is usually made when the placenta is delivered pulling the uterine fundus with it, to which it is still attached. Occasionally it is diagnosed after placental removal as a pink smooth ball like structure (the inside wall of the uterine cavity) protruding through the introitus. Take care to distinguish the inverted uterus from cervical prolapse where you can see a reddish blue cervix with an os and the patient is not shocked. Inversion can be partial and only felt on vaginal examination when a firm ball like structure can be felt in the vagina and can be confused with a prolapsed cervix or uterine fibroid. On abdominal examination the uterus will not palpable.

Management

Resuscitation: The patient is shocked out of proportion to the amount of blood loss and active resuscitation should commence immediately and continued during the attempts at correcting the inversion.

In labour ward: **Do not remove placenta if still attached.** Replace uterus immediately using whole of right hand. Hold fundus in ball of hand and fingers and thumbs in the groove where the inversion has occurred. With pressure from ball of hand on fundus and fingers 'peeling it in' in the groove, gently replace the uterus into the abdomen. (Figure 7)

Ch 6, Figure 7. Technique for correcting uterine inversion



(Adapted from: : Van den Broek N. *Life Saving Skills Manual. Essential obstetric and newborn care. Module 5, p35. RCOG press 2007*)

Inversion can be partial and only felt on vaginal examination when a firm ball like structure can be felt in the vagina. On abdominal examination the uterus will not palpable.

O' Sullivan's hydrostatic method. This is an alternative method for correcting uterine inversion. Run warm saline through a catheter in to the vagina using a silicone vacuum cup or an assistant's fist as a 'plug' to prevent leakage backwards.

If above attempts fails: Take patient to theatre as an emergency. Replacement of the uterus, under general anaesthetic, is now required.

1. In theatre: Re-attempt vaginal placement manually and with the O'Sullivan's method. However, if uterine inversion has been there for several hours these attempts may fail and a laparotomy must be done. A constriction ring will be seen through which the uterus has inverted downwards. Try to 'peel it back' with gentle traction using Allis tissue forceps placed on the round ligaments of the uterus just inside the dimple where the fundus disappears.
2. If this fails, cut the constriction ring (about a 0.5 cm incision) posteriorly. The uterus can then be pulled up ('popped backwards'). The uterus will appear to have a classical incision on the posterior surface that need to be repaired.

Remove placenta only after uterus is replaced. Following the procedure an oxytocin infusion to keep the uterus well contracted and antibiotics are required.

References

1. B.Lynch C et al. Chs 21 & 31 in: *A textbook of postpartum haemorrhage. Chapters 21 and 31*. Sapiens publishing 2006
2. Van der Broek N. Module 5 in: *Life Savings Skills Manual. Essential obstetric and newborn care*. RCOG press 2007
3. Prevention and Management of Postpartum Haemorrhage. *RCOG Green-top Guideline no 52*. May 2009
4. *WHO guidelines for the management of postpartum haemorrhage and retained placenta*. World health Organisation, Geneva 2009
5. Steer P. The surgical approach to postpartum haemorrhage. *The Obstetrician & Gynaecologist* 2009;11:231-238
6. Release study. *Lancet* 2010;374:141-147

Chapter seven

The Midwife's Approach To PPH

N. Mbombo

The focus will be on primary PPH: it occurs during the third stage of labour or within 24hours of delivery. In some instances, there is little or no visible blood loss, hence it is difficult to limit the definition of PPH to blood loss.

A guide in recognising PPH includes:

Bleeding with

- Constant trickling of blood
- Bleeding more than 500 ml
- Pad soaked in less than 5minutes.
- A heavy constant lochia that persists for a significant length of time after delivery

The midwife is often the first and/or only person present when the woman has a PPH.. It is crucial that s/he is competent and skilled in basic life support. S/he must be aware of the risk factors for PPH and the immediate steps to be taken for controlling blood loss. They are central to the effective prevention, recognition and treatment of PPH.

The management is based on an understanding of the pathophysiology of hypovolemic shock, and of the normal physiological processes of the third stage of labour, namely the blood coagulation process and the constricting effect of uterine wall muscle fibres on blood vessels.

- **Blood Coagulation process**

The failure of blood to clot can be caused by many factors such as coagulopathy from pre-eclampsia/ eclampsia, and long standing intra-uterine death,

- **The constricting effect of uterine wall muscle fibres on blood vessels**

This can be impaired by : full bladder, overstretched uterus due to multiple pregnancy, polyhydramnios, prolonged labour, anaemia, inappropriate use of oxytocic drugs, and partial separation of placenta due to mismanagement of third stage by health workers.

This knowledge should be used in conjunction with an understanding of women's social, cultural and psychological well-being.

The **BASIC PRINCIPLES** to apply in the management of PPH:

1. Call for medical help
2. Resuscitate the mother
3. Stop the bleeding
4. Provide basic nursing care

1. Call for Assistance

Without leaving the patient, call for assistance. If bleeding is brought under control before the medical assistance arrives, do not stop the doctor from coming, because the mother's condition can deteriorate very rapidly and her/his assistance can be required urgently. A single individual cannot effectively manage an emergency situation. Help must be urgently requested prior to commencing any treatment.

2. Resuscitate the Mother

The woman should not to be moved prior to resuscitation. ABC Logarithm applies.

Airway & Breathing

- Hypoxia can be more dangerous than hypovolemia. Airway and breathing should be brought under control first.
- Ensure patent airway and adequate breathing. Administer face mask oxygen therapy.
- If a woman does not respond when spoken to, she may have cerebral hypoxia and cannot manage on her own.

Circulation

- PPH is an emergency; midwives can administer resuscitation fluids without a prescription or written order first. Follow the institutional protocol.
- Every 1 ml of blood lost needs to be replaced with 3 ml of fluid until blood is available.
- Commence an intravenous infusion with 2 IV lines; ensure that fluid is delivered as quickly as possible, with the widest bore cannula available.
- Insert a urinary catheter to monitor urine output.

3. Stop the Bleeding

The initial emergency management is done regardless whether the placenta is retained or delivered.

Step 1: Rub the Uterus

The aim is to get a contraction. Make sure the bladder is empty.

- Place palmar side of fingers abdominally on top of fundus at 45 degrees.
- Massage the fundus smoothly with no pressure, using circular motion. When there is contraction, the hand is held.
- Avoid repeatedly rubbing up the uterus. Rub up and check for the contraction

Step 2: Give Oxytocic Drugs

- Give IV infusion of 20 units oxytocin in one litre of IV fluids.
- Depending on the situation, a baby may also be put to the breast to enhance physiological secretion of oxytocin from pituitary gland.

Step 3: Empty The Uterus

The problems to address related to placenta include:

- failure of the placenta to separate,
- partial separation of the placenta with resultant bleeding,
- separation with failure to deliver
- delivery with retained fragments of the placenta or membranes and/or
- excessive bleeding occurring during or immediately after the placenta is delivered.

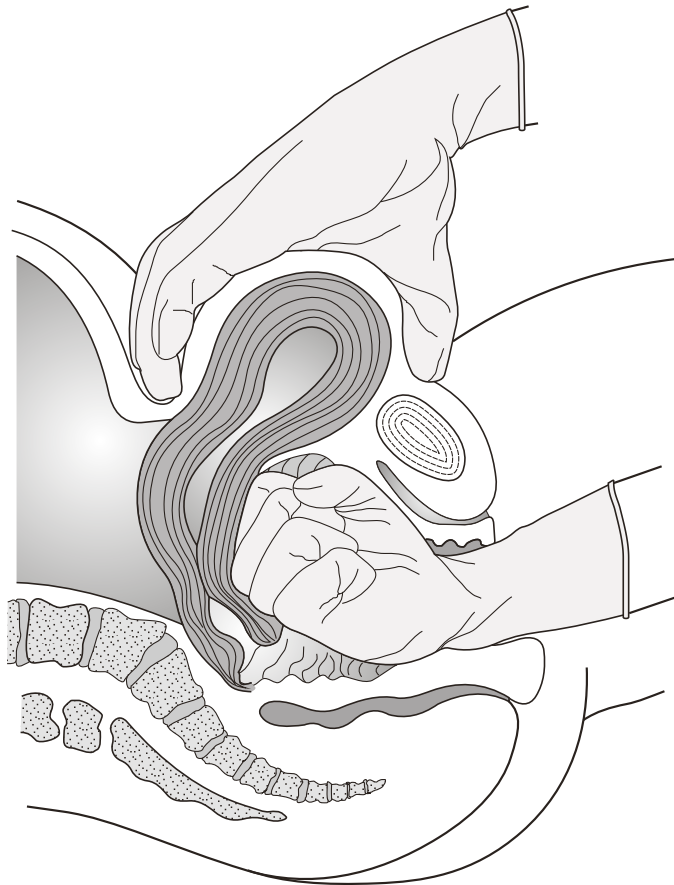
- If the **placenta is undelivered**, it should be delivered. If uterus has contracted, controlled cord traction can be attempted. A manual removal under anaesthesia by the doctor is recommended if controlled cord traction fails.
- If the **placenta has delivered**, apply light fundal pressure to expel clots. Re-examine the placenta for completeness.
- If there appears to be a placental or **membranous fragment missing**, inspect the vaginal canal and cervical os for evidence of trailing membranes, or other tissue or tears.

Try to tease them out carefully by gentle but firm massage of the uterus with the abdominal hand, to encourage contraction of the uterus.

- It is quite possible to have PPH immediately after the placenta and membranes are delivered. This is as a result of the failure of the myometrium to contract at the placental site.
- If there are perineal and vaginal **tears**:
- Determine the degree and extent
 - Apply pressure over the tear with a sterile pad and put legs together, but not crossing the ankles.
 - Check after 5 minutes, if bleeding persists, repair the tear
- Repair episiotomy
 - If bleeding persists from a poorly contracted uterus **bimanual compression** of the uterus is applied.
 - With the right elbow resting on the bed insert fingers of the right hand into the vagina like a cone and then make them into a fist when inside the vagina.
 - Place the fist of the right hand into the anterior vaginal fornix,
 - Place the left hand abdominally behind the uterus, the fingers pointing towards the cervix.

- Bring the uterus forward, compressing between the palm of left hand and the right fist in the vagina.
- This process should take few seconds. You should feel the uterus contract under your hands. Hold it in place firmly without doing further manipulation.

Ch 7, Figure 8. Technique of Bimanual Uterine Compression.



(Adapted from: A textbook of postpartum haemorrhage. Ed B Lynch C et al. Ch 31, p288. Sapiens publishing 2006)

4. Basic Nursing Care

- One-to-one care and close monitoring is essential.
- Check and record Vital Signs: Blood Pressure & Pulse every 15 minutes for the first hour, hourly for the next 4 hours, then 4 hourly. Temperature hourly then 4 hourly.
- Uterus to be checked quarter-hourly in first hour, hourly for the next 4 hours. Lochia is checked at same time
- Keep the woman warm to avoid hypothermia which is a consequence of hypovolemic shock. All wet linen should be removed and the patient must be made comfortable all the time
- Monitor and record all fluid intake and output (urine output and blood loss) and report discrepancies.
- Haemoglobin test is done, and Doctor is notified if low
- Midwives have a professional duty to document accurately and keep records. Record exact amount, dose and units of fluids and medications given. Print name and qualification alongside the signature.
- Constant communication with the patient, informing her on each procedure undertaken (when conscious). Never leave the patient alone, there should be someone to provide reassurance to the patient

Scope of Practice of a Midwife/ Advanced Midwife in the Management Of PPH

The scope of practice of a midwife and advanced midwife in relation to drugs and procedures to be performed in the management of PPH is as follows (NB: all South African Nursing Council regulations are currently being reviewed in order to be more responsive to current Midwifery practice challenges. Also note that the scope is very wide and maybe interpreted and applied in different contexts).

1. Procedures

Government Notice NO.2488, 26 Oct 1990. Regulations Relating to the Conditions under which Registered Midwives may Carry On Their Profession

7.(3) A registered midwife shall, in a case of postpartum hemorrhage when a medical practitioner is not available or pending the arrival of a medical practitioner, administer not more than 10 units of oxytocin (no PG F2 alpha) at a time by intramuscular injection, but the administration may be repeated at intervals if and when necessary.

10 (3) Where a medical practitioner is called in or consulted as contemplated in sub-regulations (1) and (2), a registered midwife shall- remain with the patient and deal with the emergency to the best of his ability until the medical practitioner arrives. This includes manual removal of placenta when the placenta is at the level of the os and bimanual compression. These could be performed until Doctor is available

The Nursing Act consolidates this further. The scope shall entail: "preparation for and assistance with operative (this includes any related operative procedures), diagnostic and therapeutic acts for the mother and child;

2 (b) the execution of a programme of treatment or medication prescribed by a registered person;

3(e) the prevention of complications relating to pregnancy, labour and the puerperium including:

(ii) the suturing of first and second degree tears or an episiotomy;

2. Medicine

Regulations Relating to the Keeping, Supply, Administering or Prescribing of Medicines by Registered Nurses Gov Notice R.2418, NOV 1984.

An authorised nurse (midwife) may, subject to the provisions of section 38A and the conditions listed in regulation 3, keep the following and supply, administer or prescribe it for the use of a person:

- (a) An unscheduled medicine;
- (b) any medicine or substance listed in Schedule 1, Schedule 2, Schedule 3 or Schedule 4 to the Medicines Control Act.

(The above includes ergometrine 0,5mg imi OR Syntometrine 1 ampoule im, OR Oxytocin 10 units IV according to the institutional protocol)

Prevention Of PPH

Midwives have a major role to play in all the preventive measures outlined in chapter 2: prevention and treatment of anaemia antenatally, at risk assessment for correct place of delivery, prevention and timely referral with prolonged labour, active management of the third stage of labour, and vigilant post delivery / post CS monitoring to enable earlier detection of PPH.

Summary

This mnemonic has been customised for SA, adapted from UK midwives on how to manage haemorrhage. It is based on ALSO (Advanced Life Support in Obstetrics) course.

H – Help!

A – Airway

E – Empty bladder

M – Maintain circulation, Measure Vital signs

O – Oxytocic drugs

R – Rub up uterus/ put baby to breast

R – Remove placenta, membranes, Suture tears

H – Holistic & Human Rights approach in the context of women's social, cultural and psychological well-being.

A – Abdominal compression

G – General anaesthetic preparation for theatre (manual removal placenta/ hysterectomy)

E – Ensure notes are complete

Chapter eight

The Role of Management in Managing Haemorrhage

M.Schoon

The organizational management is responsible to ensure that systems are in place to ensure that practitioners can manage patients with acute haemorrhage appropriately. Such functions are usually delegated down to the management structures of the maternity section with support from the institutional supply chain management. Key role players are the lead nurse in the maternity section, the lead clinician in the maternity section, the institutional clinical/ nursing manager and the executive officer of the institution.

Table 1. Key role players in management

Lead clinician	Maternity ward manager	Clinical manager	Hospital executive
Monitor clinical output	Monitor routine checklists	Monitor outcome dashboard	Accountability
Morbidity/ mortality meeting	Evaluate ward stock levels	Clinical safety / governance	Ensure resource allocation
investigate adverse events	Control staff supply	Risk management	Governance
Implement clinical protocols	Quality improvement plans	Systems policy adjustments	
Maintain skills levels	Maintain skills levels	Bottleneck manipulation	

Sustainable blood supply and safe use of blood

Blood is an expensive, dangerous but life saving medication. It is the responsibility of the institutional executive to ensure a sustainable supply. Major centers have an arrangement with a blood bank, but smaller institutions must ensure a system in place to manage a continuous supply of emergency blood. Irrespective of the supply source the following applies:

1. Ordering of blood / blood products- this is the responsibility of the attending clinician who also needs to obtain informed consent for transfusion.
2. Freeze dried plasma (FDP) or bioplasma should be ward stock in a labour wards. It is the responsibility of the professional in charge of a unit to ensure that the ward stock levels are maintained and that any used items be promptly replaced from the pharmacy.
3. Controls and checks for blood transfusion
 - a. Control and document receipt of the blood/ blood product and any serial numbers.
 - b. Informed consent by the patient or mandate for the transfusion

All institutions doing caesarean sections must have blood on-site. Whenever a blood bank distribution depot is not on-site or blood not available within 15-20 minutes, the institution should have emergency blood available on-site. The following elements must be in place for institutions with emergency blood:

1. A dedicated emergency blood refrigerator compliant with blood safety standards
 - a. Maintain temperatures between 1-10 C with an audiovisual alarm.
 - b. Refrigerator dedicated for only blood storage and Rh-typing kit
 - c. Connected to emergency power supply
2. A service level agreement with blood bank for replacing blood.
3. A dedicated professional, preferably the person in charge of a maternity ward or theatre where the emergency blood is kept with the following responsibilities to manage emergency blood.
 - a. Monitoring and replacement of emergency blood prior to the expiratory date.
 - b. Check and record refrigerator temperature twice daily.
 - c. Immediately replace units used.
 - d. Ensure that all staff is appropriately trained in use of emergency blood.
 - e. Manage and control all requests for blood transfusion.
 - f. Keep record of any transfusion reactions
 - g. Store empty blood packs in the refrigerator for 48 hours after the transfusion.

Prescripts and requests for use of emergency blood are exactly the same as for units where a blood bank is on-site. The units with emergency blood will have an "Emergency stock blood" form that has to be completed before blood is issued to the patient.

RESPONSIBILITIES OF INSTITUTIONS ISSUING EMERGENCY BLOOD

- Check units for expiry, haemolysis, clots, excessive air or other defects before transfusion
- Carry out Rh typing tests on the patient before removing emergency blood from refrigerator
- Use Rh pos blood for Rh Pos patients and Rh negative for Rh negative patients or when Rh typing result is in doubt
- Check that the seals of the emergency stock blood are intact. Do not transfuse if seals have been previously broken
- Record the patient's details and Rh typing results on the emergency stock blood form
- Do not add any drugs or medication to the emergency blood
- Warm blood on approved blood warming equipment
- Discard empty blood bags after 48 hours according hospital policy on discarding medical waste

Sustainable drug and consumables supply

It is a multi-professional team effort to ensure that there is a continuous supply of drugs and consumables, especially in the management of acute emergencies. For PPH, intravenous fluids, infusion sets, urinary catheters and uterotonic agents must always be available. Ward stock items must be controlled daily by the lead nurse/midwife in charge of the unit. For all drugs there must be minimum and maximum ward stock levels and whenever a drug moves to below the minimum level, new stock should be ordered from the pharmacy or medical stores.

Layers of responsibility for drugs and consumables are:

- Nursing management in units (stock control at ward level and placing orders)
- Pharmacists to ensure proactive procurement of pharmaceutical stock.
- Hospital supply chain management who has to ensure proactive procurement of consumables.

The biggest problem at lower level is timely placement of appropriate orders. The orders should contain the correct ICN number and it is

useful to ensure that the ICN numbers are available within the unit for all stock items. The lead nurse is responsible to have checklists in place to monitor ward stock levels. If stock is not replaced immediately, the nurse manager should liaise with pharmacy or the medical stores to enquire about the outstanding stock.

Clinical staff should identify the critical supplies that should never be out of stock. Should a *low stock situation* arise, the clinical manager must be informed to assist removing bottlenecks to fast tract procurement or authorize that items are procured urgently, or through alternative arrangements.

Access to transport

Transport is an important frustration to clinical staff and often an important factor in morbidity and mortality. Although there are provincial differences the following principles need to apply:

1. Women in labour or who have an obstetric hemorrhage are always regarded as a priority 1 case and the emergency transport officer need to be informed accordingly
2. Should a problem occur in dispatching of an ambulance, or should there be a delay in the ambulance arriving at the pick-up point, the attending physician or delegated health professional should contact the dispatching supervisor.
3. If the problem persists, contact the clinical manager, or in case of a primary health care facility, the manager of the district hospital to assist in improving transport.
4. Any delay in patient transport must be reported as an incident using the provincial incident reporting system.
5. Referral pathways must be displayed in labour wards with contact telephone numbers

Patient safety

Compromise to patient safety is usually due to systemic issues related to staffing levels, skills levels or administrative failures. Although it is expected from the clinical staff at grass roots level to ensure delivery of safe clinical practice, the accountability resides with the hospitals executive and/or provincial executive. The heads of clinical services in hospitals, or the district clinical manager in case of primary health care facilities, have the accountability to ensure

1. That there are functional service units to deliver the defined service package. (For example, there must be a functional labour ward service with a minimum dedicated staff, and 24 hour operating theatres must be functional in all hospitals which offer maternity care.)
2. That there are adequate staffing to provide the required service
3. Staff are adequately skilled to provide the required service

In terms of the hospitals act and the national health act, services must be provided within available resources but no emergency may be refused access to care. The clinical managers and CEOs of institutions have to balance the utilization of available resources to allow for adequate care.

Mechanisms to ensure patient safety are summarized

with layers of responsibility in table 2. The 'Unit manager' refers to the lead medical and nursing practitioners in charge of units irrespective of the rank and this will vary between levels of care. The 'Clinical manager' is the medical practitioner appointed as the head of clinical services or the nursing manager where applicable. The 'Executive officer' is the accountable officer of the institution.

Table 2. Allocation of responsibility for patient safety

Mechanism	Executing level	Responsibility	Audit/ monitoring	Accountability
Standardised protocols	Health practitioner	Unit managers	Quality compliance	Clinical manager
Morbidity & mortality meetings	Unit manager	Clinical manager	Quality compliance	Executive officer
Adverse events/ incidents	Health professional reporting	Clinical manager	Patient safety & clinical governance committee	Executive officer
Skills maintenance	Health care supervisors	Unit managers	Quality compliance	Clinical manager
Performance output	Health care supervisors	Unit managers	Quality compliance	Clinical manager
Equipment safety and functionality	Unit managers	Technical support services	Quality compliance	Executing officer
Adequate staff utilisation	Operational managers	Unit managers	Quality compliance	Clinical manager
Adequate staffing levels	Unit managers	Human resource manager	Clinical manager	Executive officer
Clinical record audits	Unit managers	Quality compliance	Quality compliance	Clinical manager

At operational level, the unit managers have to ensure that the standard South African EDL protocols and Maternity guidelines are in place and all health practitioners are adhering to these protocols. For treatment of PPH, this would involve ensuring display of the national PPH posters in

labour wards and theatres, dissemination of the PPH monograph, and ensuring training occurs on their use in clinical practice.

Morbidity and mortality meetings at operational level are powerful tools to assist in highlighting the value of clinical protocols and to train staff in safe clinical practice through open and frank discussions.

All institutions should have a mechanism in place to report adverse outcomes, defined as any adverse outcome that is not intended and reflects harm or medico-legal liability. This is different from morbidity and mortality assessments as it only focus on adverse outcomes, thus reflecting events that occur as a consequence of the health system and not because of natural progress of disease. The aim of reporting these events is to do a thorough root cause analysis to determine the systems involved in the etiology of these events. The clinical manager should have a multi-professional and multi-disciplinary team to assist in evaluating these events and use this to adjust policies and guidelines within the institution, or in case of a systems failure outside the institutional level, to elevate the problem to provincial level.

Chapter nine

Be Prepared: Training and ongoing Educational Initiatives

R.C. Pattinson

Postpartum haemorrhage (PPH) often occurs in women with no risk factors. An apparently low risk birth can rapidly change into a life threatening condition for either mother or baby or both. Hence all health care providers and health care facilities involved in conducting births must have the knowledge, skills and resources to manage obstetric emergencies such as PPH, but also other emergencies such as eclampsia, shoulder dystocia, cord prolapse, fetal distress, acute collapse of the mother and an asphyxiated neonate.

As detailed in previous chapters, PPH is the most common clearly avoidable cause of maternal death with around 4 out of 5 maternal deaths due to PPH being thought to be clearly avoidable within the health care services. There are many avoidable factors but they can be summarised simply as being “too little, too late”.

In 1999 the Institute of Medicine (IOM) published *To Err is Human: Building a Safer Health System*¹. This report documented the inadequate

safety that the United States medical establishment too often provided its patients. Since then there has been a rapid expanse of research into finding ways of reducing risks for patients and improving the health care providers' response to medical emergencies. Considerable knowledge has now been gained on how to reduce the risks for patients and how to train health care providers so that they react appropriately to medical emergencies. This has been extended to obstetrics. The crucial elements that every health care provider must have to be able to respond to an obstetric emergency are knowledge, skills and the ability to apply these within in a multidisciplinary team.

Improving knowledge

Knowledge and adherence to guidelines can be increased by printed educational materials², outreach visits³, Continuing Medical Education (CME) and workshops⁴, influencing opinion leaders⁴ and audit and feedback^{6,7}. These training techniques all are associated with small but significant improvements in the knowledge and quality of care of patients, and thus should be used on a regular basis to reinforce the guidelines to all health care providers in maternity units.

Improving skills

Skills' training is more difficult to achieve. Emergency events are usually rare or happen at inconvenient times and thus cannot be used in bed-side teaching. This has necessitated the move to using mannequins to improve the skills of health care providers. The use of emergency obstetric training with mannequins has been shown to improve clinical skills when tested in clinical scenarios in South Africa⁸ and also in the real clinical circumstances⁹⁻¹⁴.

Applying knowledge and skills within a multidisciplinary team

Improving knowledge and clinical skills is not enough; to be effective they have to be used in a team setting. In managing all obstetric emergencies a team is involved. The teams can vary in size and composition, but in all cases there is a team. If the team does not work together, the management of the obstetric emergency will be sub-optimal. Enquiries into maternal deaths have identified common errors contributing to maternal deaths, they are: confusion in roles and responsibilities, lack of cross-monitoring, failure to prioritise and perform clinical tasks in a structured coordinated manner, poor communication and lack of organisational support¹⁵.

In recognition of this the Crew Resource Management (CRM) programmes developed by the aviation industry to improve team working has been adapted for training in medical emergencies. The positive effects found in the aviation industry have not had the expected benefit in managing obstetric emergencies. This was probably due to the training being independent of task and context¹⁶. All units that have reported improvements in outcomes of obstetric emergencies have implemented the training programmes **within their own units** and have trained **almost all of their staff**¹⁵. These training packages have introduced simulation training and this has had the added advantage of improving inter-professional cooperation¹⁶⁻¹⁸.

Simulation training (or fire-drills) consists of creating a clinical scenario in a labour ward or antenatal ward or clinic and using either a person acting as a patient or using a mannequin. The participants go through the process of managing that obstetric emergency. An observer evaluates the activities of the team on a checklist and gives the team a score. After the exercise the observer gives feedback to all the participants. The checklist evaluates the clinical skills and knowledge of the team but also evaluates how the team functioned. The team must involve all relevant health care providers and in the case of obstetric emergencies must involve doctors

and midwives. In these scenarios it is often the team work where the process goes awry as is the case in real life.

Essential Steps in Managing Obstetric Emergencies

South Africa has a training programme for improving knowledge and skills of health care professionals in managing obstetric emergencies. The training programme is called Essential Steps in Managing Obstetric Emergencies (ESMOE). The programme was developed by a partnership of clinicians from obstetric departments in all medical schools, members of the national committee for the confidential enquiries into maternal health, the MRC maternal and infant health care strategies research unit, and supported by the national department of health, the South African College of Obstetrics and Gynaecology, the South African Society of Obstetricians and Gynaecologists, the Royal College of Obstetricians and Gynaecologists (South African Chapter), the South African Paediatric Association, the South African College of anaesthetists and the Midwifery Association of South Africa. The programme is based on the programme developed by the Royal College of Obstetricians and Gynaecologists (Life Saving Skills programme¹⁹) and their International Office gave much support and assistance in the development of ESMOE. The programme was tested on interns and showed significant increases in knowledge and skills in managing obstetric emergencies⁸.

ESMOE has been adopted by the National Department of Health as a means of improving knowledge and skills in managing obstetric emergencies and it has been specifically included in the strategic plan of the Maternal, Child and Women's Health and Nutrition cluster. An ESMOE board has been established to help coordinate the scale-up of the programme. The board's vision is to "Effectively improve emergency obstetric care to minimise maternal and perinatal mortality".

It aims to do this by:

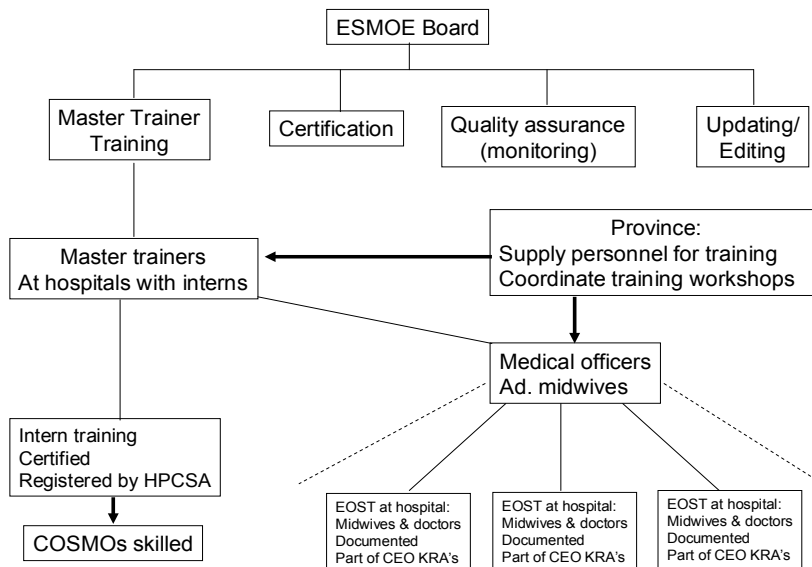
Improving the emergency management of pregnant women and their infants by using a training package for emergency obstetric care that is:

- Taught to undergraduate students, both medical and nursing,
- Taught to all interns
 - Signed off prior to registration as a doctor,
 - Training by an accredited trainer
 - Registered and certified
- Taught to all doctors involved in maternal and neonatal care
- A modified programme taught to all advanced midwives
- Serves as a basis for emergency obstetric simulation training exercises for **all** health professionals in all institutions, public and private, offering maternity care
 - these training exercises are documented and
 - they occur as part of the CEO of the institution's key performance areas.

The process is illustrated in figure 1.

Master trainers are trained during a 4 day training course where the ESMOE course is run, but also specific adult training techniques are discussed. The master trainers are selected from hospitals that have interns. Ideally every intern will have access to a master trainer and thus can be trained in ESMOE and certified before passing on to become a community service doctor. In this way it is hoped the district hospitals where most community service doctors are deployed will have the skills to manage obstetric emergencies. The lack of skills of community service doctors is currently the biggest human resource problem in managing obstetric emergencies.

Figure 1. Scale-up plan of ESMOE Board



The master trainers will be used also in 3 day training workshops which are held for doctors and midwives or district and regional hospitals. These workshops are aimed at training these health care providers in managing obstetric emergencies but also in training them in conducting emergency obstetric stimulation training (EOST) exercises. In this way the crucial elements that every health care provider must have to be able to respond to an obstetric emergency are knowledge, skills and the ability to apply these within in a multidisciplinary team will be met. A special ESMOE course is being developed for advanced midwives that take into account their scope of practice.

Summary

In order to **be prepared** for a woman with PPH every maternity unit should:

1. Have posters displayed in the unit outlining the protocols for managing PPH
2. Conduct regular in-service training discussions on PPH, where the protocols are revised. These would be best performed during the morbidity and mortality meetings of the unit. In addition intermittent folder audits of all patients with severe PPH using a quality of care checklist may help to improve quality of care.
3. Conduct regular EOST exercises in managing PPH based on the scenarios developed from the ESMOE training package. These should be documented and the score of the team kept for future comparisons. It is essential that all health care providers are involved in these exercises. A register of participants in the EOST exercises should be kept to ensure this is the case
4. The hospital management should ensure there is sufficient expertise in their institutions to run the EOST exercises effectively. This will require that from time to time medical officers and midwives are sent to ESMOE training workshops.
5. Records of the EOST exercises, the scores and the participants should be available for inspection by the District Manager.

This preparation should also occur for all other obstetric emergencies. A drop in deaths due to obstetric emergencies can only be realistically expected to occur when the EOST exercises are routine in all maternity units. It is essential that this occurs as rapidly as possible.

References:

1. Kohn IT, Corrigan JM, Donaldson MS, Editors. *To Err Is Human: Building A Safer Health System. A Report of the Committee on Quality of Health Care In America, Institute of Medicine.* Washington, DC: National Academy Press; 2000
2. Farmer AP, Légaré F, Turcot L, Grimshaw J, Harvey E, Mcgowan JL, Wolf F. Printed Educational Materials: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database of Systematic Reviews* 2008, Issue 3. Art. No.: Cd004398. DOI: 10.1002/14651858.Cd004398.Pub2.
3. O'Brien MA, Rogers S, Jamtvedt G, Oxman AD, Odgaard-Jensen J, Kristoffersen DT, Forsetlund L, Bainbridge D, Freemantle N, Davis D, Haynes RB, Harvey E. Educational Outreach Visits: Effects on Professional Practice And Health Care Outcomes. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: Cd000409. DOI: 10.1002/14651858.Cd000409.Pub2
4. Forsetlund I, Bjørndal A, Rashidian A, Jamtvedt G, O'Brien MA, Wolf F, Davis D, Odgaard-Jensen J, Oxman AD. Continuing Education Meetings and Workshops: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database of Systematic Reviews* 2009, Issue 2. Art. No.: Cd003030. DOI: 10.1002/14651858.Cd003030.Pub2
5. Doumit G, Gattellari M, Grimshaw J, O'Brien MA. Local Opinion Leaders: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database Of Systematic Reviews* 2007, Issue 1. Art. No.: Cd000125. DOI: 10.1002/14651858.Cd000125.Pub3
6. Jamtvedt G, Young JM, Kristoffersen DT, O'Brien MA, Oxman AD. Audit and Feedback: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database of Systematic Reviews* 2006, Issue 2. Art. No.: Cd000259. DOI: 10.1002/14651858.Cd000259.Pub2.
7. Pattinson RC, Say L, Makin JD, Bastos MH. Critical Incident Audit and Feedback to Improve Perinatal and Maternal Mortality and Morbidity. *Cochrane Database Of Systematic Reviews* 2005, Issue 4. Art. No.: Cd002961. DOI: 10.1002/14651858.Cd002961.Pub2
8. Frank K, Lombaard H, Pattinson RC. *Does Completion of the Essential Steps in Managing Obstetric Emergencies (Esmoe) Training Package Result in*

- Improved Knowledge and Skills In Managing Obstetric Emergencies?* Sajog 2009;15:94-99
9. Draycott T, Sibanda T, Owen L, Akande V Winter C et al. *Does Training in Obstetric Emergencies Improve Neonatal Outcome?* BR J Obstet Gynecol 2006; 113 : 177 – 182
 10. Draycott TJ, Crofts JF, Wilson LV, Yard E, Sibanda T, Whitelaw A. *Improving Neonatal Outcome Through Practical Shoulder Dystocia Training.* Obstet Gynecol 2008 ; 112 : 14 – 20
 11. Johanson RB, Menon V, Burns E, Kargramanya E, Osipov V. *Managing Obstetrics Emergencies and Trauma (Moet) Structured Skills Training in Armenia, Utilizing Models And Reality Based Scenarios.* BMC Medical Education 2002 ; 2 : 1- 5 <https://www.biomedcentral.com/1472-6920/2/5>
 12. Johannson H, Ayida G, Sadler C. *Faking It? Simulation in the Training of Obstetricians and Gynaecologists.* Curr Opin Obstet Gynecol 2005 ; 17 : 557 – 561
 13. Anderson ER, Black R, Brockelhurst P. *Acute Obstetric Emergency Drill in England and Wales: A Survey of Practice.* BR J Obste Gynecol 2005 ; 112 : 372 – 375
 14. Cameron CA, Robberts CI, Bell J, Fisher W. *Getting an Evidence-Based Post-Partum Haemorrhage Protocol into Practice.* Aus N Z J Obstet Gynecol; 2007 : 47 :169 – 175
 15. Lewis G, Editor. *The Confidential Enquiry into Maternal and Child Health (Cemach). Saving Mothers' Lives: Reviewing Maternal Deaths to Make Motherhood Safer—2003–2005. The Seventh Report of the Confidential Enquiries into Maternal Deaths in The United Kingdom.* London: Cemach, 2007.
 16. Siassakos D, Crofts JF, Winter C, Weiner CP, Draycott TJ. *The Active Components of Effective Training in Obstetric Emergencies.* BJOG 2009;116:1028-1032
 17. Reeves S, Zwarenstein M, Goldman J, Barr H, Freeth D, Hammick M, Koppel I. *Interprofessional Education: Effects on Professional Practice and Health Care Outcomes.* *Cochrane Database Of Systematic Reviews* 2008, Issue 1. Art. No.: Cd002213. Doi: 10.1002/14651858.Cd002213.Pub2.
 18. Osman H, Campbell OMR, Nassar AH. *Using Emergency Obstetric Drills in Maternity Units as a Performance Improvement Tool.* Birth 2009; 36:43-50
 19. Van Den Broek N. *Life Saving Skills Manual.* 2nd Edition, RCOG Press, London 2007

Chapter ten

The Community Approach to Prevention and Management of Postpartum Haemorrhage

D.Nyasulu, S.Engelbrecht

Context for community-based interventions

Given the current challenges faced by the health care system, in terms of resource constraints, and current statistics on PPH there seems to be an opportunity to strengthen family-centred maternity care and community empowerment in order to meet the health needs of women who cannot access health care.

The role of the family and the community in supporting the woman in pregnancy and childbirth cannot be overestimated. The mother is the member of a family and the family belongs to the community. It is more likely that even long before the woman makes contact with the health service, members of her family and community would have provided her with some kind of health care and support. Even if delivery occurred in a health care centre under the supervision of a skilled care provider, the mother returns to her own family in the community. Family

members e.g. her husband, her mother and community members such as traditional birth attendants and community health workers take over the responsibility of providing the essential care to the mother and her newborn.

It follows then that the community can be utilized meaningfully to be an extended arm of health services. In South Africa studies show that close to 95% of pregnant women attend antenatal care, yet patient-oriented and community factors result in delays in seeking and reaching appropriate health care facilities. In this regard policy makers as well as health care providers need to realize and accept that families and communities can play a major role in providing health care and as such their ability to contribute towards health care should be increased.

A community-based approach to PPH prevention and management must be a collaborative effort between parents, families, caregivers, health professionals and other related community groups. Of great importance is that all providers need accurate information about what constitutes quality care in the post partum period.

Community Partners

Community partners are individuals in the community that can work with the health care providers to extend health care to the community level. These include, but are not limited to, the following:

- Key leaders in the community: Chiefs, Councillors, Religious leaders, Traditional healers, Teachers
- Family Members: Parents, Grandparents, Husbands/Partners, In-laws
- Community organizations: Women's groups, Support groups
- Community/Village Health Workers, Traditional birth attendants
- Lay Counsellors
- Women's Groups
- NGOs

Key messages to the Community about PPH

PPH is unpredictable. It may happen to women who do not have any complaints during pregnancy. It may occur rapidly, creating an emergency situation. If no emergency plan to respond to the emergency situation is in place, the condition of the woman deteriorates fast. Giving birth in a facility with a skilled provider, and anticipation and preparation for emergency are the keys to prevent PPH and ensure timely response to PPH should it occur. The key to achieving safer pregnancy, safer delivery and a safer postpartum period include:

- (1) Giving birth in a facility with a skilled provider.
- (2) Adequate preparation for labour and childbirth.
- (3) Identification of danger signs during labour and the postpartum period.
- (4) Readiness for complications during labour and the postpartum period.
- (5) All pregnant women should take iron supplements during pregnancy

Prevention / Treatment of PPH at the community level

To prevent PPH and reduce the risk of death, routine preventive actions should be offered to all women from pregnancy through to the immediate postpartum period.

During pregnancy

1. **Promote antenatal care and, where possible, provide outreach clinics.** During antenatal care visits, health care providers should take the following steps:

- Develop a **birth preparedness plan**. Women should plan to give birth with a skilled attendant who can provide interventions to prevent PPH (including AMTSL), can identify and manage PPH, and refer the woman for additional treatment if needed.
- Develop a **complication readiness plan** that includes recognition of danger signs and what to do if they occur, where to get help and how to get there, and how to save money for transport and emergency care.
- Routinely screen to **prevent and treat anaemia** during pre-conceptual, antenatal, and postpartum visits to increase the woman's tolerance to blood loss during delivery. Counsel women on nutrition, focusing on available iron and folic acid-rich foods, and provide iron/folate supplementation during pregnancy. Help prevent anaemia by addressing major causes, such as malaria and hookworm, in endemic areas.
- In cases where the woman cannot give birth with a skilled attendant, prevent prolonged/obstructed labour by providing information about the signs of labour, when labour is too long, and when to come to the facility or contact the birth attendant.
- **Prevent harmful practices** by helping women and their families to recognize harmful customs practiced during labour (e.g. providing herbal remedies to increase contractions, etc.).

Preparing for birth with a skilled birth attendant:

- Make plans to give birth with a skilled birth attendant
- Decide birth plan issues
- Prepare what is needed for birth
- Save money

Preparing in case of a complication:

- Learn about danger signs before, during and after childbirth
- Establish a savings plan/scheme
- Make a plan for decision-making in case an emergency occurs while the primary decision-maker is away.
- Arrange in advance for transportation in case of emergency
- Arrange for a blood donor in case of need

- Take culturally sensitive actions to **involve men** and encourage understanding about the urgency of labour and need for immediate assistance.
2. **Promote community mobilization** and behaviour change communication (BCC) Programs for prevention of PPH include a variety of complementary activities, such as: awareness raising and community dialogue on safe motherhood; importance of giving birth with a skilled provider in a facility; and the establishment of emergency evacuation/referral systems/plans.
 3. **Consider community use of uterotonic agents such as misoprostol.** Although all attempts should be directed towards women delivering in facilities, there are areas in South Africa where access may be difficult and home deliveries occur with or without a skilled attendant. In some areas traditional birth attendants (TBAs) are involved with such deliveries. Experience in other countries have indicated that training of TBAs to administer a uterotonic agent such as 400-600micrograms of oral misoprostol after delivery of the placenta, or with excessive bleeding may reduce morbidity from PPH. If cold chain facilities exist then oxytocin made up as a purpose designed injection unit (the Uninject system) is a safer and more effective alternative. Such measures have not yet been introduced in South Africa, and there is concern about unregulated use of misoprostol which can cause major problems such as rupture of the uterus if given in high doses for inappropriate indications during late pregnancy or in labour. However, it is important to consider this approach especially in areas where home births may be common. Before distributing uterotonic agents to a community based attendant, providers must carefully explain dangers of PPH and the importance of giving birth with a skilled provider in a facility, how misoprostol prevents PPH, safe use of misoprostol, and dangers of inappropriate use of misoprostol.

During labour and childbirth

For **prevention** of PPH:

1. Promote giving birth with a skilled provider in a facility.
 - Promote use of at least: (1) a uterotonic drug after birth of the baby and (2) uterine massage after delivery of the placenta:
 - If skilled attendants are present at birth, practice active management of the third stage of labour (AMTSL). If cold chain is an issue, consider use of oxytocin in the Uniject device with a time-temperature-indicator or misoprostol 600 mcg orally.
 - In areas with high rates of home delivery, TBAs should be advised to deliver the placenta with maternal force and gravity (preferably with the woman squatting), and massage the uterus immediately after delivery of the placenta. Controlled cord traction should NEVER be applied by an untrained or unskilled birth attendant. Consider providing TBAs with uterotonic agents such as oral misoprostol (see section 3 in preceding section).
2. Promote early and frequent voiding.
3. Promote self-massage of the uterus and self monitoring by the woman.
4. Promote immediate breastfeeding or nipple stimulation.

For management of PPH:

1. Promote **community mobilization** and behaviour change communication (BCC) Programs for awareness raising and community dialogue on: signs/symptoms of PPH to ensure early recognition of PPH; dangers of PPH; and the establishment of emergency evacuation/referral systems/plans. Early recognition of excessive bleeding (PPH) after delivery of the baby, by the birth attendant, relative or the mother herself, is essential for initiation of prompt and appropriate actions to save the live of the bleeding mother. Early recognition of PPH, initiation of first aid, and prompt referral can reduce the delay in reaching and receiving additional lifesaving care for PPH.

If PPH does occur, positive outcomes depend on how healthy the woman is when she has PPH (particularly her haemoglobin level), how soon a diagnosis is made, and how quickly effective treatment is provided after PPH begins.

2. Promote **Home-based life-saving skills** (HBLSS) to address PPH by negotiating and working with women and communities on interventions that can be done at home. It uses an action card titled “Bleeding too much” to remind women, their partners, and their families of the skills needed to prevent or manage PPH, including but not limited to:

- Nipple stimulation / Breastfeeding
- Uterine Massage
- Bladder emptying

A woman is bleeding too much after giving birth if she has:

- soaked 2 or more *kangas* (2 meters of cotton cloth).
- fast bleeding that is not decreasing after birth (soaks 2 or more pads in less than 30 minutes).
- clots the size of lemons or bigger.
- slow, continuous bleeding that does not stop.

Any time a woman is bleeding and gets faint or feels dizzy, she has bled too much and needs immediate attention.

- Use of Misoprostol tablets / oxytocin in the Uniject device by TBA (NB see section 3 above)
- If uterine atony: External bimanual compression until the woman reaches the health care facility
- If genital lacerations: Perineal / vaginal Compression to stop bleeding until the woman reaches the health care facility

What can you do if you bleed heavily after giving birth?

If you think you are bleeding heavily and you feel dizzy and weak, **immediately go for help**. You can lose a lot of blood very quickly and need treatment as soon as possible to save your life. While you are waiting to get to help, you should:

- Ask somebody to call for medical assistance or arrange transport.
- Make sure your **bladder is empty**. If your bladder is full it can prevent the uterus from contracting.
- **Breastfeed** your baby, if you have chosen to do so. If you are not breastfeeding, then rub your nipples between your fingers to stimulate them. When the nipples are stimulated, a natural substance called oxytocin is produced that helps the uterus contract.
- **Rub up your uterus** until it feels hard. If your uterus stays soft in spite of massage, then someone can compress it externally between two hands to constrict uterine blood vessels and stop bleeding.
- If you are bleeding from a tear in your birth canal, someone should **put a clean cloth on the tear and apply pressure** until bleeding has stopped or you have reached the health care facility.
- If your placenta has not delivered, try squatting and push with a contraction. If this does not work, you need to get help immediately.

Evidence base for proposed strategies

There is a significant opportunity to prevent and manage PPH at the community level. Evidence for several community based interventions can be found in the references cited below. The articles cover community interventions such as community mobilisation and behaviour change, community transport arrangements, training of traditional birth attendants, uterine massage, breast feeding and nipple stimulation, home based life saving skills, and community use of uterotonic agents.

Conclusion

There is no “magic bullet” to reduce deaths of women from PPH in the community. Rather, there needs to be a concerted effort to improve care provided at all levels of the continuum of care – from the community to the facility. Women need to feel respected and well cared for at the facility level in order to seek care there. If community-level interventions are implemented and this results in more women seeking care at the facility, the facilities need to be prepared to receive these women and provide them with the quality services they require and deserve.

References

1. PATH. The community approach to preventing and managing postpartum haemorrhage. Durban:PATH;2009
2. POPPHI Community-Based Task Force. (a) Community-based Prevention of PPH: A Summary of the Literature. Seattle: PATH; 2007; and (b) Prevention and treatment of PPH at the community level; A guide for policy makers, health care providers, donors, community leaders, and program managers.Seattle; PATH;2008
3. Howard-Grabman L, Snetro G. *How to mobilize communities for health and social change*. Baltimore, Maryland: Johns Hopkins Bloomberg School of Public Health, Center for Communication Programs, Health Communication Partnership; 2003. Available at: http://www.hcpartnership.org/Publications/Field_Guides/Mobilize/pdf.
4. Thaddeus S. Perceptions matter: Barrier to treatment of postpartum hemorrhage. *Journal of Midwifery & Women's Health*. 2004;49:293–297.
5. Tsu VD, Mai T, Nguyen Y, Luu H. Reducing postpartum hemorrhage in Vietnam : Assessing the effectiveness of active management of third-stage labor. *Japan Society of Obstetrics and Gynecology*. 2006;32:489–496.
6. Strand R, Da Silva F, Jangsten E, Bergström S. Postpartum hemorrhage: a prospective, comparative study in Angola using a new disposable device for oxytocin administration. *Acta Obstetrica et Gynecologica Scandinavica*. 2005;84:260–265.
7. Langenbach C. Misoprostol in preventing postpartum hemorrhage: A meta-analysis. *International Journal of Gynecology & Obstetrics*. 2006;92: 10–18.
8. Walraven G, et al. Misoprostol in the management of the third stage of labour in the home delivery setting in rural Gambia: a randomized controlled trial. *BJOG*: 2005;112:1277–1283.
9. Sanghvi H, Wiknjosastro G, Chanpong G, Fishel J, Ahmed S, Zulkarnain M. *prevention of postpartum hemorrhage study West Java, Indonesia*. Baltimore, MD: JHPIEGO. 2004.
10. Derman R, et al. Oral misoprostol in preventing postpartum haemorrhage in resource-poor communities: a randomized controlled trial. *Lancet*. 2006;368:1248–1253.

11. Abdel-Aleem H, Hofmeyr GJ, Shokry M, El-Sonoosy E. Brief Communication: Uterine massage and postpartum blood loss. *International Journal of Gynaecology & Obstetrics*. 2006;93:238–239.
12. Bullough C, Msuku R, Karonde L. Early Suckling and Postpartum Haemorrhage: Controlled Trial in Deliveries by Traditional Birth Attendants. *Lancet*. 1998;2:522–525.
13. Geller SE, Adams MG, Kelly PJ, Kodkany BS, Derman RJ. Postpartum hemorrhage in resource-poor settings. *International Journal of Gynecology & Obstetrics*. 2006;92:202–211.
14. N. Sloan, personal communication.

Sources and References from which the Guidelines in this Monograph Are Derived

1. Saving Mothers. *Essential Steps in the Management of Common Conditions associated with Maternal Mortality*. Dept Health SA, 2007
2. Van den Broek N. *Life savings Skills Manual. Essential Obstetric and Newborn Care*. RCOG press,UK 2007
3. *Guidelines for Maternity Care in South Africa*. Dept Health, South Africa 2007
4. *Saving Mothers reports 1,2,3&4*, Dept Health SA, Pretoria
5. Mousa HA, Alfirivec Z. *Treatment of primary postpartum haemorrhage*. Cochrane Database Syst Rev 2007 ;(1):CD003249.DOI:10.1002/14651858.CD003249.pub2
6. *WHO guidelines for the management of postpartum haemorrhage and retained placenta*. World Health Organisation, Geneva 2009
7. RCOG Green Top guideline no. 52. *Prevention and management of postpartum haemorrhage*. RCOG May 2009
8. *Textbook of Postpartum Haemorrhage*. Eds B-Lynch C, Keith L, Lalonde A, Karoshi M.Sapiens publishing 2006
9. Steer P. The surgical approach to postpartum haemorrhage. *The Obstetrician and Gynaecologist* 2009;11:231-238
10. Schuurman N, Mackinnon C, Lane C, Etches D. *Prevention and Management of Postpartum Haemorrhage*. *J Soc Obstet Gynaecol Can* 2000;22:271-281