

*Guidelines for*

# **MATERNITY CARE** *in South Africa 2007*



**A manual for clinics,  
community health centres and  
district hospitals**



**health**

Department:  
Health  
REPUBLIC OF SOUTH AFRICA



# **GUIDELINES FOR MATERNITY CARE IN SOUTH AFRICA**

A manual for clinics, community health centers  
and district hospitals

Department of Health  
Republic of South Africa  
2007

Third edition

## **FOREWORD**

Maternal health care is one of the priority reproductive health issues that have been identified as requiring urgent attention in South Africa. The commitment to improve maternal health is demonstrated by making maternal deaths a notifiable condition and by formation of the National Committee on Confidential Enquiry into Maternal Deaths (NCCEMD).

One of the key recommendations made by the NCCEMD in the latest Saving Mothers Report 2002 - 2004 is to update and strengthen the guidelines on the management of conditions which commonly result in maternal deaths and have these distributed and implemented throughout South Africa by 2007. These guidelines evolved in response to this challenge.

The purpose of the guidelines on maternity care is to give guidance to Health Care Workers providing obstetric and anaesthetic services in clinics, community health centers and district hospitals. Failure to have and follow standard protocols at primary and secondary levels is one of the common related problems.

These guidelines were strengthened and updated following a vast review of literature and were reviewed by many of our experts and program managers in the field. Guidelines however require constant review to take into account current best evidence in health care.

I hope implementation of these guidelines will have a measurable impact on the reduction of not only maternal mortality but also morbidity.

I wish to thank the team that spent many days, weeks, and months in the production of this work of high quality.

These guidelines should be used to develop protocols of management at provincial and institutional level, so that we reduce maternal deaths and improve the quality of care during and after pregnancy. Their wide dissemination and implementation through appropriate training is firmly supported.



**MR TD MSELEKU**  
**DIRECTOR-GENERAL: HEALTH**

## **PREFACE**

This document has been prepared by the National Maternity Guidelines Committee at the Department of Health, Pretoria. This third edition of the guidelines has been extensively updated, but follows the general format of the successful first and second editions. The contents are the result of broad and intensive discussions, feedback and debate.

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Special thanks to the following colleagues who updated the PMTCT policy guidelines: Ms MR Molupe, Ms PJ Sithole and Mr D Loykissoonalal.

# TABLE OF CONTENTS

<b>Chapter 1</b>	<b>Introduction</b>	<b>6</b>
	Maternity care in South Africa	7
	Maternal mortality	
	Ten Recommendations from Saving Mothers 2002 - 2004	7
	Safe motherhood in South Africa	8
	A national strategy for maternity care	9
	Objective of the national guidelines	10
	Using these guidelines	10
<b>Chapter 2</b>	<b>Levels of maternity care</b>	<b>12</b>
	The need for levels of care	13
	Clinic	13
	Community Health Centre	14
	Level 1 Hospital	15
	Level 2 Hospital	16
	Level 3 Hospital	16
	Emergency transport	17
<b>Chapter 3</b>	<b>Antenatal care</b>	<b>18</b>
	Principles of antenatal care	19
	The first antenatal visit	20
	Subsequent antenatal visits	28
	BANC checklist	29
<b>Chapter 4</b>	<b>Labour and the puerperium</b>	<b>32</b>
	Normal labour and puerperium	34
	Abnormalities of the first stage of labour	44
	Abnormalities of the second stage of labour	52
	Caesarean section	54
	Emergencies during labour	55
	Immediate care of the newborn	57
	Abnormalities of the third and fourth stages	60
	Abnormalities of the puerperium	63
<b>Chapter 5</b>	<b>Anaesthesia and resuscitation</b>	<b>66</b>
	Preanaesthetic evaluation	67
	Anaesthesia for caesarean section	69
	Complications during obstetric anaesthesia	71
	Cardiopulmonary resuscitation in pregnancy	74
<b>Chapter 6</b>	<b>Hypertensive disorders of pregnancy</b>	<b>76</b>
	Hypertension in pregnancy	77
	Classification and grading	77
	Pathophysiology of pre-eclampsia	79
	Management of pre-eclampsia	81
	Management of eclampsia	85
	Labour, delivery and postpartum care	87
	Chronic hypertension	88
<b>Chapter 7</b>	<b>Pregnancy problems</b>	<b>89</b>
	Intrauterine growth restriction	91
	Intrauterine death	92
	Antepartum haemorrhage	94
	Multiple pregnancy	98
	Breech presentation and transverse lie	99
	Preterm labour	100

	Prelabour rupture of the membranes	103
	Chorioamnionitis	106
	Post term pregnancy	106
	Induction of labour with a live baby	106
	Previous caesarean section	108
	Rhesus incompatibility	110
	Poor obstetric history	110
	Birth defects and genetic disorders	112
<b>Chapter 8</b>	<b>Medical disorders in pregnancy</b>	<b>115</b>
	Anaemia	116
	Diabetes mellitus	118
	Cardiac disease	120
	Asthma	121
	Thromboembolism	122
	Epilepsy	122
<b>Chapter 9</b>	<b>Infections in pregnancy</b>	<b>123</b>
	Abnormal vaginal discharge	124
	Genital ulcers	124
	Genital warts	124
	Syphilis	124
	Malaria	125
	Urinary tract infection	127
	Pneumonia and tuberculosis	127
	Human immunodeficiency virus infection	
	Prevention of Mother to Child HIV Transmission	127
<b>Chapter 10</b>	<b>Prevention of mother-to-child hiv transmission and management of hiv positive</b>	<b>128</b>
	Summary	130
	Acronyms	131
	Introduction	131
	Background	131
	Risk factors for Mother-to-child HIV Transmission	132
	Antenatal Care	133
	Management of Labour	138
	Post- Delivery	139
	Termination of Pregnancy	142
	Other Considerations	142
<b>Chapter 11</b>	<b>Audit</b>	<b>145</b>
	Collection of essential data	145
	Essential statistics	146
	Maternal death notification	147
<b>Appendix I</b>	<b>List of abbreviations used in the guidelines</b>	<b>154</b>
<b>Appendix II</b>	<b>Guidelines for PRM</b>	<b>155</b>
<b>Appendix III</b>	<b>Maternal death notification form</b>	<b>165</b>
<b>Appendix IV</b>	<b>Equipment lists, drugs and supplies per level of care</b>	<b>170</b>

# CHAPTER 1

## INTRODUCTION

<b>Maternity care in South Africa</b>	<b>7</b>
<b>Maternal mortality</b>	<b>7</b>
<b>Ten Recommendations from the Saving Mothers Report 2002 -2004</b>	<b>7</b>
<b>Safe motherhood in South Africa</b>	<b>8</b>
<b>A national strategy for maternity care</b>	<b>9</b>
Community participation	9
A supportive legal framework	9
Adaptation to local realities	9
Quality of care	9
Improvement in the status of women	9
Provision of skilled midwifery and obstetric services	9
Clinical guidelines	9
Regionalised care and referral systems	9
Management capacity	10
Continuing audit of services	10
Research	10
<b>Objective of the national guidelines</b>	<b>10</b>
<b>Using these guidelines</b>	<b>10</b>
Format and content	10
Exclusions	11
Copyright	11

## **MATERNITY CARE IN SOUTH AFRICA**

There is a growing global commitment to reduce the unacceptably high maternal death rates in developing countries. Progress towards this goal in South Africa demands national cooperation to assess the causes of maternal death and provide guidelines regarding maternity care, to ensure that quality health services are rendered.

Maternity care forms an integral component of primary health care and free health services for pregnant women. Within South Africa, the Maternal and Child Health programme is located in general development policies, which are focused on meeting the basic needs of rural and urban communities, maximising human resources potential, enlarging the economy and spreading its benefits, and democratising society and its institutions. To comply with these principles, the Minister of Health announced the introduction of free health care services for pregnant women and children under the age of 6 years in July 1994.

## **MATERNAL MORTALITY**

Maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Maternal deaths may be divided into:

- Direct obstetric deaths – resulting from obstetric complications of pregnancy, labour or the puerperium, from interventions, omissions, incorrect treatment or from a chain of events resulting from any of these
- Indirect obstetric deaths – resulting from previously existing disease which was aggravated by the physiological effects of pregnancy

Data from the 1998 South African Confidential Enquiries into Maternal Deaths suggest that the main causes of maternal deaths are related to failure to use health care facilities, inadequacy of services and substandard care. An official 'maternal mortality ratio' is not yet available for South Africa, but the true ratio is believed to be close to 150 maternal deaths per 100 000 live births.

Problems with maternity care in South Africa currently include:

- AIDS (acquired immune deficiency syndrome) has become the leading cause of maternal death in South Africa
- Hypertension accounts for a large number of maternal deaths, in many cases associated with inappropriate management of eclampsia and pulmonary oedema.
- Haemorrhage remains an important cause of maternal death, associated with substandard care and poor referral systems in outlying areas
- A significant number of preventable maternal deaths are due to pregnancy-related sepsis

## **SUMMARY OF KEY RECOMMENDATIONS FROM THE SAVING MOTHERS REPORT 2002 – 2004**

### Recommendation 1

Protocols on the management of important conditions causing maternal deaths must be available and utilized appropriately in all institutions where women deliver. All midwives and doctors must be trained on the use of these protocols

### Recommendation 2

All pregnant women should be offered information on, screening for and appropriate management of communicable and non-communicable diseases

### Recommendation 3

Criteria for referral and referral routes must be established and utilized appropriately in all provinces

### Recommendation 4

Emergency transport facilities must be available for all pregnant and post partum women and their babies with complications (at any site)

### Recommendation 5

Staffing and equipment norms must be established for each level and for every health institution concerned with the care of pregnant women

### Recommendation 6

Blood for transfusion must be available at every institution where caesarean sections are performed

### Recommendation 7

Contraceptive use must be promoted through education and service provision and the number of mortalities from unsafe abortions must be reduced

### Recommendation 8

Correct use of the partogram should become the norm in each institution conducting births. A quality assurance programme should be implemented using an appropriate tool

### Recommendation 9

Skills in anaesthesia should be improved at all levels of health care particularly at level 1 hospitals

### Recommendation 10

Women, families and communities at large must be empowered, involved and participate actively in activities, projects and programmes aiming at improving maternal and neonatal health as well as reproductive health in general

## **SAFE MOTHERHOOD IN SOUTH AFRICA**

The following are considered to be 'pillars' of safe motherhood (based on the World Health Organisation's Safe Motherhood Initiative):

1. **Choice on contraception** – to ensure that individuals and couples have the information and services to plan the timing, number and spacing of pregnancies
2. **Antenatal care** – the identification of risk factors and early diagnosis of pregnancy complications and appropriate management, and health education
3. **Clean and safe delivery** – to ensure that all health workers have the knowledge, skills and equipment to perform clean and safe delivery and provide postpartum care to mother and baby
4. **Essential obstetric care** – to ensure that essential care for high risk pregnancies and complications is made available to all women who need it
5. **Choice on termination of pregnancy** – to provide women who have unwanted pregnancies with a legal, safe and acceptable choice

# **A NATIONAL STRATEGY FOR MATERNITY CARE**

## **COMMUNITY PARTICIPATION**

Women, families and communities must be empowered to contribute actively to improving maternal, perinatal and family health. Conditions that adversely affect the outcome of pregnancy, such as sexually transmitted disease, unwanted pregnancies and lack of transportation should be addressed within the communities involved.

## **A SUPPORTIVE LEGAL FRAMEWORK**

Legislation and policies must be in place to support the national strategy, in terms of free care, termination of pregnancy services and protection of women. Politicians should publicly commit themselves to support improvements in health care for pregnant women.

## **ADAPTATION TO LOCAL REALITIES**

Some of the underlying causes of maternal and perinatal mortality, such as poverty, illiteracy and other national priorities, must be taken into account in the consideration of inadequacies in the health service or the utilisation thereof by pregnant women.

## **QUALITY OF CARE**

Health workers administering care to pregnant women must demonstrate respect and a genuine interest in their clients, and avoid an arrogant, rude or judgmental attitude. This applies even in the context of a poor working environment or perceived unsafe practices of certain pregnant women.

## **IMPROVEMENT IN THE STATUS OF WOMEN**

Active efforts must be made to improve the status of women in society, especially in education, reproductive choice, employment and the prevention of abuse.

## **PROVISION OF SKILLED MIDWIFERY AND OBSTETRIC SERVICES**

The 3 levels of the district health care pyramid (family and community, health centre, and district hospital) must function in an efficient and cost-effective manner. Midwives and doctors are the best equipped to provide technologically appropriate care to women during their reproductive lives. To prevent maternal deaths, all hospitals must offer caesarean section and blood transfusion facilities. The practice of home deliveries, whether by professional or lay midwives, is not encouraged.

## **CLINICAL GUIDELINES**

The development of management guidelines for normal and high risk pregnancies will provide a framework for a high standard of maternity care.

## **REGIONALISED CARE AND REFERRAL SYSTEMS**

The district is the basic unit of a health care region, served by a district hospital and a number of health centres. A well coordinated referral system, with access to transport and facilities, is essential for the provision of optimal care to all pregnant women in the district.

## **MANAGEMENT CAPACITY**

Poor management has been identified as a major weakness of health services in developing countries. Proper financial planning and optimal management of staff and resources are keystones to a fully functional district or provincial health system.

## **CONTINUING AUDIT OF SERVICES**

It is essential to review and audit services and practices in districts and provinces, to improve current services and to develop new services where necessary. Medical and nursing audit meetings should be held at all levels of the health care system.

## **RESEARCH**

Important areas for research include evaluation of the impact of community involvement as a strategy for improving maternal and neonatal health, operation and evaluation of reorganised antenatal care, and cost effectiveness studies of various interventions

## **OBJECTIVE OF THE NATIONAL GUIDELINES**

These guidelines have been prepared by the Subdirectorate: Maternal Health for the guidance of health workers (doctors and midwives) providing obstetric, surgical and anaesthetic services for pregnant women in district clinics, health centres and hospitals, where there is limited access to specialist services.

In the absence of a functioning system of primary health care and without guidance for clinical management and referral, pregnancy related deaths and ill health can be expected to continue at unacceptable high rates.

## **USING THESE GUIDELINES**

### **FORMAT AND CONTENT**

These guidelines are intended for use in clinics, community health centres and district (level 1) hospitals where specialist obstetricians are not normally available. They are concerned with the diagnosis and especially the management of common and serious pregnancy problems. The assumption is made that the reader has a basic knowledge and understanding about the care of pregnant women. With a few exceptions (e.g. pre-eclampsia), there is no mention of aetiology and pathogenesis of the conditions described. The emphasis is on the practical identification and correct management of problems, including referral to higher levels of care. The approach is unashamedly dry, and reduced to point format, so that a management plan can be quickly assimilated and enacted. For certain clinical problems, algorithms (flow diagrams) have been prepared.

The guidelines are based on the best available evidence from published research, modified where necessary to suit local conditions. References are not given, but are available from the authors on request. Specifics of management and drug dosing are not cast in stone, and can be modified according to the experience of the reader and new evidence. Each patient is an individual and may not necessarily be served best by the suggested guidelines. The guidelines would be used most effectively if individual hospitals and community health centres drew up their own protocols based on the contents, adjusted to their own particular circumstances.

## EXCLUSIONS

The following topics have been excluded from the guidelines:

- **Contraception, termination of pregnancy, miscarriage and ectopic pregnancy.** These are not usually considered to be aspects of maternity care.
- **The role of community based resources.** This includes community health workers, doulas (birth supporters), traditional birth attendants and support groups.
- **Technical descriptions of procedures.** Surgical techniques, ultrasound, amniocentesis, etc. cannot be learned from a book. Emergency procedures such as breech delivery, are however described.
- **Neonatal care.** Only immediate care of the newborn is described

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## CHAPTER 2

# LEVELS OF MATERNITY CARE

<b>The need for levels of care</b>	<b>13</b>
<b>Clinic</b>	<b>13</b>
Functions	13
Staffing	13
Facilities	13
<b>Community Health Centre</b>	<b>14</b>
Functions	14
Staffing	14
Facilities	14
<b>Level 1 hospital</b>	<b>15</b>
Functions	15
Staffing	15
Facilities	15
<b>Level 2 hospital</b>	<b>16</b>
Functions	16
Staffing	16
Facilities	16
<b>Level 3 hospital</b>	<b>16</b>
Functions	16
Staffing	16
Facilities	17
<b>Emergency transport</b>	<b>17</b>

## **THE NEED FOR LEVELS OF CARE**

The definitions of levels of care have been modified, with minor adjustments, from the Department of Health's Maternal, Child and Women's Health policy proposal, which was published in 1995.

Different levels of health care are required in districts and regions for the efficient functioning of the health service. Most medical conditions do not need the facilities of large hospitals. For cost effective health management, clinics and hospitals should share the load of patient care, whereby clinics manage common and low risk problems and hospitals the more difficult clinical entities. It is essential to have in place a referral system with clear protocols of management, referral, transport and responsibility.

Approximately 60-70% of all women who use the government facilities will require the services of a hospital at some stage during their pregnancies. About 10% of women will require the services of a specialist obstetrician at a level 2 or level 3 hospital.

The terms clinic, community health centre, and level 1, level 2 and level 3 hospitals, will be used in these guidelines and follow the definitions given below. Neonatal care staffing and facilities are not included.

Comprehensive lists of equipment, drugs and supplies appear in Appendices IV . These lists may assist managers of maternity care services to provide adequately equipped facilities in their areas.

### **CLINIC**

This is a unit which normally functions only on weekdays during working hours. Antenatal care is one of a number of activities in the clinic, the others being chronic diseases, child health, family planning, etc.

### **FUNCTIONS**

- Antenatal care for low and intermediate risk women including on-site blood testing
- Postnatal checks including contraception
- Referral of problems to hospital
- Management of emergencies

### **STAFFING**

Midwives, enrolled nurses, nursing assistants, community health worker and a visiting medical officer

### **FACILITIES**

- All the necessities to run an antenatal clinic
- Equipment and drugs for obstetric emergencies (oxygen, Ringer-Lactate solution, magnesium sulphate, hexoprenaline)
- Sterile delivery packs for emergency deliveries
- Reliable transport service for emergency transfer to hospital
- Effective communication system (radio or telephone)

# COMMUNITY HEALTH CENTRE

This is a 24 hour comprehensive obstetric unit run by midwives. Where it stands alone as a maternity service, it might be called a midwife obstetric unit (MOU). More often, the maternity section will run alongside other services such as emergency care, minor ailments, chronic diseases, and promotive services.

## FUNCTIONS

- Antenatal care for low and intermediate risk women including on-site routine blood testing
- Treatment of the common problems of pregnancy
- 24 hour labour and delivery service for low risk women
- Vacuum extraction
- Postnatal checks including contraception
- Referral of problems to hospital
- Management of emergencies

## STAFFING

Advanced midwives, midwives, enrolled nurses, nursing assistants, community health worker and a visiting or resident medical officer

## FACILITIES

- All the necessities to run an antenatal clinic
- All equipment to run a low risk labour ward
- Hand-held Doppler instrument for fetal heart auscultation
- A vacuum extractor
- Equipment and drugs for obstetric emergencies (oxygen, Ringer-Lactate solution, magnesium sulphate, hexoprenaline)
- Effective communication system (radio or telephone)
- Reliable 24 hour transport service for emergency transfer to hospital
- A mothers' waiting area in rural areas with poor transport infrastructure

## **LEVEL 1 HOSPITAL**

This may be called a district hospital, as it would normally be the base hospital for a health district. The definition applies best to rural areas, while in urban areas, level 1 hospital functions are often integrated into larger hospitals

### **FUNCTIONS**

- Antenatal care for high risk women including on-site routine blood testing
- Antenatal ultrasound service
- Treatment of pregnancy problems, including admission to hospital
- 24 hour labour and delivery service for intermediate and high risk women
- Vacuum extraction, caesarean section and manual removal of placenta
- Regional and general anaesthesia
- Blood transfusion
- Essential special investigations
- Postnatal care including complications and postoperative care
- Postpartum sterilisation
- Referral centre for clinics and community health centres in the district
- Supervision of clinics and community health centres in the district
- Referral of complicated problems to level 2 or level 3 hospitals
- Counselling and support
- Genetic screening and counselling services

### **STAFFING**

Advanced midwives, midwives, enrolled nurses, nursing assistants, social workers, community health workers, full time medical officers and visiting specialist obstetricians

### **FACILITIES**

- All the necessities to run an antenatal clinic including an ultrasound scanner
- All equipment to run a high risk labour ward including a vacuum extractor, cardiotocograph (CTG) machines and intravenous fluid infusion pumps
- A 24 hour laboratory service
- Blood bank
- Equipment and drugs for obstetric emergencies including a fully equipped resuscitation trolley and defibrillator
- Fully equipped operating theatre
- X-ray facilities
- Reliable transport service for emergency transfer to level 2 or level 3 hospitals
- A mothers' waiting area in rural areas with poor transport infrastructure

## **LEVEL 2 HOSPITAL**

This may be called a regional hospital, as it is the base hospital for a health region, which will include a number of districts. Level 2 hospitals frequently include level 1 functions and may be the base hospitals for nearby clinics and community health centres.

### **FUNCTIONS**

- All level 1 functions
- Management of severely ill pregnant women
- Specialist supervision of the care of pregnant women
- Prenatal diagnosis, e.g. genetic amniocentesis
- Multidisciplinary care – other specialities, physiotherapy etc.
- Referral centre for level 1 hospitals in the region
- Supervision and support for level 1 hospitals

### **STAFFING**

Advanced midwives, midwives, enrolled nurses, nursing assistants, full time medical officers and full time specialist obstetricians

### **FACILITIES**

- All the facilities required in a level 1 hospital
- Intensive care unit

## **LEVEL 3 HOSPITAL**

This may be called a central (or tertiary) hospital.

### **FUNCTIONS**

- All level 1 and level 2 functions
- Specialist combined clinics, e.g. cardiac and diabetic pregnancy clinics
- Advanced prenatal diagnosis such as chorion villus sampling and cordocentesis
- Management of extremely ill or difficult obstetric patients
- Supervision and support for level 1 and level 2 hospitals
- Responsibility for policy and protocols in the regions served

### **STAFFING**

Advanced midwives, midwives, enrolled nurses, nursing assistants, full time medical officers and full time specialist obstetricians, including subspecialty skills, e.g. fetal medicine

## **FACILITIES**

- All the facilities required in level 1 and level 2 hospitals
- Specialised equipment for management of very ill or difficult obstetric patients

## **EMERGENCY TRANSPORT**

Appropriately staffed and equipped vehicles (ambulances) are to be available 24 hours a day in all health districts, to move women with emergencies from one health facility to another, or from their homes to a health facility. Appropriate communications, whether radio or telephone, must be in place so that ambulances can be called to transport such women as rapidly as possible.

Requirements for a maternity ambulance

- A midwife or qualified paramedic to accompany the patient in the vehicle
- All standard equipment for an ambulance, with essential materials for the care of a mother and newborn baby, including a delivery kit

## CHAPTER

# ANTENATAL CARE

<b>Principles of antenatal care</b>	<b>19</b>
Objectives	19
Preconception care	19
The antenatal card	19
Relationship with private caregivers	20
<b>The first antenatal visit</b>	<b>20</b>
Confirmation of pregnancy and timing of the first visit	20
The importance of the first antenatal visit	20
History taking	20
Physical examination	20
Mid-upper arm circumference	21
Estimation of gestational age	22
Essential screening investigations	26
Screening tests that are not offered routinely	26
Medications and vaccines	26
Final assessment	26
Information for pregnant women	27
<b>Subsequent antenatal visits</b>	<b>28</b>
Schedule for return visits	28
Content of subsequent antenatal visits	28
Fetal movement counting	31
<b>FIGURES, BOXES, TABLES AND ALGORITHMS</b>	
Figure 3.1. Symphysis-fundal height (SFH) graph of a woman with correct menstrual dates	24
Figure 3.2. SFH graph of a woman whose menstrual dates are unknown	25
Box 3.1. Preparation for home delivery	28
Box 3.2. Check list of risk factors requiring antenatal referral	30
Box 3.3. List of risk factors that arise during antenatal care	31
Table 3.1. Schedule for Basic Antenatal Care Activities (BANC) at each visit	29
Table 3.2. Fetal movement chart	31

# PRINCIPLES OF ANTENATAL CARE

## OBJECTIVES

Antenatal care attempts to ensure, by antenatal preparation, the best possible pregnancy outcome for women and their babies. This may be achieved by:

- Screening for pregnancy problems
- Assessment of pregnancy risk
- Treatment of problems that may arise during the antenatal period
- Giving medications that may improve pregnancy outcome
- Provision of information to pregnant women
- Physical and psychological preparation for childbirth and parenthood

## PRECONCEPTION CARE

This is the optimization of a woman's health or knowledge before she plans or conceives a pregnancy. All health workers (not only midwives and obstetric doctors) who care for women in the reproductive age group need to consider the possible effect of pregnancy on women they care for. Such women may be asked if there is a possibility of a pregnancy in the near future. If pregnancy is not desired, appropriate counselling and advice on contraception may be offered.

If a woman is considering pregnancy, the following considerations will assist in preparing her in terms of her own health and that of the baby that will be conceived:

- The presence of any medical conditions, controlled or uncontrolled
- Medication or radiation needed as treatment for such conditions
- The past obstetric history
- Nutritional issues, e.g. undernutrition or obesity
- Immunity to rubella by previous exposure or vaccination
- Family history and genetic risks
- Use of tobacco, alcohol and other recreational drugs
- Possible occupational and environmental exposures
- Social, economic and family issues
- Mental health issues

While designated preconception clinics are not the norm in South Africa, all health workers who look after women in the reproductive age have a responsibility to encourage women to make reproductive choices and assist those who are considering pregnancy to optimize their health and knowledge appropriately.

## THE ANTENATAL CARD

All pregnant women that present to a health care facility, public or private, should have, or should receive, an antenatal card. This is the principal record of the pregnancy and it must be completed at each antenatal clinic visit and retained by the mother until delivery, after which it will be kept at the place of confinement or final referral. It is not necessary for antenatal clinics to keep a duplicate record of the card. Only a record of attendance, with results of special investigations, needs to be kept at the antenatal clinic.

The format of antenatal cards currently varies between health care providers, but most are adequate for essential antenatal care. Women who present to an antenatal clinic with a card from another provider should have that card completed at the clinic, rather than being issued with a new card on which information would be duplicated.

## **RELATIONSHIP WITH PRIVATE CAREGIVERS**

Private midwives, general practitioners and obstetricians are responsible for the pregnancy care of many South African women. Dialogue and mutual respect should be encouraged between private caregivers and the government service. Women that are referred from private to public service care, and vice versa, should carry letters or cards that summarise all relevant antenatal care up to that point. Ultrasound reports are particularly valuable, as they assist in accurate dating of pregnancies.

## **THE FIRST ANTENATAL VISIT**

### **CONFIRMATION OF PREGNANCY AND TIMING OF THE FIRST VISIT**

A woman should visit her health care provider as soon as she suspects pregnancy, even as early as the first missed menstrual period. Urine pregnancy tests must be available at all health care facilities. Women who present to primary care clinics and are found to be pregnant must be issued with an antenatal card and receive first visit antenatal care. Those who request termination of pregnancy should be appropriately counselled and referred.

### **THE IMPORTANCE OF THE FIRST ANTENATAL VISIT**

Complete assessment of gestational age and risk factors can be made at the first ante-natal visit. It is not necessary to wait until the second visit before such assessments are finalised. After one visit, a pregnant woman can be regarded as 'booked'.

At the first visit, find out what health care the woman has received so far in the pregnancy, especially from private practitioners. If she has had previous antenatal care obtain information ( records) from the provider, if possible and regard that as the first visit.

## **HISTORY TAKING**

Take a full and relevant history including:

- Current pregnancy
- Previous pregnancies, any complications and outcomes
- Medical conditions, including psychiatric problems, and previous operations
- Familial and genetic disorders
- Allergies
- Use of medications
- Use of alcohol, tobacco and other substances
- Family and social circumstances

## **PHYSICAL EXAMINATION**

- Do a general examination including weight, height, heart rate, colour of mucous membranes, blood pressure, a check for oedema, and palpation for lymph nodes

- Do a systemic examination including teeth and gums, breasts, thyroid, and heart and lung examination. Where no staff member in the antenatal clinic has been trained to perform heart and lung examination, this may be omitted provided the pregnant woman has no history or symptoms of heart or lung disease. Refer women with dental problems to a dentist or dental therapist.
- Examine the pregnancy including inspection and palpation of the pregnant uterus, with measurement of the symphysis-fundal height (SFH) in cm. Listen to the fetal heart from 26 weeks gestation.

## **MID-UPPER ARM CIRCUMFERENCE**

### **THE MEASUREMENT OF MID-UPPER ARM CIRCUMFERENCE (MUAC)**

After extensive discussion and consultation, the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) has included MUAC in the national Maternal Death Notification Form. The MUAC gives useful information on nutritional status and pregnancy risk and is easily done during the antenatal period or during labour. Use of the MUAC in pregnancy is supported by research done in a number of African countries and elsewhere. A reading list is provided below.

The NCCEMD requests that all institutions training health workers in the care of pregnant women, and all health facilities that treat pregnant women, instruct and support their staff in routine measurement of MUAC.

MUAC is advantageous over body-mass index because height does not need to be measured, accurate scales are not required, the woman does not have to stand up straight, no calculations need be done, and MUAC, unlike weight, does not normally increase significantly during pregnancy

#### **An MUAC $\geq$ 33 cm:**

- Suggests obesity
- Is associated with an increased risk of pre-eclampsia and maternal diabetes
- Is associated with an increased risk of delivery of a larger than normal infant
- Indicates that blood pressure measurement with a normal-sized adult cuff may be an overestimation

#### **An MUAC <23 cm:**

- Suggests undernutrition or a chronic wasting illness
- Is associated with delivery of a smaller than normal infant

#### **How to measure MUAC**

1. Measure the MUAC just before or just after checking the blood pressure
2. Use a soft tape-measure, as for symphysis-fundal height
3. Measure the MUAC at any gestation, or during or after labour
4. Measure the arm circumference in either the right or left arm, midway between the tip of the shoulder (acromion) and the tip of the elbow (olecranon)
5. Record the measurement to the nearest 1 mm
6. The arm should hang freely (elbow extended)
7. Record the MUAC on the antenatal card or in the labour ward admission notes

## What should be done if an abnormal MUAC is found?

- **On its own, an abnormal MUAC:**

- Is not a reason for more frequent antenatal visits
- Is not a reason for referral to a higher level of care
- Does not require extraordinary special investigations, e.g. chest x-ray, glucose testing
- Should lower the health worker's threshold for concern as follows:

- **An MUAC <23 cm should:**

- Raise vigilance for undernutrition or chronic illness, e.g. infection or neoplasia
- Raise vigilance for fetal growth restriction, and careful SFH measurement and uterine palpation at all antenatal visits

- **An MUAC ≥33 cm should:**

- Raise concerns about risks of hypertension and gestational diabetes
- Raise concern about the risk of fetal macrosomia – disproportion, shoulder dystocia
- Necessitate use of a large sphygmomanometer cuff

Information about the MUAC will assist the National Committee to understand the role of obesity, undernutrition and obesity in maternal mortality in South Africa.

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## ESTIMATION OF GESTATIONAL AGE

Indicate on the antenatal card how the gestational age was estimated. The first estimation of gestational age, with the expected date of delivery, should be used for the remainder of the pregnancy and must not be changed unless important new information becomes available.

**Last menstrual period**

This is valid if the woman is sure of her dates, and where palpation of the uterus and SFH measurement are compatible with the given dates (Figure 3.1). Gestation age must be calculated from the first day of the last menstrual period.

**Symphysis-fundal height (SFH) measurement**

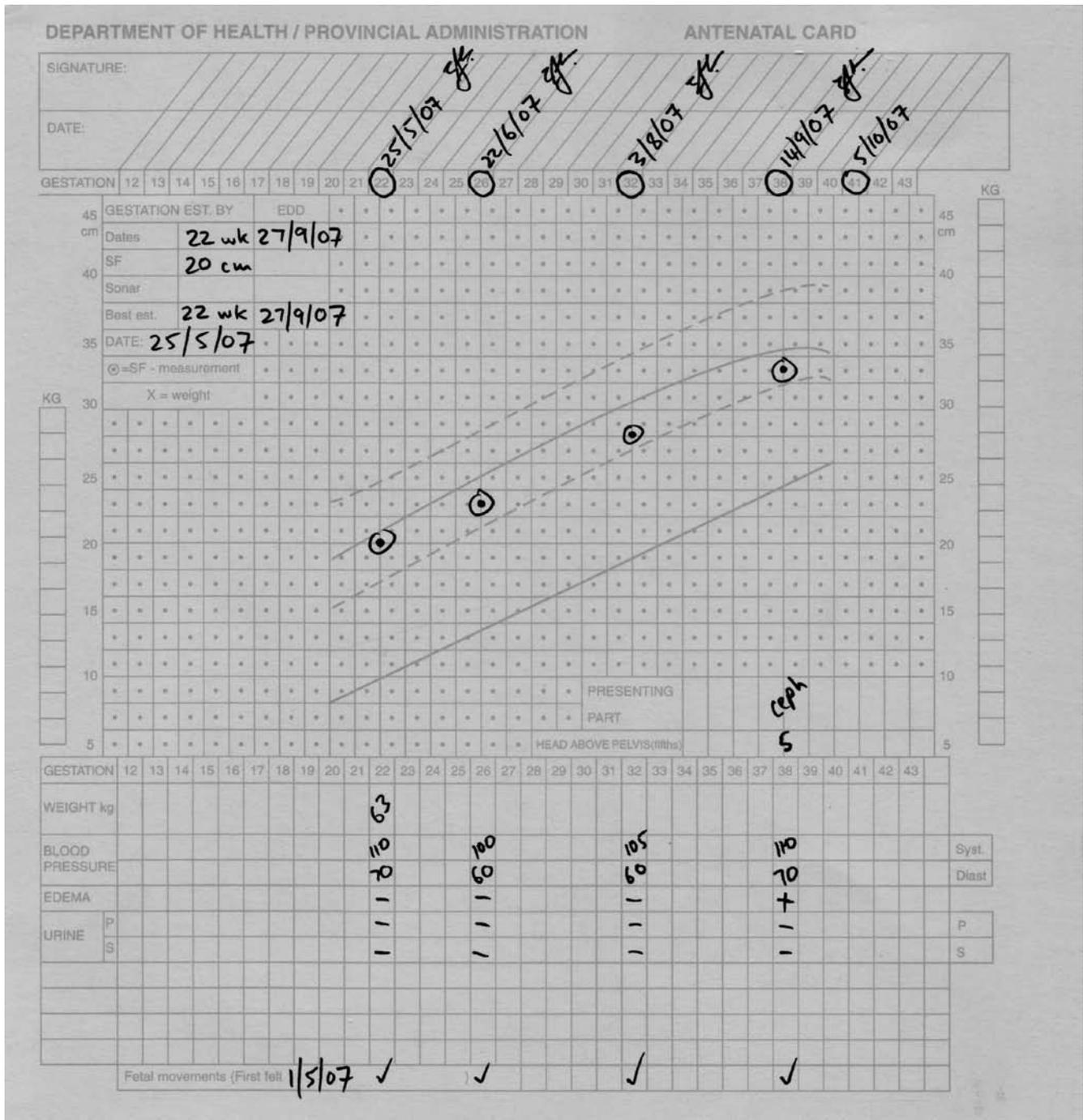
This is used for estimation of gestational age after 24 weeks if the dates from the last menstrual period are unknown or wrong, in the presence of a normal singleton pregnancy. The measured SFH is plotted onto the 50th centile line on the SFH graph, allowing the corresponding gestational age to be read from the graph (Figure 3.2).

**Palpation**

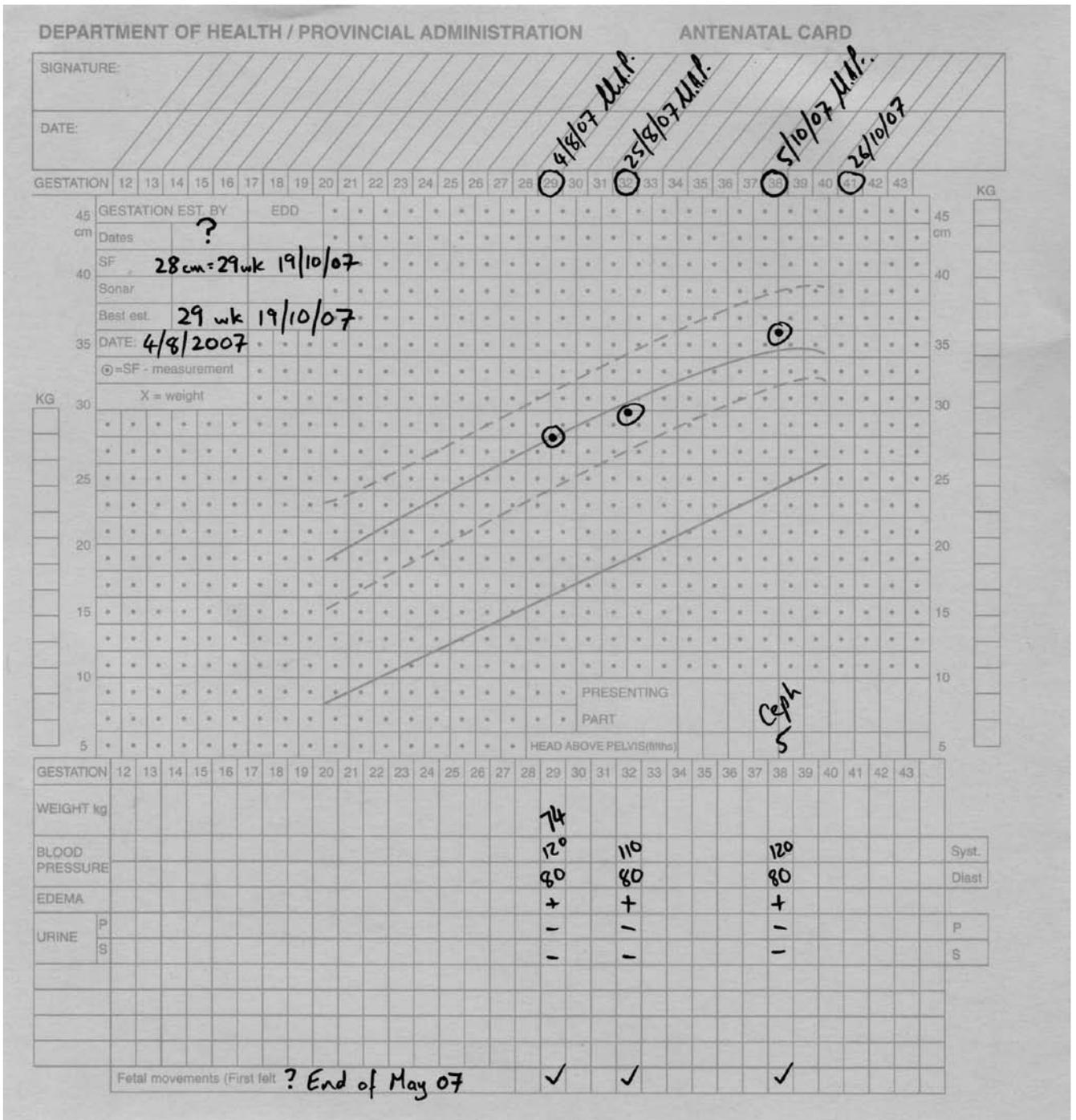
The SFH measurement is of little value for estimation of gestational age at  $<20$  cm and  $\geq 35$  cm (corresponding to  $<20$  weeks and term respectively). In early pregnancy, bimanual and abdominal palpation can be used, and at term, palpation of the fetal head is of some value. Gestational age assessment by palpation requires care, skill and experience.

**Ultrasound**

An ultrasound scan for gestational age estimation should be requested for women who are unsure of dates with SFH measurement less than 24 cm. Fetal measurements by ultrasound give reasonably accurate gestational age estimates before 24 weeks of gestation. Ultrasound after 24 weeks is less reliable.



**Figure 3.1. SFH graph of a woman with correct menstrual dates.** At booking (25/5/07), she was 22 weeks pregnant by dates. The SFH was 20 cm, in keeping with her dates. SFH growth is normal, just above the 10th centile line.



**Figure 3.2. SFH graph of a woman whose menstrual dates are unknown.** At booking (4/8/07), the SFH of 28 cm was entered on the 50th centile line, giving a gestational age of 29 weeks. SFH growth is close to the 50th centile line, and appears normal.

## **ESSENTIAL SCREENING INVESTIGATIONS**

- Syphilis serology. Non specific reagin tests (RPR, WR, VDRL) are performed, using a rapid card test.
- Rhesus (D) blood group, using a rapid card test
- Haemoglobin (Hb) level, using a portable haemoglobinometer or copper sulphate screening method
- Human immunodeficiency virus (HIV) serology, using rapid test kit. This must follow National guidelines on routine counselling and voluntary testing.
- Urine dipstick testing for protein and glucose

All of the above tests can be performed by midwives or appropriately trained auxiliary staff at the clinic 'on site', with the results available to the pregnant women before they complete the first visit. .

## **SCREENING TESTS THAT ARE NOT OFFERED ROUTINELY**

Inform pregnant women that the following screening tests are not routinely offered, but may be indicated in special circumstances:

- ABO blood group
- Triple screen for Down's syndrome and neural tube defects
- Rubella serology
- Blood glucose screening
- Cervical (Papanicolaou) smear
- Urine culture
- Ultrasound scan

## **MEDICATIONS AND VACCINES**

The following are given to all pregnant women:

- Ferrous sulphate tablets 200 mg daily, to prevent anaemia
- Calcium tablets 1000 mg daily, to prevent complications of pre-eclampsia
- Folic acid tablets 5 mg daily.

### **Tetanus toxoid (TT) immunization, to prevent neonatal tetanus:**

- First pregnancy: TT1 at first antenatal visit, TT2 4 weeks later and TT3 6 months later
- Later pregnancies: Two TT boosters, one in each pregnancy at the first visit, for the two subsequent pregnancies, at least one year apart.
- A total of five properly spaced doses of TT provide life-long protection against tetanus
- If in a subsequent pregnancy, there is no record of previous immunization, treat as for a first pregnancy

## **FINAL ASSESSMENT**

The final assessment should include:

- Check-list for risk factors and a plan for further antenatal care and delivery (list of risk factors in Box 3.2)

- A best estimate of gestational age, based on the evidence obtained from the date of the last menstrual period, fetal palpation, measurement of SFH and ultrasound if available
- A plan for management of any problems

## **INFORMATION FOR PREGNANT WOMEN**

Certain essential information must be provided to all pregnant women, verbally and in the form of written or illustrated cards or pamphlets. This includes:

### **1. Five danger signs and symptoms of pregnancy**

- Severe headache
- Abdominal pain (not discomfort)
- Drainage of liquor from the vagina
- Vaginal bleeding
- Reduced fetal movements

A woman that experiences any of these symptoms should report immediately to her clinic or hospital with her antenatal card.

### **2. Self-care in pregnancy**

- Diet and exercise
- Personal hygiene and breast care
- Use of medications
- Abuse of alcohol, tobacco and recreational drugs

### **3. A delivery plan**

At the end of the first visit, all pregnant women should be given a provisional delivery plan:

- The expected date of delivery, based on the best estimate of gestational age
- The expected place of delivery, whether community health centre or hospital
- The expected mode of delivery, whether vaginal or caesarean section
- Who will deliver the baby, whether midwife or doctor
- Pain relief options including non pharmacological methods.
- A transport plan for emergency or delivery, including important contact numbers
- Preparation for possible home delivery (Box 3.1.)

### **4. Newborn and infant care**

- Plans for infant feeding and techniques, whether breast or formula
- Details of follow up care: immunisation and where this can be obtained

## 5. Future pregnancies and contraception

- Information on genetic disorders and birth defects (Table 7.3)
- Contraception that will be used after the pregnancy

### PREPARATION FOR HOME DELIVERY

There are situations which will force a woman to give birth at her home or in a vehicle. In such cases, the delivery should be conducted as safely as possible as follows:

- Ensure that the woman gives birth in a clean environment
- Have clean linen ready for mother and baby
- Boil lengths of string to tie the umbilical cord and keep them in an antiseptic solution, e.g. methylated spirits
- Use a clean blade (new if possible) to cut the umbilical cord
- Put the baby to the breast as soon as it is born to enhance uterine contraction
- Check that the mother is not bleeding excessively
- Keep both mother and baby warm
- Arrange for referral to a health facility for further management

#### Box 3.1. Preparation for home delivery

## SUBSEQUENT ANTENATAL VISITS

### SCHEDULE FOR RETURN VISITS

- A 'basic antenatal care' schedule of four follow-up visits is provided for women without risk factors as listed (Boxes 3.2 and 3.3).
- Following an early booking visit (<12 weeks), return visits should be scheduled for 20, 26, 32, and 38 weeks, and 41 weeks if still pregnant.
- This is not applicable for women with risk factors, whose return visits schedules will depend on their specific problems.

### CONTENT OF SUBSEQUENT ANTENATAL VISITS

- A summary of basic antenatal care is shown in Table 3.1.
- Ask about general well-being, fetal movements, danger symptoms and any problems
- Check the blood pressure, heart rate and colour of the mucous membranes
- Measure the symphysis-fundal height (SFH) in cm. Plot the SFH on the graph against the gestational age and compare with the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> centiles for gestational age and with previous measurements
- Palpate carefully for breech presentation at 38 weeks
- Test the urine for protein, glucose, blood and ketones
- Repeat HIV test at 32 weeks for all women who tested negative at initial testing
- Repeat blood tests: Hb at 32 and 38 weeks, and a repeat RPR at  $\pm 36$  weeks if the first test was negative before 20 weeks of pregnancy
- Repeat information for danger signs pregnancy, and review delivery and transport plans, as well as feeding and contraception choices at 32 and 38 weeks.

- At 38 weeks, remind the woman to bring her antenatal card when she presents to the clinic or hospital in labour

Table 3.1. Check list for Basic Antenatal Care Activities (BANC) at each antenatal visit. If the first visit is later than 12 weeks, all activities for the '<12' week visit should be undertaken at that time, regardless of gestation.

<b>Weeks of gestation:</b>	<b>&lt;12</b>	<b>20</b>	<b>26</b>	<b>32</b>	<b>38</b>
History taken	×				
Clinical examination	×				
Estimated date of delivery calculated	×				
Blood pressure taken	×	×	×	×	×
Maternal height and weight	×				
Haemoglobin test	×			×	×
RPR performed	×				
Rapid Rh performed	×				
Counseled and voluntary testing for HIV	×				
Urine tested	×				
Tetanus toxoid given	×				
Iron and folate supplementation given	×	×	×	×	×
Calcium supplementation given	×	×	×	×	×
Information on emergencies given	×	×	×	×	×
Antenatal card completed, given to woman	×	×	×	×	×
Clinical examination for anaemia		×	×	×	×
Urine test for protein		×	×	×	×
Uterus measured for growth		×	×	×	×
Instructions given for delivery and transport				×	×
Advice on lactation and contraception				×	×
Detection of breech and referral					×
Reminder to bring card when in labour					×
Give follow-up visit for 41 weeks					×

## **CHECK LIST OF RISK FACTORS REQUIRING REFERRAL OR HOSPITAL DELIVERY**

### **Obstetric history**

Previous stillbirth  
Previous neonatal death  
Previous low birth weight baby (<2.5 kg)  
Previous large baby (>4.5 kg)  
Previous pregnancy admission for hypertension or pre-eclampsia/eclampsia  
Previous caesarean section  
Previous myomectomy  
Previous cone biopsy  
Previous cervical cerclage

### **Current pregnancy**

Diagnosed or suspected multiple pregnancy  
Age <16 years  
Age >34 years  
Rhesus isoimmunisation in previous or current pregnancy  
Vaginal bleeding  
Pelvic mass  
Diastolic blood pressure  $\geq 90$  mmHg

### **General medical conditions**

Diabetes mellitus  
Cardiac disease  
Kidney disease  
Epilepsy  
Asthma on medication  
Active tuberculosis  
Known 'substance' abuse including alcohol  
Any severe medical condition

### **Risk factors requiring hospital delivery**

Previous postpartum haemorrhage  
Parity  $\geq 5$

### **Box 3.2. Check list of risk factors requiring antenatal referral**

## FURTHER RISK FACTORS THAT ARISE DURING ANTENATAL CARE

Anaemia not responding to iron tablets  
 Uterus large for dates (>90th centile symphysis-fundal height)  
 Uterus small for dates (<10th centile symphysis-fundal height)  
 Symphysis-fundal height decreasing  
 Breech or transverse lie at term  
 Extensive vulval warts that may obstruct vaginal delivery  
 Pregnancy beyond 41 weeks  
 Abnormal glucose screening (GTT or random blood sugar)  
 Reduced fetal movements from 28 weeks

### Box 3.3. List of risk factors that arise during antenatal care

## FETAL MOVEMENT COUNTING

This is only indicated for high risk pregnancies, e.g. pre-eclampsia, diabetes mellitus, intrauterine growth impairment, previous unexplained stillbirth.

1. Ask the mother to count fetal movements (not just kicks) for one hour at the same time every day, usually after breakfast
2. The number of movements should be recorded on a fetal movement chart (Table 6.2)
3. If there are 4 or more movements in one hour, the count is repeated at the same time on the next day
4. If there are less than 4 movements in one hour, or less than half of the hourly average (after about a week of counting), the mother should count fetal movements for one more hour

In the second hour, if there are still less than 4 movements or less than half of the hourly average, CTG is indicated to assess fetal well-being. Delivery may be considered depending on the clinical situation

Date	Time Started	Movements in first hour	N.B.	Movements in second hour	N.B.
			If less than 4 movements in the first hour go on to the second hour and count again		If less than 4 movements in the second hour please go to your clinic for a further test

Table 3.2. Fetal movement chart

# CHAPTER 4

## LABOUR AND THE PUERPERIUM

<b>Normal labour and puerperium</b>	<b>34</b>
Diagnosis of labour	34
Admission of a woman in labour	34
General care of women in labour	35
Routine monitoring of the first stage of labour	36
Analgesia in labour	37
Management of the second stage of labour	40
Management of the third stage of labour	41
Management of the fourth stage of labour	41
Management of the puerperium	42
<b>Abnormalities of the first stage of labour</b>	<b>44</b>
Poor progress in the latent phase of labour	44
Poor progress in the active phase of labour	44
Meconium staining of the liquor	51
Fetal monitoring	51
<b>Abnormalities of the second stage of labour</b>	<b>52</b>
Poor progress in the second stage of labour	52
Vacuum extraction	52
Forceps delivery	53
Caesarean section	54
Indications for caesarean section	54
The operation	54
Requests by pregnant women for caesarean section	55
<b>Emergencies during labour</b>	<b>55</b>
Fetal distress	55
Cord prolapse	55
Shoulder dystocia	56
<b>Immediate care of the newborn</b>	<b>57</b>
Neonatal resuscitation	57
Immediate care of the well newborn	58
<b>Abnormalities of the third and fourth stages</b>	<b>60</b>
Retained placenta	60
Primary postpartum haemorrhage	60

**Abnormalities of the puerperium** **63**

Secondary postpartum haemorrhage 63

Puerperal sepsis 63

**FIGURES, BOXES, TABLES AND ALGORITHMS**

Figure 4.1. Correct completion of a partogram – normal labour 38

Figure 4.2. Partogram – poor progress due to cephalopelvic disproportion 46

Figure 4.3. Partogram – poor progress due to inadequate contractions 48

Box 4.1. Oxytocin for induction or augmentation of labour 50

Box 4.2. Problems requiring transfer to hospital in labour or puerperium 65

Table 4.1 The Apgar score 59

Algorithm for neonatal resuscitation 59

Algorithm for management of postpartum haemorrhage 62

# NORMAL LABOUR AND PUERPERIUM

## DIAGNOSIS OF LABOUR

Labour is diagnosed if there are persistent painful uterine contractions accompanied by at least one of the following:

- Cervical effacement and dilatation
- Rupture of the membranes
- Show

**Latent phase:** the woman is in labour and the cervix is less than 4 cm dilated and more than 1 cm long

**Active phase:** the woman is in labour and the cervix is  $\geq 4$  cm dilated and less than 1 cm long

Sometimes one cannot be certain if the woman is in the latent or active phase.

## ADMISSION OF A WOMAN IN LABOUR

### History taking

1. Carefully review the antenatal card. Clearly note all risk factors. Interview unbooked mothers as if they were attending ante natal clinic for the first time
2. Find out the HIV status, using the national coding system if noted on the card. If the HIV status is not noted or cannot be decoded, ask confidentially if an HIV test has been done, and the result.
3. Note the nature of labour pains, vaginal bleeding, fetal movements, passage of liquor and any other relevant symptoms

### Physical examination

1. Note the psychological state, heart rate, temperature, blood pressure, and any oedema or pallor
2. Examine the abdomen
  - Inspection
  - Symphysis-fundal height in cm
  - Lie, presentation, position, and attitude
  - Level of the presenting part in fifths above the pelvic brim
  - Liquor volume
  - Uterine tone, and strength and frequency of contractions
  - Auscultation of the fetal heart rate between, during and after contractions
  - Estimation of fetal weight

3. Perform a vaginal examination:

- Vulva and vagina: abnormal discharge, warts or ulcers
- Cervix: length (effacement), position, consistency, and dilatation in cm
- Membranes: ruptured or not and whether there is meconium staining
- The presenting part: its position, the degree of moulding and caput

### **Special investigations**

1. Test the urine for glucose, protein and ketones
2. Take blood for RPR and rhesus group in unbooked women and in those whose results are not available, and for Hb if there is no recent result (<6 weeks old). Make sure that all results are available and written into the records prior to the women leaving the facility.
3. Offer routine counseling and voluntary testing for HIV if no result is available

## **GENERAL CARE OF WOMEN IN LABOUR**

### **1. Assessment of problems and risks**

Refer women with problems or risk factors to an experienced midwife or doctor, who may transfer the mother to a hospital, depending on the specific problem (Box 4.2).

### **2. Respect, privacy and companionship**

Treat all women in labour with respect and courtesy. Ensure privacy and always perform intimate examinations behind screens or curtains, with a chaperone if necessary. Allow family or friends to provide companionship during labour.

### **3. Diet and fluids**

Allow low risk women to eat and drink during labour. An intravenous drip is not routinely required. High risk women (Box 4.2) should not eat or drink during the active phase of labour and require an intravenous drip of Ringer-Lactate solution to run at 120 mL/hour.

### **4. Mobility and posture**

Encourage women in the latent phase of labour to walk around. Any posture (sitting, standing, kneeling, lying) is acceptable, except the flat supine position which causes compression of the aorta and vena cava by the uterus

### **5. Enemas and shaving of pubic hair**

These procedures are not of value in labour, and should not be offered routinely.

### **6. Artificial rupture of the membranes (amniotomy)**

This procedure may contribute to fetal infection and HIV transmission, and is not necessary in the routine management of normal labour.

## 7. Partogram

Enter all observations, fluid intake and output, and medications on the partogram.

### ROUTINE MONITORING OF THE FIRST STAGE OF LABOUR

#### Latent phase (cervix $\leq 3$ cm dilated):

- Blood pressure and pulse rate 4 hourly
- Temperature 4 hourly
- Uterine contractions 2 hourly
- Fetal heart rate 2 hourly
- Vaginal examination 4 hourly

Any change in condition warrants more frequent observation

#### Active phase (cervix $\geq 4$ cm dilated):

##### • Maternal condition

- Blood pressure hourly
- Heart rate hourly
- Temperature 4 hourly
- Urine volume and test 2 hourly

##### • Fetal condition

- Fetal heart rate  $\frac{1}{2}$  hourly – before, during and after contractions, using a hand-held Doppler instrument
- Colour and odour of the liquor 2 hourly if the membranes have ruptured

##### • Progress of labour

- Frequency and strength of uterine contractions hourly
- Level of the presenting part (in fifths above the brim) 2 hourly
- Cervical dilatation 2 hourly
- Caput and parieto-parietal moulding 2 hourly
- 

##### • Treatment given

- All medications
- All fluids administered, by whatever route

##### • Summary of findings

- Identified problems
- Proposed management

## **The partogram: alert and action lines**

Record all findings of maternal and fetal condition, and of progress in labour, on the partogram. As soon as the active phase of labour is diagnosed, draw an alert line at a slope of 1 cm/hour from the first cervical dilatation that is  $\geq 4$  cm dilated. Alternatively, if the partogram has a pre-drawn alert line, the cervical dilatation should be moved up to coincide with the alert line.

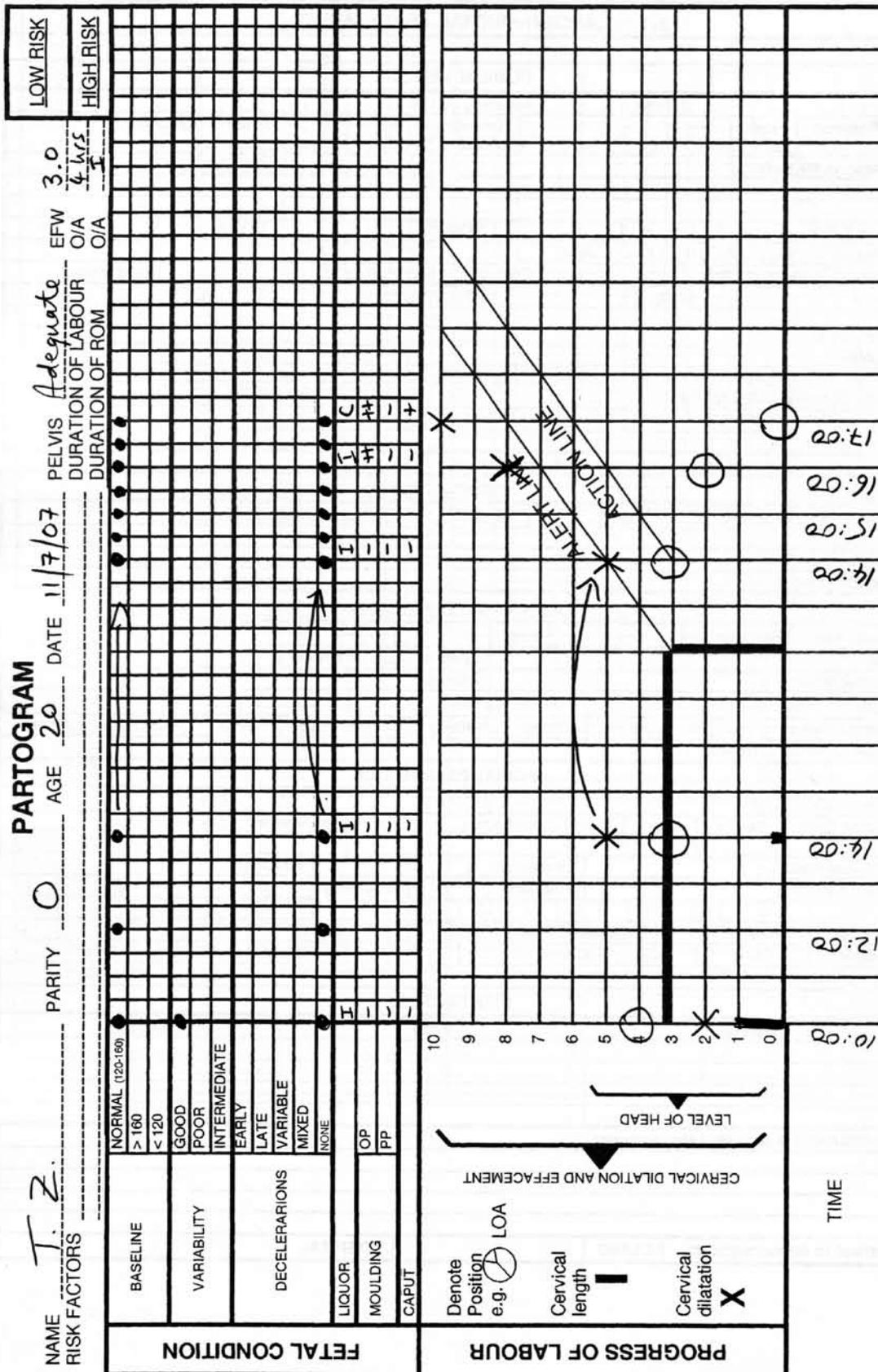
The action line is drawn 2 hours to the right and parallel to the alert line, and represents the extreme of poor progress where 'action' is mandatory (e.g. transfer from a clinic to hospital, oxytocin infusion or caesarean section)

Examples are shown in Figures 4.1, 4.2 and 4.3.

## **ANALGESIA IN LABOUR**

Pain relief should be offered to all women in labour

- Support and companionship have been shown to reduce the need for analgesic medication in labour
- Allow the woman to use positions and postures that best alleviate the labour pains
- Pethidine 100 mg IM with promethazine 25 mg IM 4 hourly is acceptable in both the latent and active phases, even up to full dilatation of the cervix
- Inhaled entonox (50/50 oxygen/nitrous oxide mixture) by mask is useful in the late first stage
- Epidural analgesia is generally not feasible for use in level 1 hospitals and community health centres. Some institutions may however have the necessary skills and equipment for this procedure



**Figure 4.1. Correct completion of a partogram – normal labour.** This woman presented in the latent phase of labour and made good progress to delivery.



## **MANAGEMENT OF THE SECOND STAGE OF LABOUR**

The second stage commences when the cervix reaches full dilatation (10 cm). From the time that full dilatation of the cervix is first noted, up to 2 hours may pass before the mother starts to bear down. Time can only be allowed for the head to descend onto the pelvic floor if fetal distress and cephalopelvic disproportion have been ruled out. The bladder should be emptied, using a catheter if necessary. The observations of the first stage of labour should continue. Efforts at bearing down are only encouraged when the fetal head starts to distend the perineum and the mother has an urge to push.

When the mother is ready to bear down:

- Always communicate clearly with the mother to gain co-operation
- Be supportive and encouraging
- Put the mother in a suitable position: propped up, sitting, squatting, kneeling, semi-Fowler's or wedged supine. Avoid the flat supine position as the uterus will compress the aorta and inferior vena cava
- Encourage pushing only during contractions
- Listen to the fetal heart rate between every second contraction
- Protect the perineum when the head crowns
- Gently suction the baby's mouth and nostrils while awaiting restitution and external rotation
- Record the times of onset of the second stage, onset of bearing down efforts and delivery

### **Episiotomy**

Episiotomy should only be performed for a valid indication:

- Thick or rigid perineum
- Fetal distress in the second stage of labour
- Prolonged second stage of labour with the fetal head bulging the perineum
- Maternal conditions where rapid delivery is required, e.g. cardiac disease
- Breech or assisted delivery
- Previous third degree tear
- Delivery of preterm babies where the perineum is tight

Local anaesthetic (lignocaine 1% solution, maximum 20 mL) must be infiltrated into the perineum before cutting the episiotomy. Mediolateral episiotomy is preferred, to prevent extension to a third degree tear.

## **MANAGEMENT OF THE THIRD STAGE OF LABOUR**

This stage starts immediately after delivery of the infant and ends with delivery of the placenta.

The active method should always be used, to prevent excessive bleeding:

- Immediately after delivery of the infant, ensure by abdominal palpation that there is no previously undiagnosed second twin
- If there is no second twin, give oxytocin 10 units IM
- Await uterine contraction and place the left hand on the mother's abdomen over the uterus.
- Do not massage or squeeze the uterus
- When the uterus is felt to contract, keep steady tension on the umbilical cord with the right hand, while pushing the uterus upwards with the left hand
- Deliver the placenta by applying continuous gentle traction on the cord
- Examine the placenta for completeness and any abnormalities

## **MANAGEMENT OF THE FOURTH STAGE OF LABOUR**

This stage is defined as the first hour after delivery of the placenta. The woman is at risk for postpartum haemorrhage and must be observed closely.

- Check if the uterus is well contracted
- Ensure that there is no excessive vaginal bleeding
- Check and record the mother's heart rate, blood pressure and temperature

During this time, the baby can be given to the mother. The pulse rate and blood pressure are recorded again after one hour, with continuous assessment of uterine contraction and vaginal bleeding. At the conclusion of the fourth stage, the mother can be given something to eat and be sent to a postnatal ward.

## **MANAGEMENT OF THE PUERPERIUM**

Discharge from clinic or hospital is permissible 6 hours after delivery provided that:

- There are no surgical, medical or obstetric problems that require attention
- The mother looks and feels well
- There is no evidence of anaemia
- The pulse rate, temperature and blood pressure are all normal
- There is no uterine tenderness
- There is no active vaginal bleeding
- There are no serious urinary symptoms (incontinence, retention)
- There is no excessive pain in the abdomen or perineum
- Breastfeeding, or formula feeding, has been explained and demonstrated
- Contraception has been discussed and provided

### **POSTNATAL CARE INTERVALS**

#### 6 HOURS

- Measure BP, pulse , respiration and temperature
- Do urine testing
- Assess general condition of the mother
- Assess for vaginal bleeding
- Check that uterus has contracted and measure fundal height
- Check if able to pass urine
- Exclude signs of eminent eclampsia if hypertensive
- Exclude abnormal vaginal blood flow
- Examine the perineum for tears and suture
- Look for signs of infection
- Provide counseling for HIV if omitted during ANC

#### 3 DAYS

- General condition of the mother
- BP, temperature and pulse
- Do urine testing
- Check fundal height
- Exclude urinary problems and establish if able to micturate
- Check vaginal bleeding for amount, colour and odour
- Check perineum for progress with healing
- Assess for haemorrhoids
- Exclude signs of thrombosis
- Check breasts for any problems
- Exclude signs of infections
- Estimate HB
- Provide counseling for HIV if omitted during ANC

- Provide information on diet, signs of complications, nutrition and contraception
- Assess the emotional status of the mother
- Review the discharge summary and ensure that Vit A and TT3 are given

#### 6 WEEKS

- Assess the general well being of the mother
- BP, temperature pulse and respiration
- Estimate HB
- Provide counseling and voluntary HIV testing
- Support on contraception method
- Assess and support the feeding method of choice
- Exclude signs of infections
- Review the discharge summary and ensure that Vit A and TT3 are given

#### **ON DISCHARGE ASSESS THE FOLLOWING**

- Mother's nutritional status
- Provide nutritional supplements if needed
- Exclude signs of anaemia and provide iron supplements
- Mental status or any abnormal behaviour
- Assess and support choice of feeding
- Provide contraception information that will enable mother to make an informed choice
- Provide the contraception of choice prior to discharge
- Advice on danger signs
- Offer routine counseling and voluntary HIV testing if not done during ANC

All findings should be recorded and the mother be given appointments to attend her nearest clinic for reassessment as described above. A relevant discharge summary must be written and given to the women to keep for postnatal and future pregnancy appointments.

Essential details of the pregnancy and delivery are to be entered on the Women's Health Card. If no cards are available, a relevant discharge summary must be written and given to the women to keep for postnatal and future pregnancy appointments.

# ABNORMALITIES OF THE FIRST STAGE OF LABOUR

## POOR PROGRESS IN THE LATENT PHASE OF LABOUR

The latent phase is prolonged when it exceeds 8 hours.

### Management

- Exclude other causes of abdominal pain, e.g. abruptio placentae, urinary tract infection
- Exclude false labour – characterised by no cervical changes and no increase in strength, regularity or frequency of labour pains. Women in false labour may be discharged if there are no other obstetric problems
- After excluding fetal distress and cephalopelvic disproportion (CPD), rupture the membranes and/or start an oxytocin infusion as for the active phase of labour (Box 4.1)

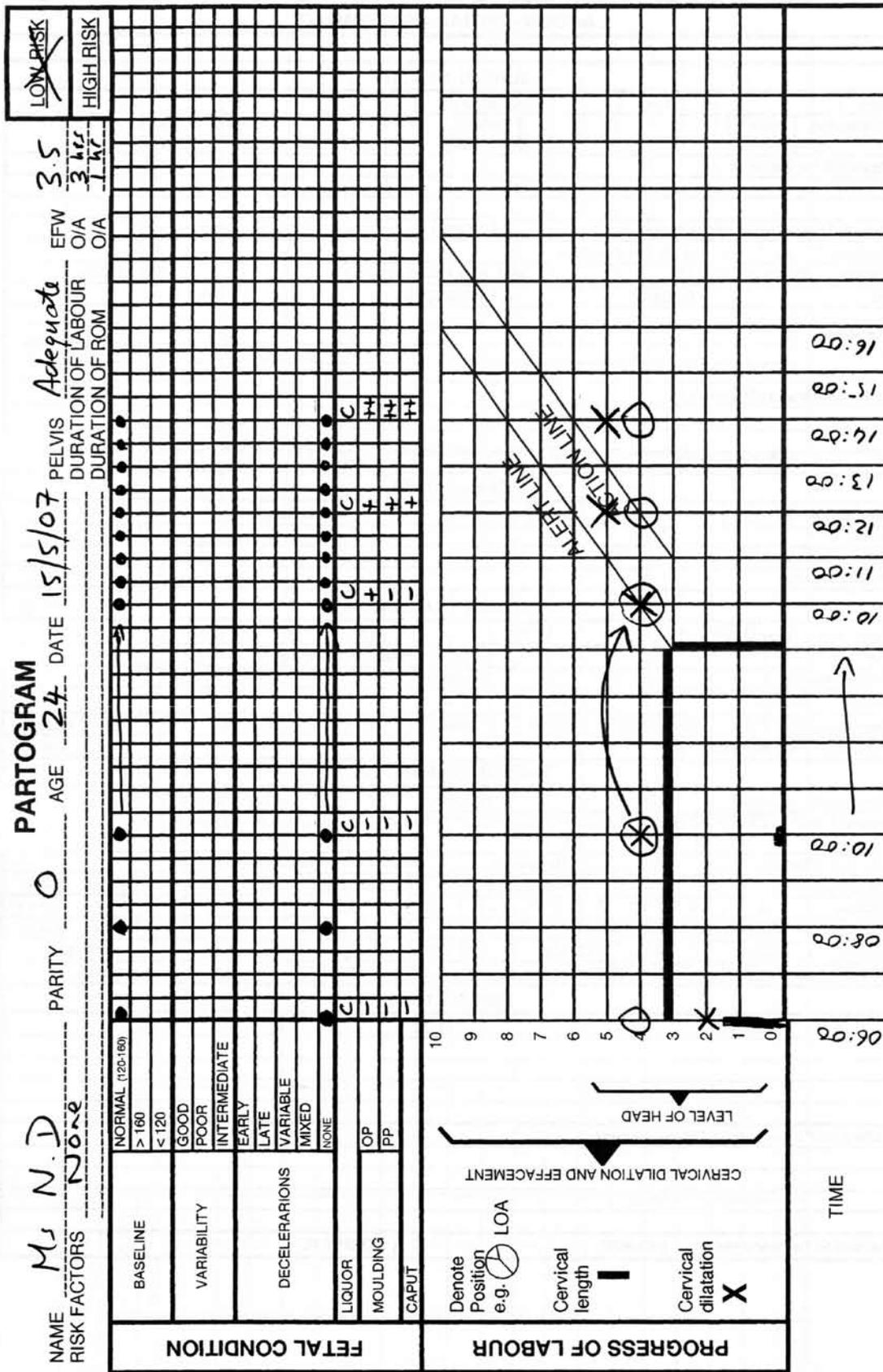
## POOR PROGRESS IN THE ACTIVE PHASE OF LABOUR

Labour is prolonged if the cervix dilates at a rate of less than 1 cm/hour (crosses the alert line). Partograms illustrating poor labour progress are shown in Figures 4.2 and 4.3.

### Management

- Use the rule of 4 Ps in the assessment (patient, powers, passage, passenger)
- Exclude CPD (increasing grade of parieto-parietal moulding with no descent, or grade 2 parieto-parietal moulding with head 3/5 above the brim): if found, caesarean section should be performed
- Exclude malpresentation: breech presentation with poor progress requires caesarean section
- Exclude fetal distress: if found, caesarean section should be performed
- Ensure adequate maternal hydration: start an intravenous infusion of Ringer-Lactate to run at 120-240 mL/hour
- Ensure that the bladder is empty; catheterisation is acceptable if the mother cannot void
- Give reassurance and support; do not leave the mother alone
- Give analgesia
- Rupture the membranes if still intact
- If there are no contraindications, start oxytocin infusion (Box 4.1)





**Figure 4.2. Partogram – poor progress due to cephalopelvic disproportion (CPD).** This woman presented in the latent phase of labour with spontaneous rupture of the membranes at home. Labour is prolonged as a result of CPD. Note the increase in moulding score with failure of descent of the head.





MATERIAL CONDITION	NAME AND SIGNATURE OF PERSON OF PERSON EXAMINING				
	OBM L/M	OBM L/M	OBM L/M	OBM L/M	OBM L/M
CONTRACTION	5	4	3	2	1
	Contractions per 10 mins.	>40 sec	20-40 sec	<20 sec	
DRUGS AND INTRAVENOUS FLUIDS					
B.P. AND PULSE					
URINE					
ASSESSMENT TIME					
PROBLEMS IDENTIFIED					
PLAN					

**Figure 4.3. Partogram – poor progress due to inadequate contractions.** This woman presented in the active phase of labour. Her labour is prolonged as a result of inefficient uterine action. Oxytocin augmentation was followed by normal delivery.

## **OXYTOCIN FOR INDUCTION OR AUGMENTATION OF LABOUR**

1. Add oxytocin 5 units to 1 L of Ringer-Lactate or Plasmalyte
2. Start infusion at a rate of 25 mL/hour (2 mU/minute or 6 drops/minute using a 15 drops/mL set)
3. Increase the infusion rate by doubling every 30 minutes – 50, 100, 200 mL/hour – until 3 to 4 strong contractions (>40 seconds) are achieved
4. If the infusion rate reaches 200 mL/hour and strong contractions are not achieved, increase the dose by starting an infusion of 10 units in 1 L at 200 mL/hour (33 mU/minute or 50 drops/minute using a 15 drops/mL)
5. Do not exceed an infusion rate of 200 mL/hour of oxytocin 10 units/L
6. Oxytocin may be given with intact membranes, when amniotomy is contraindicated or should be delayed

### **Precautions**

- There must be no evidence of CPD
- There must be no evidence of fetal distress
- Use CTG monitoring wherever possible
- Use oxytocin with great caution in multiparas, after excluding CPD
- Do not use oxytocin with parity  $\geq 5$  or previous caesarean section

### **Oxytocin for augmentation of labour at community health centres**

- Use oxytocin for augmentation only, not for induction
- An advanced midwife must be in attendance
- Monitor fetal heart rate every 15 minutes using a hand-held Doppler
- Only use oxytocin only for primigravidas
- Do not give oxytocin when labour progress has crossed the partogram action line – transfer the mother to hospital

### **Box 4.1. Oxytocin for induction or augmentation of labour**

## **MECONIUM STAINING OF THE LIQUOR**

Thin meconium staining requires no special management. Thick meconium staining is associated with an increased risk of fetal distress:

- Transfer from a community health centre to hospital unless delivery is imminent
- Monitor the fetus with a cardiotocograph (CTG) if available
- When the head extends at delivery, thoroughly suction the infant's mouth and then nose before delivering the trunk. Further care is described in the section on neonatal resuscitation.

## **FETAL MONITORING**

For low risk labour, listen to the fetal heart with a stethoscope or hand-held Doppler instrument every 30 minutes, before, during and after contractions.

Cardiotocography (CTG) is used for high risk labour only, and should be available in hospitals. CTG machines are however in short supply.

All CTG tracings must be kept safely in the mother's file. After CTG interpretation, write a note in the file with a comment on the CTG, so that a record is available even if the CTG tracing is lost.

### **Common indications for CTG monitoring in labour**

- Previous caesarean section
- Offensive liquor or thick meconium stained liquor
- Labour progress which has crossed the action line
- Suspected intrauterine growth impairment
- Suspected fetal distress
- Oxytocin infusion
- Prolonged rupture of membranes (>24 hours) or chorioamnionitis
- Pre-eclampsia
- Antepartum haemorrhage
- Multiple pregnancy

# ABNORMALITIES OF THE SECOND STAGE OF LABOUR

## POOR PROGRESS IN THE SECOND STAGE OF LABOUR

The second stage is prolonged if:

- The fetal head has not descended onto the pelvic floor after 2 hours of full dilatation, or
- If delivery has not occurred after 45 minutes of pushing in a nullipara, or 30 minutes of pushing in a multipara

### **If the mother is not bearing down after 1 hour of full dilatation:**

1. Re-examine to make sure the cervix is fully dilated
2. Rupture the membranes if they are still intact
3. Attempt delivery by asking the mother to bear down
4. If these efforts fail at a community health centre, transfer to hospital urgently
5. Exclude CPD, fetal distress or breech presentation: these necessitate caesarean section
6. Start oxytocin infusion (Box 4.1)
7. Continue routine monitoring of labour
8. Re-assess after one more hour: if not delivered, caesarean section or vacuum extraction will be required (below)

### **Failure of the head to descend despite maternal pushing**

If delivery has not occurred after 45 minutes of pushing in a nullipara, or 30 minutes in a multipara, or if there is no noticeable head descent with 3 consecutive pushes:

- Take care with assessing the level of the fetal head: excessive caput or moulding may give the impression that the head is deep in the pelvis even when it is not engaged. Use fifths above the brim to estimate head descent
- Perform vacuum extraction if the head is 0/5 or 1/5 palpable above the pelvic brim, if necessary with episiotomy and/or oxytocin infusion
- Arrange for emergency caesarean section if the head is 2/5 or more palpable above the pelvic brim

## VACUUM EXTRACTION

Vacuum extraction (ventouse) may be performed at community health centres by experienced advanced midwives, and in hospitals by advanced midwives and doctors

### **Conditions for safe vacuum extraction**

- Vertex presentation
- Head not more than 1/5 palpable above the pelvic brim
- Certainty about the position of the presenting part
- Cervix fully dilated
- Membranes ruptured

- Bladder empty
- Mother fully informed and co-operative
- Strong uterine contractions (>40 seconds)

### **Technique**

Techniques vary according to different cups and operators. Important principles include:

- Check the equipment thoroughly before use
- Apply traction only during contractions
- No more than 3 pulls (during 3 contractions) are allowed
- There should be noticeable descent with each pull
- No more than 2 cup detachments are allowed
- Failed vacuum extraction necessitates caesarean section
- Write up the procedure fully: time taken, cup type and size, number of pulls, number of detachments, and neonatal condition

### **FORCEPS DELIVERY**

This may be preferred over vacuum extraction when the mother is HIV positive, but should be done or supervised only by persons experienced with the instrument, and where all conditions for forceps delivery are met.

# CAESAREAN SECTION

## INDICATIONS FOR CAESAREAN SECTION

Common indications for caesarean section include:

- Cephalopelvic disproportion
- Fetal distress
- Previous caesarean section
- Failed induction of labour
- Intrauterine growth restriction
- Breech presentation
- Placenta praevia
- Transverse lie
- Previous third-degree tear

## THE OPERATION

All hospitals, as described in the chapter on levels of care, must have facilities and staff for the performance of caesarean section. Surgical techniques vary according to the circumstances and the experience of the operator. The following principles should be followed in all hospitals:

- Obtain informed consent for surgery, with the operation and its indication clearly explained to the mother
- Ensure that stored blood for transfusion is available in the hospital
- Ensure that caesarean section can be performed within one hour of the decision to operate
- Check the mother's Hb level
- Just before starting the operation, ensure that:
  - If sterilisation is to be done, consent has been obtained
  - The fetal heart can still be heard
  - The indication for operation is still valid
  - The fetal presentation and position are known
- Always give a broad spectrum antibiotic (intravenous first generation cephalosporin, e.g. cefazolin 2 g IV as a single dose) at the time of caesarean section, irrespective of whether it is an elective or emergency operation
- Use a vertical skin incision if there is a risk of intraoperative haemorrhage (antepartum haemorrhage, severe pre-eclampsia, coagulopathy),
- Allow the woman to be up and about as soon as she feels strong enough
- Give oral fluids and a light meal as soon as the woman feels hungry
- Consider prophylaxis against thromboembolism for women at risk (sodium heparin 5000 units SC 12 hourly while in hospital)
- Consider discharge from hospital from the third postoperative day

## REQUESTS BY PREGNANT WOMEN FOR CAESAREAN SECTION

Caesarean section is associated with an increased risk of maternal infection, haemorrhage, thromboembolism, death, and obstetric complications in subsequent pregnancies. Women who ask for caesarean section and have a relative indication, e.g. breech presentation or previous caesarean section, should be booked for elective caesarean section. Women with no clinical indication for caesarean section should be counselled about the risks and benefits of the procedure. In general, the performance of caesarean section without a valid indication is unacceptable practice.

## EMERGENCIES DURING LABOUR

### FETAL DISTRESS

This is suspected when the following signs are observed:

- Baseline fetal heart rate  $\geq 160$  beats per minute
- Baseline fetal heart rate  $< 110$  beats per minute
- Variability persistently  $< 5$  beats per minute on CTG, in the absence of sedating drugs
- Late decelerations of the fetal heart rate

### Management of fetal distress

1. Explain the problem to the mother
2. Lie the mother in a left lateral position
3. Give oxygen by face mask at 6 L/minute
4. Start an intravenous infusion of Ringer-Lactate to run at 240 mL/hour
5. Do a vaginal examination for cervical dilatation and to exclude cord prolapse:
  - If vaginal delivery is imminent (cervix fully dilated), deliver immediately, by vacuum extraction if necessary
  - If vaginal delivery is not imminent, give hexoprenaline 10 micrograms IV and prepare for immediate caesarean section. Arrange urgent transfer from a community health centre to hospital

### CORD PROLAPSE

**If the fetus is alive (fetal heart heard) and viable (estimated weight  $\geq 1$  kg):**

1. Call for assistance
2. Explain the problem to the mother
3. Perform vaginal examination:
  - **If the cervix is fully dilated and the fetal head has engaged in the pelvis, immediately deliver the baby, by vacuum extraction if necessary**
  - **If the cervix is not fully dilated, make arrangements for urgent caesarean section and/or transfer to hospital and proceed as follows:**

1. Replace the cord in the vagina or wrap it in warm wet towels
2. Handle the cord as little as possible
3. With the fingers, push the presenting part off the cord. Do not remove the fingers from the vagina if the presenting part compresses the cord
4. Insert an indwelling urinary catheter, at least size 18
5. Fill the mother's bladder with 500 mL normal saline and clamp the catheter
6. Give oxygen to the mother by face mask at 6 L/minute
7. Start an intravenous infusion of Ringer-Lactate
8. Give hexoprenaline 10 micrograms IV as a single dose
9. Place the mother in a left lateral Sims position\*
10. Make accurate notes of all that was done, with times
11. Before starting the caesarean section, make sure the fetus is alive (heart beat, cord pulsation)
12. If the baby is dead, or not yet viable, and there is no other indication for caesarean section, await vaginal delivery

*\*If the head is engaged in the pelvis or bladder filling fails to relieve cord compression, put the mother in a knee-elbow position*

## **SHOULDER DYSTOCIA**

This occurs with large babies (usually >3.5 kg) when delivery of the head is not followed by delivery of the shoulders. Emergency management is as follows:

1. Call for at least 2 assistants to help with delivery
2. Explain the problem to the mother
3. Immediately move the mother to the edge or end of the delivery bed
4. Tell the mother to hyperflex the hip joints (McRoberts' position) with the help of assistants. Her knees should almost touch her shoulders
5. Cut a wide episiotomy
6. Apply suprapubic pressure to force the anterior shoulder under the symphysis pubis
7. Push the head downwards to apply traction on the anterior shoulder. Do not stretch the neck, and avoid forceful jerking movements
8. If unsuccessful at this stage, deliver the posterior arm by locating the posterior shoulder in the vagina and sweeping the arm in front of the fetal chest. Once the posterior arm is delivered, proceed to deliver the anterior shoulder as mentioned above.
9. If this fails, rotate the baby through 180 degrees through a face-to-pubis position, to bring the posterior shoulder forward and make it anterior. It is important to hold both the arm and head together to facilitate rotation and reduce the risk of injury
10. If delivery has not been achieved so far, the baby is likely to die
11. If the baby is dead, await spontaneous delivery, although breaking the clavicle(s) may assist the process

# IMMEDIATE CARE OF THE NEWBORN

## NEONATAL RESUSCITATION

### General Principles

Every birth should be attended by at least one person skilled in neonatal resuscitation whose sole responsibility is management of the newborn. Therefore all staff who conduct deliveries should be able to resuscitate and provide immediate care to newborn infants.

### Babies that may require resuscitation

Always ensure that a skilled doctor or nurse is available at birth for the following:

- Meconium staining of amniotic fluid or any other evidence of fetal distress
- Prematurity (<36 weeks), Postmaturity (>42 weeks), anticipated small baby (<2000g) or large baby (>4000g).
- Multiple pregnancy, known major congenital abnormalities or hydrops
- Cord prolapse
- Abruptio placentae
- Prolonged or difficult labour
- Malpresentation

### Identifying infants who need resuscitation or ongoing assistance

Apgar scores must be assigned at 1 and 5 minutes. In addition, even before 1 minute, ask yourself the following questions:

- Is the amniotic fluid clear of meconium?
- Is the baby breathing or crying?
- Is there good muscle tone?
- Is the colour pink?
- Was the baby born at term?

If the answer is **YES** to all these questions, provide routine care:

1. Dry the baby, remove the wet linen and provide warmth
2. Clear the airway only if there are secretions, wiping the mouth and nose with gauze, cotton wool or clean linen.
3. Maintain warmth by putting the infant directly on the mother's chest and covering with dry linen (kangaroo mother-care - KMC)
4. Do not separate these babies from their mothers
5. Start feeds within an hour after birth, breastfeed unless contraindicated.

If the answer is **NO** to any of these questions, evaluate and resuscitate:

1. Provide warmth
2. Place the infant on a flat surface facing up with the head supported in a neutral position (not flexed, not hyperextended)
3. Suction the mouth and nose only when necessary i.e. when there are secretions that may obstruct the airway
4. Dry the baby and remove the wet linen

5. Provide gentle tactile stimulation (slapping the feet or gentle rubbing the back) for 2-3 seconds if the infant is not crying.
6. Determine the baby's colour, respiratory effort and heart rate. Listen to the heart rate with a stethoscope over the apex for 6 seconds multiply by 10

If the infant is **not breathing or breathing irregularly or heart rate is <100/ minute**, call for assistance and start resuscitation:

- A. **Airway:** Maintain the head in a neutral position, clearing secretions by gentle suction.
- B. **Breathing:** Start bag mask ventilation (BMV) at a 40 breaths/minute. Make sure that the chest moves with bagging. If the chest does not move, check the seal of the mask on the baby's face, and check for flexion or overextension of the neck. Reassess colour, respiratory effort and heart rate after 20-30 seconds. Most infants will respond to BMV. Stop bagging only if the infant is breathing regularly, and only give oxygen. If not breathing and heart rate is >60/minute continue bagging and reassess every 30 seconds until the infant starts breathing.
- C. **Circulation:** Intubate and start chest compressions if the heart rate is <60/min despite BMV. Perform chest compressions using index and middle fingers placed on the lower third of the sternum to depress the chest to about a third of its anterior-posterior diameter. Give compressions at a ratio of 3:1 (three chest compressions to one bagging). Reassess after 30 seconds and if the heart rate is still <60/minute give adrenalin 1:10 000 at 0.1 mL/kg intravenously or into the endotracheal tube. This may be repeated every 3-5 minutes. Give naloxone only after establishing good ventilation and if the mother received narcot ics in the last 4 hours of labour.

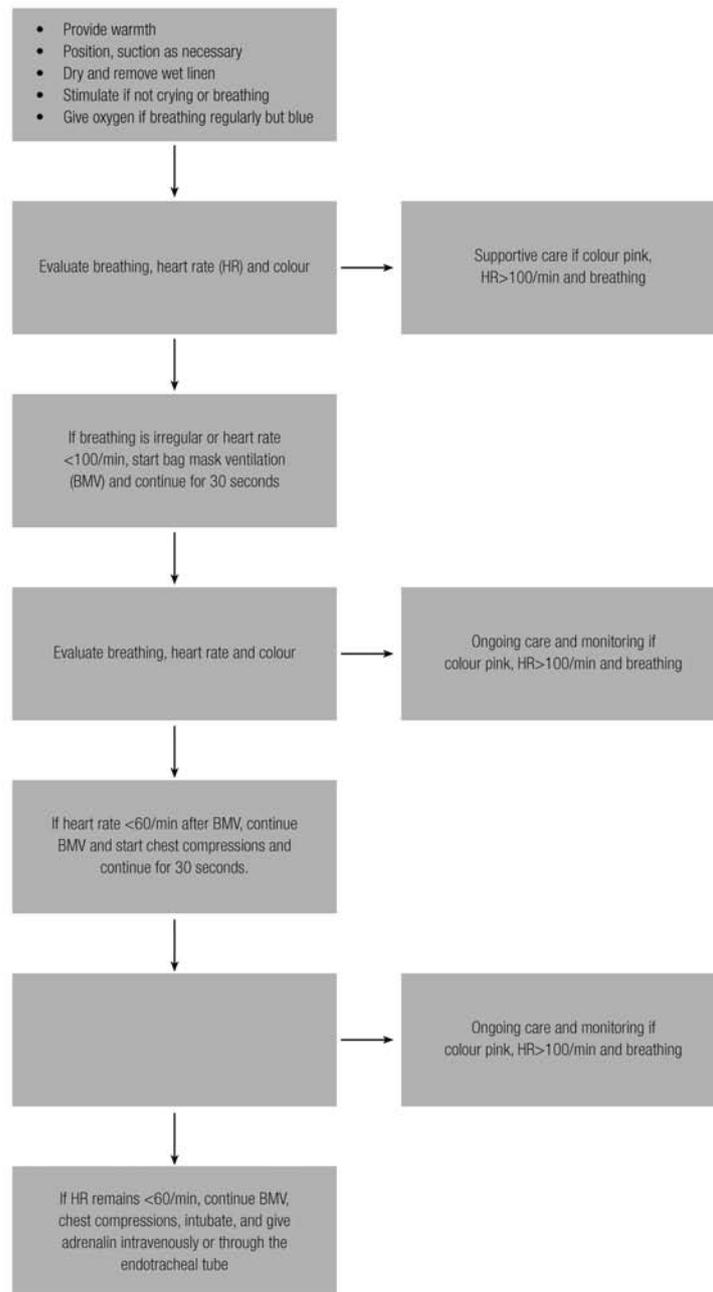
Babies who require prolonged BMV or more extensive resuscitation are at high risk for developing subsequent complications. Therefore these infants must be admitted for ongoing monitoring and support. Keep them warm, monitor temperature, respiration, heart rate, blood pressure, glucose and urine output.

## **IMMEDIATE CARE OF THE WELL NEWBORN**

- Wear protective gloves when handling a newborn who has not been bathed
- Maintain the baby's temperature by warming the environment, drying the infant immediately after birth, and using kangaroo mother care
- Assign an Apgar score at 1 and 5 minutes
- Do physical examination to look for congenital abnormalities
- Take measurements (weight, length and head circumference)
- Skin care – use cotton wool with tap water to remove blood and meconium. Do not remove the vernix caseosa
- Eye care – apply erythromycin ointment within an hour after birth
- Give vitamin K, 1 mg IM within an hour after birth
- Start feeds within an hour after birth. Breastfeed unless contraindicated

Table 4.1. The Apgar score.

Sign	Score		
	0	1	2
Colour	Blue or pale	Pink body, blue extremities	All pink
Heart rate	Absent	<100 beats per minute	>100 beats per minute
Respiratory Effort	Absent	Gasping or irregular	Regular or crying
Muscle tone	Limp or floppy	Some flexion of extremities	Active movement
Response to stimulation	No response	Grimace	Cry or cough or sneeze



**ALGORITHM FOR  
NEONATAL RESUSCITATION**

# ABNORMALITIES OF THE THIRD AND FOURTH STAGES

## RETAINED PLACENTA

A placenta is retained when it is not delivered within 30 minutes of delivery of the baby

### Management of retained placenta

1. Ensure that the bladder is empty by passing a urinary catheter
2. Start an infusion with oxytocin 20 units in 1L Ringer-Lactate at 120-240 mL/hour)
3. Observe the mother constantly for vaginal bleeding or placental delivery. Give nothing by mouth
4. If placenta has not been delivered after one hour of oxytocin infusion, or if there is excessive vaginal bleeding, transfer from a community health centre to hospital
5. If there is excessive bleeding, observe pulse, BP, and respiratory rate every 15 minutes, excluding signs of shock, and add a second intravenous line
6. Perform manual removal in an operating theatre under general anaesthesia

### Manual removal of placenta, and evacuation of the uterus

All hospitals should have facilities and staff to perform these procedures. The following principles should be followed:

- Blood for transfusion must be available in the hospital
- Use general or neurolept anaesthesia
- Give prophylactic broad spectrum antimicrobials at the time of the procedure
- If instruments are needed, use the largest available forceps and curettes, to prevent uterine perforation

## PRIMARY POSTPARTUM HAEMORRHAGE

This is defined as blood loss greater than 500 mL in the first 24 hours after delivery, or as a visibly excessive blood loss after delivery.

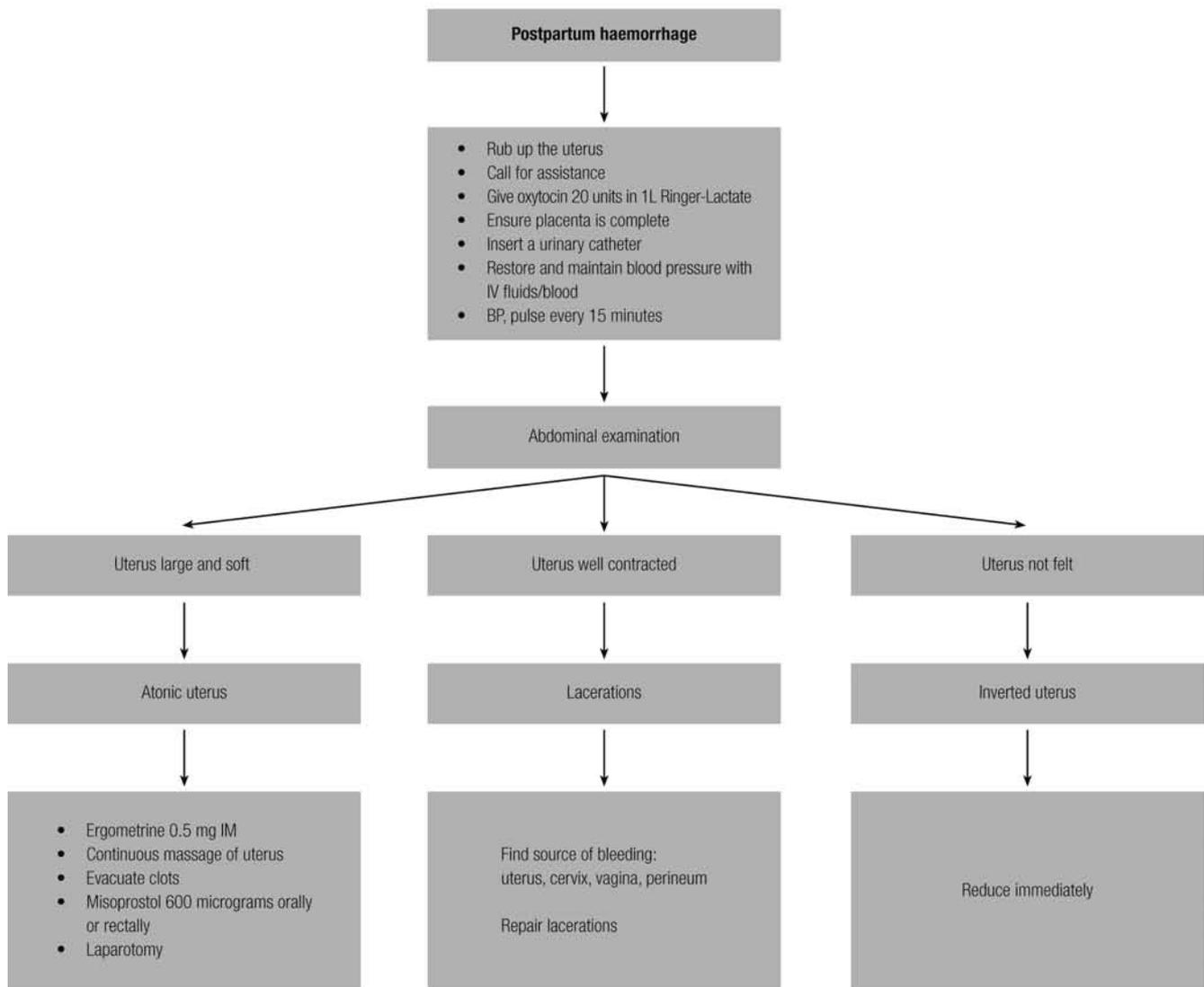
### Prevention

Identify women at risk: risk factors include multiple pregnancy, antepartum haemorrhage, history of previous postpartum haemorrhage, parity >4, and prolonged labour. For these patients, administer oxytocin 20 units in 1 L Ringer-Lactate at 125 mL/hour after delivery of the placenta in addition to routine third stage management

### Management

1. Rub up the uterus to expel clots and induce uterine contractions
2. Call for assistance
3. Insert a Ringer-Lactate drip to run fast, and add a second line with oxytocin 20 units in 1 L Ringer-Lactate
4. Ensure that the placenta has been delivered, and is complete
5. Insert an indwelling urinary catheter
6. Look for the cause of bleeding by examining the mother's abdomen:

- A large soft uterus is atonic: give ergometrine 0.5 mg IV and massage the uterus continuously. If clots are retained in the uterus, remove them manually. The mother may help by massaging her own uterus
  - A well contracted uterus indicates that haemorrhage is caused by lacerations. These need to be found and repaired following a thorough examination of the entire birth canal
  - If the uterus cannot be felt through the abdomen, uterine inversion may be the cause of haemorrhage, and can be confirmed by performing a vaginal examination. This needs to be reduced as soon as possible
7. Chart observations of BP, pulse and PV bleeding every 15 minutes
8. If the bleeding has not stopped, transfer the mother urgently from a community health centre to hospital.
- Further management may include the following:
- Bimanual compression of the uterus
  - Continuous uterine massage
  - Blood transfusion
  - A second dose of ergometrine 0.5 mg IM
  - Misoprostol 600 micrograms orally or rectally as a single dose
  - Exploration and evacuation of uterus in theatre
  - Surgery – repair of lacerations, B-Lynch suture, hysterectomy, uterine or internal iliac artery ligation



**ALGORITHM FOR MANAGEMENT OF POSTPARTUM HAEMORRHAGE**

# ABNORMALITIES OF THE PUERPERIUM

## SECONDARY POSTPARTUM HAEMORRHAGE

- This is passage of fresh blood or clots more than 24 hours after delivery
- Common causes are infection, retained products of conception, and wound breakdown
- Resuscitate as described for primary postpartum haemorrhage, and transfer from a community health centre to hospital
- Specific treatment should be directed at the cause: antibiotics as in puerperal sepsis, repair of wounds, or evacuation of retained products

## PUERPERAL SEPSIS

This is infection of the genital tract after delivery. It may involve the endometrium, myometrium, pelvic peritoneum or the entire peritoneal cavity.

Risk factors for puerperal infection include:

- Caesarean section\*
- Prolonged labour or rupture of membranes\*
- Frequent vaginal examinations in labour
- Traumatic delivery
- Anaemia
- HIV infection
- Retained placenta or products of conception\*
- Low socioeconomic status

*\*Patients having caesarean section, retained placenta and prolonged rupture of membranes should always receive antibiotic prophylaxis*

### Mild puerperal sepsis

Clinical features are mild uterine tenderness without signs of peritonitis, a heart rate <100/minute, temperature <37.5 degrees, and mild to moderately offensive lochia.

### Management

- Give amoxicillin 500 mg orally 3 times daily and metronidazole 400 mg orally 3 times daily
- If allergic to penicillin, give erythromycin 500 mg orally 4 times daily
- Encourage adequate intake of oral fluids
- If there are retained products, admit to hospital for evacuation of the uterus
- Suggest salt water sitz baths twice daily for gaping episiotomy or tears
- Follow up for reassessment after 24 hours

## **Severe puerperal sepsis**

There is a temperature  $\geq 37.5$  degrees and/or tachycardia  $\geq 100$ /min in the presence (not always) of offensive lochia and/or uterine or abdominal tenderness

### **Management**

- Admit to hospital
- Take blood for full blood count and smear, urea and creatinine, blood culture and HIV serology
- Start antimicrobial treatment:
  - Ampicillin 1 g IV 6 hourly
  - Gentamicin 240 mg IV daily
  - Metronidazole 1 g suppository twice daily
- Insert an indwelling urinary catheter
- Perform uterine evacuation if there are retained products
- Observe hourly fluid intake and output, pulse rate, respiratory rate and blood pressure for the first 24-48 hours
- Transfer to level 2 or level 3 hospital (for intensive care and/or laparotomy) if:
  - There is generalised peritonitis
  - There is evidence of septic shock
  - There is organ dysfunction (renal failure, adult respiratory distress syndrome, coagulopathy)
  - There is no improvement after 24-48 hours of treatment

## **Caesarean section wound sepsis**

This usually presents 4-10 days after the operation. The wound may be tender and indurated, and pus can be expressed from the suture line.

### **Management**

- Admit to hospital
- Remove all sutures
- Irrigate the wound with saline and remove all pus and dead tissue
- Dress the wound with saline soaked gauze twice daily
- With features of severe puerperal sepsis, treat as described above
- With no features of severe puerperal sepsis, give oral antimicrobials as for mild puerperal sepsis above
- Perform secondary wound closure (if necessary) under local anaesthetic when the wound is clean

## **PROBLEMS REQUIRING REFERRAL TO HOSPITAL DURING LABOUR OR THE PUERPERIUM**

### **Before delivery**

Nullipara of age  $\geq 35$  years  
Parity  $\geq 5$   
Previous caesarean section or uterine surgery  
Previous postpartum haemorrhage requiring blood transfusion  
Serious medical disorder (e.g. symptomatic asthma or epilepsy)  
Cardiac disease  
Anaemia (Hb  $< 10$  g/dL)  
Hypertension (diastolic BP persistently  $\geq 90$  mmHg) or eclampsia  
Multiple pregnancy  
Breech presentation or transverse lie  
Estimated fetal weight  $< 2$  kg  
Rupture of the membranes before the onset of labour  
Maternal pyrexia  $\geq 37.5$  degrees  
Vulvovaginal ulcers or blisters  
Extensive vulvovaginal warts that may obstruct delivery  
Antepartum haemorrhage  
Suspected fetal distress  
Thick meconium staining of the liquor  
Offensive liquor  
Cord prolapse  
Poor progress in the latent phase of labour ( $\geq 8$  hours)  
Poor progress in the active phase of labour (crossing partogram action line)  
Poor progress in the second stage of labour ( $\geq 1$  hour)  
Any woman who is in shock, short of breath or appears very ill

### **After delivery**

Retained placenta or delivery of incomplete placenta  
Postpartum haemorrhage  
Anaemia (Hb  $< 8$  g/dL)  
Maternal pyrexia ( $\geq 37.5$  degrees)  
Third-degree perineal tear  
Hypertension (persistently  $\geq 150/100$  mmHg)

Inverted uterus  
Any woman who is in shock, short of breath or appears very ill

Any woman who is in shock, short of breath or appears very ill

### **Box 4.2. Problems requiring transfer to hospital in labour or the puerperium**

## CHAPTER 5

# ANAESTHESIA AND RESUSCITATION

<b>Pre-anaesthetic evaluation</b>	<b>67</b>
Clinical assessment and special investigations	67
Fluids and blood transfusion	67
<b>Anaesthesia for caesarean section</b>	<b>67</b>
General anaesthesia	68
Spinal anaesthesia	69
Anaesthesia for pre-eclampsia and eclampsia	69
Complications during obstetric anaesthesia	71
Complications of spinal anaesthesia	71
Complications of general anaesthesia	72
<b>Cardiopulmonary resuscitation during pregnancy</b>	<b>74</b>
Modifications to basic life support	74
Modifications to advanced cardiovascular life support	74
Emergency hysterotomy for cardiac arrest	74
<b>FIGURES, BOXES, TABLES AND ALGORITHMS</b>	
Box 5.1. Management of cardiorespiratory arrest	75
Algorithm for failed intubation at caesarean section	73

# PRE-ANAESTHETIC EVALUATION

## CLINICAL ASSESSMENT AND SPECIAL INVESTIGATIONS

- Obtain a full clinical history
- Clarify the indication and urgency for surgery
- Perform a physical examination that includes baseline blood pressure (BP) and assessment of the airway
- Ensure that a baseline Hb level is available (within the previous 4 weeks)
- The appropriate Hb level should be determined on a case to case basis. In a healthy woman a level of 8 g/dL is acceptable as a minimum figure
- Do not measure urea and electrolytes, and platelet counts in healthy women
- A recent platelet count (< 6 hours) should be available in women with pre-eclampsia
- A platelet count should be available in HIV positive women

## FLUIDS AND BLOOD TRANSFUSION

- Ensure rapid access to 2 units of O-negative blood, and also to plasma (freeze dried or fresh frozen), colloids and crystalloids
- Avoid glucose containing solutions pre-operatively
- Unless there is ongoing haemorrhage that can only be controlled by surgery, make every attempt to optimize intravascular volume status pre-operatively

## ANAESTHESIA FOR CAESAREAN SECTION

Spinal anaesthesia is usually considered to be safer than general anaesthesia (GA), but the anaesthetist must be skilled at both techniques. In choosing the method of anaesthesia, always place the mother's safety above that of the fetus.

### Contraindications to spinal anaesthesia

- Maternal refusal
- Haemodynamically instability, present or potential, e.g. placenta praevia
- Fixed cardiac output, e.g. aortic or mitral stenosis, constrictive pericarditis
- Local sepsis or severe systemic sepsis
- Platelet count <75 000/mm<sup>3</sup> or other bleeding problem
- Raised intracranial pressure, e.g. eclampsia
- Severe fetal distress (relative contraindication)

### Acid aspiration prophylaxis

- For elective cases, give cimetidine 200 mg orally 12 hours and 2 hours pre-operatively, metoclopramide 10 mg orally 2 hours pre-operatively and sodium citrate 0.3M 30 mL not more than 30 minutes before anaesthesia
- For emergency cases, give cimetidine in 200 mL slowly IV, metoclopramide 10 mg IV, and sodium citrate as above
- Avoid using magnesium trisilicate, even if sodium citrate is unavailable

## Supplemental oxygen

This may be required to keep the SaO<sub>2</sub> at >94% perioperatively

## Aortocaval compression

- Tilt the patient with a wedge under the right buttock or a 15 degree left lateral tilt of the surgical table
- With persistent hypotension, increase the tilt or ask the surgeon to lift the uterus away from the vena cava
- Delivery of the fetus is the definitive relief for aortocaval compression

## Monitoring

- The anaesthetist must be present and observe the patient at all times peri-operatively and be available until recovery is complete
- Minimal monitoring includes electrocardiograph (ECG), blood pressure (BP) and pulse oximetry
- Capnography is required for GA
- Place all monitors before induction and take baseline readings
- Monitor ECG and SaO<sub>2</sub> continuously
- Monitor BP every minute for the first 10 minutes after spinal anaesthesia, and then at least every 5 minutes if the BP is stable

## GENERAL ANAESTHESIA

### Pre-induction

- Check equipment (including suction) and drugs before starting
- Check presence of surgeon, to permit induction to delivery time < 7 minutes
- A skilled assistant must assist the anaesthetist
- An IV cannula of at least 18G must be running freely with either Ringer-Lactate or normal saline
- Pre-oxygenate with 100% oxygen for 3-5 minutes or 4 deep breaths in critical emergencies

### Induction and anaesthesia

1. Induce with thiopentone 4-7 mg/kg IV or propofol 2.0-2.5 mg/kg IV
2. As eyes close, the assistant applies cricoid pressure, and suxamethonium 1.0-1.5 mg/kg IV is given
3. Intubate with a 7.0 cuffed oral endotracheal tube as fasciculations cease or when 60 seconds have passed
4. Confirm tube placement with capnography and then auscultation
5. Maintain anaesthesia with 50/50 N<sub>2</sub>O/O<sub>2</sub>, and up to 1 MAC volatile agent
6. Give small doses of a neuromuscular blocker, e.g. atracurium 20 mg IV then 5 mg boluses to prevent 'bucking' on the endotracheal tube
7. However, if surgery is expected to be quick (<30 minutes), 1-2 mL of a mixture containing suxamethonium 100 mg with atropine 0.5 mg made up to 10 mL, can be used. This does not require reversal, but must be used for short cases only, as it cannot be repeated
8. Give fentanyl 1-2 micrograms/kg IV or morphine 0.10-0.15 mg/kg IV with delivery of the baby
9. Give oxytocin 5 units IV with delivery of the baby
10. If the uterus contracts poorly, repeat oxytocin 5 units IV, and/or give 20 units in 1 litre of crystalloid fluid to infuse slowly

11. At the end of the operation:

- a. Give a rectal suppository of an inflammatory drug e.g. indomethacin 100 mg if not contraindicated (peptic ulcer, renal dysfunction, asthma)
- b. Put the patient in a left lateral position
- c. Reverse the neuromuscular block, if used
- d. Extubate the patient when completely awake and fully reversed

### **Patient awareness**

- This may occasionally occur with caesarean section done under GA
- Contributory factors include air as opposed to N<sub>2</sub>O/O<sub>2</sub>, and inadequate concentration of volatile agent
- Signs are tachycardia, hypertension, sweating, lacrimation and large pupils
- Treatment is correct of contributory factors and/or giving a small dose of IV induction agent or ketamine

## **SPINAL ANAESTHESIA**

### **Preparation**

- Check equipment (including suction) and drugs before starting
- Always be ready to convert to GA at a moment's notice
- Using at least an 18G IV cannula, Give a preload of 0.5 L Ringer-Lactate or normal saline

### **Technique**

1. Use the sitting position and ensure sterile conditions
2. Identify the patient's L3/L4 intervertebral space for injection
3. Use the smallest gauge needle possible (e.g. 25G), to prevent headache
4. On obtaining CSF, inject heavy bupivacaine 0.5% 1.8 mL with fentanyl 10 micrograms (0.2 mL), then apply a sterile dressing
5. Place the patient in a left lateral tilt or wedged position with a pillow under the shoulders to prevent cephalad spread of local anaesthetic
6. Monitor BP every minute for at least the first 10 minutes (above)
7. Be vigilant for hypotension or high motor block (below)

## **ANAESTHESIA FOR PRE-ECLAMPSIA AND ECLAMPSIA**

There are problems with both GA and spinal anaesthesia in these patients, and the risks and benefits of each method must be considered for each individual patient. However, spinal anaesthesia is usually preferred, after excluding contraindications (above), even in women with severe pre-eclampsia.

### **Risks associated with general anaesthesia**

- Difficult or failed intubation due to severe laryngeal or facial oedema
- Exaggerated hypertensive response to endotracheal intubation
- Sensitivity to muscular relaxants if magnesium sulphate is used

## **Risks associated with spinal anaesthesia**

- Associated bleeding problem, e.g. low platelets, DIC
- Hypotension due to uncorrected hypovolaemia
- Brain stem herniation if there is raised intracranial pressure

## **Obtunding the hypertensive response to intubation**

It is vital that measures are employed to prevent a severe rise in BP associated with laryngoscopy in pre-eclampsia. This may prevent maternal intracranial haemorrhage or acute pulmonary oedema

- Give magnesium sulphate 30-40 mg IV then alfentanil 7.5 micrograms/kg IV, followed immediately by induction of GA
- If alfentanil is not available, give fentanyl 2-3 micrograms/kg IV instead (onset of action is 2-3 minutes slower)
- Lignocaine 1.0-1.5 mg/kg IV can be used, but not with a live fetus, as this may worsen fetal acidosis

# COMPLICATIONS DURING OBSTETRIC ANAESTHESIA

## COMPLICATIONS OF SPINAL ANAESTHESIA

Most maternal deaths here result from poorly treated or unrecognized hypotension or high motor block ('high spinal')

### Hypotension during spinal anaesthesia

Treat early and aggressively if BP falls below baseline or the patient shows evidence of hypotension, e.g vomiting, pallor and dizziness

1. Maximise relief of aortocaval compression (above)
2. Elevate the patient's legs, but do not put the table head-down
3. Give vasopressors:
  - a. Phenylephrine 12.5 – 25 micrograms IV boluses or infusion. Excess may cause hypertension and bradycardia, which will wear off
  - b. Ephedrine 5-10 mg IV boluses
  - c. With severe bradycardia and hypotension, give adrenaline 1:10 000, 2-3 mL boluses
4. Fluids: colloids have a more rapid effect than crystalloids
5. Delivery of the fetus: this alleviates aortocaval compression and should not be delayed

### High motor block

This results in hypotension and paralysis, with varying degrees of severity and speed of onset. It usually occurs soon after injection, but may occur at any time during the operation or even in the recovery period. For this reason, patients must be observed constantly for at least 90 minutes after receiving a spinal anaesthetic.

### Symptoms and signs

- Sensation of respiratory difficulty
- Inability to speak properly
- Inability to move the arms
- Hypotension
- Bradycardia
- Dizziness
- Nausea

### Treatment of high motor block

Use the ABC + full stomach principle:

1. Airway – insert an oropharyngeal airway
2. Breathing – hand ventilation using a bag and mask with 100% oxygen, then cricoid pressure and endotracheal intubation
3. Circulation – aggressive treatment of hypotension (above)
4. The patient might be paralysed but still awake – when BP is restored, give IV or volatile agents as for GA

## **COMPLICATIONS OF GENERAL ANAESTHESIA**

Most maternal deaths here occur after failed intubation with subsequent hypoxia or aspiration

### **Risk factors for failed intubation**

- Obesity
- Oedema, especially in pre-eclampsia/eclampsia
- Structural facial abnormalities, e.g. small chin
- Dental problems, e.g. buck teeth or missing incisor
- Scar tissue, e.g. healed burns or tracheostomy
- Inability to extend the neck

### **Failed intubation drill**

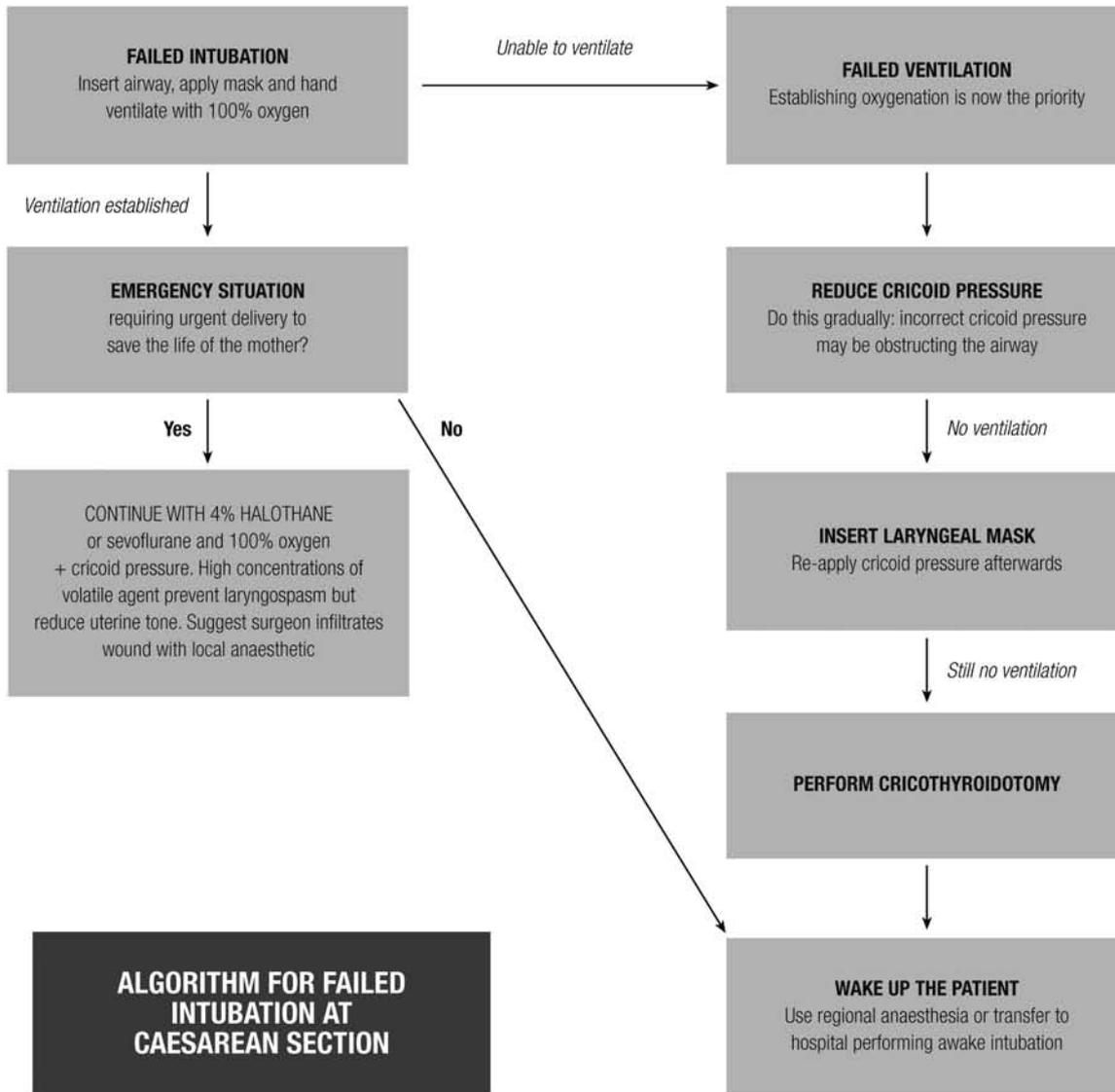
An algorithm is shown. This should be practiced regularly by all who administer and assist with obstetric anaesthetics. The drill is based on:

1. Early recognition of failed intubation
2. Rapid provision of oxygenation before hypoxia ensues
3. Prevention of aspiration after oxygenation is established

### **Difficult airway trolley**

This must always be readily available in all obstetric theatres, and should include:

- Spare Guedel airways size 2 and 3
- Cuffed oral endotracheal tubes in half-sizes from 4.5 to 7.0
- Spare laryngoscopes with size 3 or 4 blades
- Flexible gum elastic bougie
- Stiff intubation stylet
- Laryngeal masks size 3 and 4
- Cricothyroidotomy set



**ALGORITHM FOR FAILED INTUBATION AT CAESAREAN SECTION**

- Note:**
- Do not try to intubate more than twice
  - Try once with 7.0, once with 6.0 tube
  - Try move cricoid pressure backwards, upwards and to the right ('BURP')
  - Call for help
  - Do not give a 2nd dose of suxamethonium
  - Do not turn the patient

# **CARDIOPULMONARY RESUSCITATION IN PREGNANCY**

## **MODIFICATIONS TO BASIC LIFE SUPPORT**

- Beyond 20 weeks gestation aortocaval compression may compromise venous return to the heart and should be relieved by 15-30 degree lateral tilt (e.g. rolled blanket under right hip) or manual displacement of the uterus
- Airway and breathing: owing to increased risk of regurgitation, apply cricoid pressure during mask ventilation
- Circulation: apply chest compressions higher, just above the centre of the sternum, because the gravid uterus elevates the diaphragm
- Defibrillation: remove fetal or uterine monitors before performing shocks

## **MODIFICATIONS TO ADVANCED CARDIOVASCULAR LIFE SUPPORT**

- Airway: secure the airway early owing to increased risk of regurgitation. Apply cricoid pressure before and during endotracheal intubation. Because of airway oedema use small endotracheal tubes (try 7.0 then 6.0)
- Breathing: ensure oxygenation early as hypoxaemia develops early in pregnant patients. Check that the endotracheal tube is in the trachea by using a capnograph and by auscultation
- Circulation: use standard ACLS guidelines for chest compressions and drugs. Although it may compromise uterine blood flow, adrenaline should be used as it could be life-saving for the mother
- Differential diagnosis: in addition to the same reversible causes of cardiac arrest in non-pregnant patients, consider amniotic fluid embolism, pre-eclampsia/eclampsia, and magnesium sulphate toxicity (Box 6.4).

## **EMERGENCY HYSTEROTOMY FOR CARDIAC ARREST**

- At gestation >20 weeks, emergency hysterotomy (caesarean section) must be performed within minutes if maternal resuscitation is not immediately successful. Appropriate equipment and a surgeon should be available
- This is done primarily to relieve aortocaval obstruction and to improve maternal resuscitation.
- Survival of the baby is best when delivered within 5 minutes of cardiac arrest

## **MANAGEMENT OF CARDIORESPIRATORY ARREST**

1. Call for help, call for a defibrillator, call for intubation equipment, call for a caesarean section pack if pregnancy >20 weeks
2. Displace the uterus to the side, preferably using 15-30 degree lateral tilt
3. Begin cardiopulmonary resuscitation, using the principles of ABC (airway, breathing, compression). Perform external cardiac compression at a rate of 100/minute. Give 2 breaths (2 seconds each) for every 15 compressions
4. Attach electrocardiograph leads and intubate using cricoid pressure. Ventilate with 100% oxygen
5. In the presence of ventricular fibrillation or pulseless ventricular tachycardia, defibrillate, starting at 200 J, increasing to 200-300 J, and then to 360 J if necessary
6. Give adrenaline 0.01 mg/kg every 3 minutes, intravenously or into the endotracheal tube
7. Re-assess for heartbeat and breathing every minute
8. If resuscitation has not been successful in 4 minutes, and if the uterus is >20 weeks size, perform a hysterotomy/caesarean section. Do the operation without delay at the site of resuscitation
9. Continue cardiopulmonary resuscitation during the operation
10. Treat the cause of the cardiorespiratory arrest
11. Arrange follow up care: consider transfer to a level 2 or level 3 hospital for intensive care unit admission

### **Box 5.1. Management of cardiorespiratory arrest**

## CHAPTER 6

# HYPERTENSIVE DISORDERS OF PREGNANCY

<b>Hypertension in pregnancy</b>	<b>77</b>
Definition of hypertension	77
Definition of proteinuria	77
<b>Classification and grading</b>	<b>77</b>
Definitions of hypertensive disorders of pregnancy	78
Grades of pre-eclampsia	79
<b>Pathophysiology of pre-eclampsia</b>	<b>79</b>
Women at risk for the development of pre-eclampsia	80
<b>Management of pre-eclampsia</b>	<b>81</b>
At the clinic	81
Admission of a woman with pre-eclampsia	81
Further management of mild pre-eclampsia	82
Severe pre-eclampsia	82
Conservative management of severe pre-eclampsia	83
Imminent eclampsia	83
HELLP syndrome	83
Organ dysfunction in pre-eclampsia	83
<b>Management of eclampsia</b>	<b>85</b>
Immediate management of eclampsia	85
Management of eclampsia after fits have been controlled	85
Post-delivery care	86
<b>Labour, delivery and postpartum care</b>	<b>87</b>
Induction of labour	87
Labour and delivery	87
Postpartum care	88
<b>Chronic hypertension</b>	<b>88</b>
Antenatal care	88
Delivery and postpartum care	88
Chronic renal disease	88
<b>FIGURES, BOXES, TABLES AND ALGORITHMS</b>	
Figure 6.1. Pathophysiology of pre-eclampsia	80
Box 6.1. Measurement of blood pressure in pregnancy	78
Box 6.2. Indications for delivery in pre-eclampsia	84
Box 6.3. Controlling the blood pressure in pre-eclampsia	84
Box 6.4. Administration of magnesium sulphate	86
Table 6.1. Classification of hypertensive disorders of pregnancy	77

# HYPERTENSION IN PREGNANCY

Hypertensive disorders of pregnancy are the most frequent direct cause of maternal mortality in South Africa. This important fact should always be remembered when pregnant women are provided with information and education during visits for antenatal care, labour or in the puerperium. This important information should also be given to communities and relatives of pregnant women. Early detection and timely intervention is essential to prevent maternal and perinatal complications.

## DEFINITION OF HYPERTENSION

A blood pressure (BP) of 140/90 mmHg or more, on 2 occasions at least 2-4 hours apart

## DEFINITION OF PROTEINURIA

The presence of 1+ proteinuria or more on reagent strip (dipstick) testing on clean catch urine specimens taken at least 4 hours apart and persisting through pregnancy, or:

Protein excretion  $\geq 300$  mg in a 24 hour specimen of urine

## CLASSIFICATION AND GRADING

This is shown in Table 6.1 and depends on:

- The time of onset of the hypertension, whether before or after 20 weeks of pregnancy
- The presence or absence of proteinuria

Table 6.1. Classification of hypertensive disorders of pregnancy

<b>HYPERTENSION:</b>	<b>Onset before 20 weeks</b>	<b>Onset after 20 weeks</b>
<b>With no proteinuria</b>	Essential hypertension	Gestational hypertension
<b>With proteinuria</b>	Chronic renal disease	Pre-eclampsia

## DEFINITIONS OF HYPERTENSIVE DISORDERS OF PREGNANCY

**Essential hypertension:** hypertension without proteinuria diagnosed before 20 weeks of pregnancy, or a history of essential hypertension prior to the pregnancy

**Chronic renal disease:** hypertension with proteinuria, diagnosed before 20 weeks of pregnancy, or a history of chronic renal disease prior to the pregnancy

**Gestational hypertension:** hypertension without proteinuria, detected after 20 weeks of pregnancy

**Pre-eclampsia:** hypertension with proteinuria, both detected for the first time after 20 weeks of pregnancy

**Unclassified hypertension:** hypertension detected in a woman in whom the BP was not measured before 20 weeks of pregnancy. This may be proteinuric or non-proteinuric.

**Superimposed pre-eclampsia:** pre-eclampsia that develops in a woman with chronic hypertension or chronic renal disease

### MEASUREMENT OF BLOOD PRESSURE IN PREGNANCY

- The right and left lying semi-lateral, and sitting positions are acceptable
- The supine position (lying flat on the back) should not be used after 24 weeks
- Use the correct cuff size
- Ensure that the cuff is at the level of the heart during measurement
- Take the diastolic blood pressure at the point where the sounds disappear (Korotkoff phase 5). In patients where the sounds do not disappear, use the point of muffling (Korotkoff phase 4).

#### Box 6.1. Measurement of blood pressure in pregnancy

## GRADES OF PRE-ECLAMPSIA

**Mild pre-eclampsia:** a diastolic BP of 90-109 mmHg, with 1+ or 2+ proteinuria

**Severe pre-eclampsia:** a diastolic BP of  $\geq 110$  mmHg and  $\geq 1+$  proteinuria, or 3+ proteinuria irrespective of the level of BP, or organ dysfunction irrespective of the level of BP or amount of proteinuria

**Imminent eclampsia:** symptoms and signs that develop in a pre-eclamptic woman, i.e. severe headache, visual disturbances, epigastric pain, hyperreflexia, dizziness and fainting, vomiting

**Eclampsia:** generalised tonic-clonic seizures after 20 weeks of pregnancy and within 7 days after delivery, associated with hypertension and proteinuria

**HELLP syndrome:** the presence of haemolysis, elevated liver enzymes and low platelets, almost always in association with hypertension and proteinuria

## PATHOPHYSIOLOGY OF PRE-ECLAMPSIA

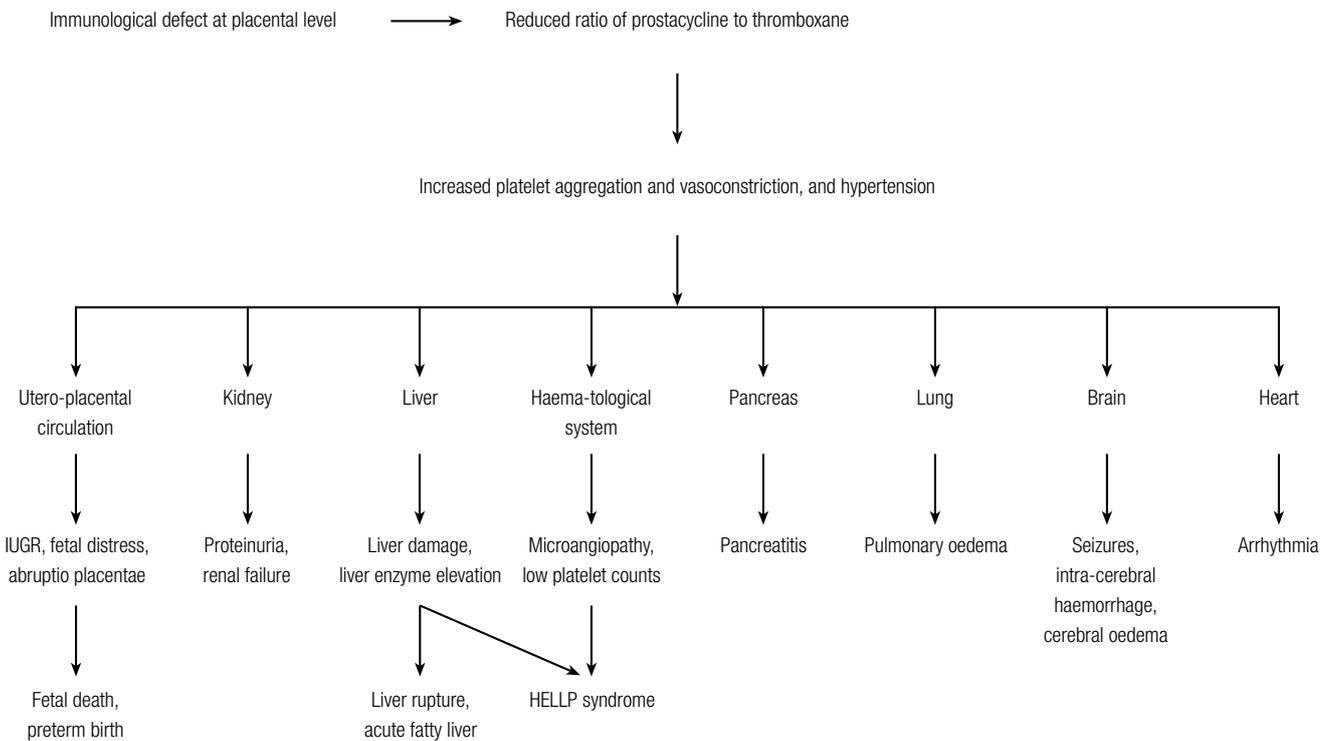
Pre-eclampsia is a multiorgan disease affecting predominantly the circulatory system, renal system, central nervous system, coagulation, liver etc. as shown in Figure 6.1.

A placental immunological or chemical defect causes a prostaglandin imbalance, which affects the endothelium (lining) of blood vessels resulting in spasm of blood vessels, platelet aggregation and leakage of plasma from capillaries

Pre-eclampsia complicates 5-10% of pregnancies in South Africa. There is still no effective method of prevention, and the only known cure is termination of pregnancy. Early detection, treatment and follow up may help in reducing death and morbidity from complications of pre-eclampsia.

Maternal deaths are most frequently caused by:

- Eclampsia, cerebral haemorrhage and cerebral oedema
- Pulmonary oedema
- Haemorrhage from abruptio placentae or liver rupture
- Acute renal failure



**Figure 6.1. Pathophysiology of pre-eclampsia**

## WOMEN AT RISK FOR THE DEVELOPMENT OF PRE-ECLAMPSIA

All pregnant women may develop pre-eclampsia. Those most susceptible are:

- Primigravidas, in particular teenagers and elderly primigravidae
- Multigravidae with new partners
- Women of age 35 and above
- Women with a previous pregnancy complicated by pre-eclampsia
- Women with a previous abruptio placentae
- Women with chronic hypertension and chronic renal disease
- Women with multiple pregnancies
- Medical complications such as diabetes, connective tissue disorders or antiphospholipid syndrome

# MANAGEMENT OF PRE-ECLAMPSIA

## AT THE CLINIC

### Prevention

For women at high risk – e.g. previous severe early onset pre-eclampsia:

- Aspirin 75 mg orally daily, from 12 weeks gestation
- Calcium supplementation – 1 g elemental calcium in divided doses daily, e.g. calcium carbonate (168 mg) 2 tablets orally 3 times daily with food. This is best taken 4 hours before or after iron supplements

### Gestational hypertension

- Advise on bed rest and dangerous symptoms associated with hypertension
- Prescribe methyldopa
- Review in 2 or 3 days, but advise earlier return if there are symptoms

### Mild pre-eclampsia

- Prescribe a loading dose of methyldopa 1 g orally
- Refer the woman to hospital on the same day

### Severe pre-eclampsia, imminent eclampsia, and eclampsia

- Institute emergency treatment (Boxes 6.3 and 6.4)
- Transfer to hospital immediately – inform the receiving hospital

## ADMISSION OF A WOMAN WITH PRE-ECLAMPSIA

### History and examination

Do a full clinical assessment, but give special attention to:

- Symptoms of imminent eclampsia
- Vaginal bleeding
- Severity of oedema
- Pallor and jaundice
- Heart and lung examination
- Precise measurement of the BP, to the nearest 2 mmHg
- A repeat BP measurement after 20 minutes
- Uterine tenderness, irritability, fetal size and liquor volume
- Assessment of the cervix for induction of labour

## Special investigations

- Full blood count (FBC), including platelet count
- Serum urea and creatinine
- Serum uric acid (unless the mother is in labour)
- Aspartate transaminase (AST) (in eclampsia and severe pre-eclampsia)
- Urine dipstick test for protein
- Ultrasound assessment of fetal size and liquor volume
- Cardiotocography (CTG)

Further management depends on whether the pre-eclampsia is mild or severe: women with mild pre-eclampsia can be admitted to an antenatal ward, while severe pre-eclampsia requires emergency management.

## FURTHER MANAGEMENT OF MILD PRE-ECLAMPSIA

- Do daily ward rounds and ask about symptoms of imminent eclampsia
- Measure 4 hourly BP
- Perform daily urine dipstick test for protein:
  - If proteinuria is irregularly observed, request a 24 hour specimen for protein content.
  - If proteinuria is not observed, the mother may be discharged and advised to attend the high risk antenatal clinic weekly, depending on the home circumstances.
- Monitor maternal fetal movement counts daily (Table 6.2)
- Repeat FBC, serum urea, creatinine and uric acid weekly
- Perform CTG daily if possible
- Start antihypertensive medication if BP  $\geq$ 150/100 (Box 6.3)
- If less than 34 weeks, give steroids (betamethasone 12 mg IM and repeat after 24 hours, or dexamethasone 8 mg IM 8 hourly for 3 doses) to accelerate fetal lung maturity
- Delivery is indicated for any of the reasons listed in Box 6.2

## SEVERE PRE-ECLAMPSIA

If the diastolic BP is  $\geq$ 110 mmHg on two occasions at least 20 minutes apart:

1. Start an intravenous drip and preload with 200-250 mL Ringer-Lactate over 20 minutes
2. Insert an indwelling urinary catheter
3. Control the BP
4. Transfer urgently from a community health centre to hospital by ambulance
5. Take blood for FBC, urea, creatinine, uric acid, and AST
6. Measure the BP at least hourly
7. Record urine output hourly
8. Assess fetal condition with CTG, and fetal size by ultrasound
9. If  $<$ 34 weeks or estimated fetal weight  $<$ 2 kg, give steroids to accelerate fetal lung maturity
10. Delivery may be delayed for 24-48 hours to allow steroids to take effect
11. Conservative management is acceptable for pregnancies of 26-33 weeks (or estimated fetal weight of 900-1500 g), if there are no indications for delivery (Box 6.2)

## **CONSERVATIVE MANAGEMENT OF SEVERE PRE-ECLAMPSIA**

From 26-33 weeks, after stabilisation of a mother with severe pre-eclampsia (see emergencies below), it may be in the baby's interests to allow the pregnancy to continue. This is permissible as long as there is no indication for delivery (Box 6.2), and should take place in hospitals with experience and facilities for managing severe pre-eclampsia, and with facilities for the treatment of very low birth weight infants.

Management is the same as for mild pre-eclampsia with the addition of:

- Non-stress test at least daily, preferably twice daily
- Ultrasound scans of the fetus every 2 weeks
- FBC, serum urea, creatinine and uric acid twice weekly
- AST weekly
- Careful daily assessment for indications for delivery (Box 6.2)

## **IMMINENT ECLAMPSIA**

Management is the same as for severe pre-eclampsia, with the addition of magnesium sulphate (Box 6.4).

At times, the patient's symptoms may resolve, making delivery unnecessary. She should then be treated as for pre-eclampsia (mild or severe, depending on the level of the BP).

## **HELLP SYNDROME**

HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome is a dangerous condition. Transfer urgently to a level 2 or level 3 hospital, as there is a high risk of haemorrhage, renal failure, and pulmonary oedema.

## **ORGAN DYSFUNCTION IN PRE-ECLAMPSIA**

Evidence of organ dysfunction in pre-eclamptic women requires immediate transfer to a level 2 or level 3 hospital. Such patients may show evidence of:

- Acute renal failure – rapid rise of serum urea and creatinine levels, and oliguria (urine output <500 mL/24 hours)
- Liver dysfunction – jaundice or a rise in serum liver enzyme levels
- Coagulation dysfunction – deranged INR and PTT profile, falling platelet count, or platelet count <100 000/mm<sup>3</sup>
- Cardiorespiratory dysfunction – acute pulmonary oedema: this should be treated immediately as described for women with cardiac disease
- Cerebral dysfunction – prolonged coma or localising signs

## INDICATIONS FOR DELIVERY IN PRE-ECLAMPSIA

Pregnancy  $\geq 38$  weeks

Pregnancy  $\geq 32$  weeks in severe pre-eclampsia

Estimated fetal weight  $\geq 1.5$  kg in severe pre-eclampsia

Pregnancy  $< 26$  weeks in severe pre-eclampsia

Eclampsia

Cerebral oedema

HELLP syndrome

Renal dysfunction (serum urea  $\geq 8$  mmol/L, creatinine  $\geq 100$  mmol/L, urine output  $< 500$  mL/24 hours)

Rising uric acid level (persistently  $\geq 0.45$  mmol/L)

Thrombocytopaenia (platelet count persistently  $< 100,000/\text{mm}^3$ )

Uncontrollable hypertension (BP persistently  $> 160/110$  mmHg)

Fetal distress

Dead fetus

Suspected abruptio placentae

### Box 6.2. Indications for delivery in pre-eclampsia

## CONTROLLING THE BLOOD PRESSURE IN PRE-ECLAMPSIA

### Emergency treatment (BP $\geq 160/110$ )

- Preload the patient with 200-250 mL Ringer-Lactate solution over 20 minutes
- Give nifedipine 10 mg orally swallowed (not chewed, sublingual or buccal)
- Give a loading dose of methyldopa 1 g orally
- Consider giving magnesium sulphate (Box 6.4)
- Transfer the patient urgently to hospital by ambulance
- Measure the BP every 10 minutes
- Aim for a diastolic BP of 90-100 mmHg
- Repeat nifedipine 10 mg after 30 minutes if necessary

An alternative is labetalol, as an IV infusion at 20 mg/hour (200 mg in 200 mL of normal saline, run at 20 mL/hour), increasing by 20 mg/hour every 20 minutes to achieve hypertension control or to a maximum of 300 mg in 24 hours.

### Stepwise maintenance treatment (BP $\geq 150/100$ ), depending on response

- Step 1: Methyldopa 500 mg orally twice daily up to a maximum of 750 mg 3 times daily
- Step 2: Add nifedipine 10 mg orally 3 times daily up to a maximum of 30 mg 3 times daily.
- Step 3: Add prazosin starting with 1 mg orally 3 times daily up to a maximum of 7 mg 3 times daily
- Step 4: Consider delivery.

### Box 6.3. Controlling the blood pressure in pre-eclampsia

# MANAGEMENT OF ECLAMPSIA

## Principles of care

- First aid measures
- Control of convulsions and prevention of further convulsions
- Reduction of high blood pressure
- Clinical and laboratory assessment
- Delivery
- Post-delivery care

## IMMEDIATE MANAGEMENT OF ECLAMPSIA

1. Call for help – advanced/experienced midwife or experienced doctor
2. Turn the woman onto her side (left lateral)
3. Clear the airway – ensure that it is open and remove secretions or vomitus. Insert an oropharyngeal airway if necessary
4. Give oxygen by mask
5. Prevent injuries, e.g. with cot sides, and remove sharp objects, etc.
6. Insert an oropharyngeal airway if necessary
7. Start an intravenous drip and give magnesium sulphate (Box 6.4)
8. With persistent convulsions or restlessness, give additional magnesium sulphate 2 g IV or clonazepam 1 mg IV over 5 minutes
9. Insert an indwelling urinary catheter
10. Transfer urgently from a community health centre to hospital
11. Continue observations of vital signs while waiting for the ambulance

## MANAGEMENT OF ECLAMPSIA AFTER FITS HAVE BEEN CONTROLLED

1. Send blood for FBC and measurement of urea, creatinine, AST and clotting profile (INR, PTT)
2. Control the blood pressure if  $\geq 160/110$  mmHg (Box 6.3)
3. Insert a central venous pressure line using a cubital vein, if feasible
4. Continue intravenous fluids (Ringer-Lactate or normal saline) at 80 mL/hour
5. Monitor BP, respiratory rate, urine output and state of consciousness hourly
6. Assess fetal condition with CTG
7. Continue magnesium sulphate 5 g IM 4 hourly using the precautions as listed (Box 6.4) until 24 hours after delivery or 24 hours after the last convulsion, whichever is later
8. The baby should be delivered as soon as possible after the first fit:
  - By caesarean section if there is fetal distress or the cervix is unfavourable or if there is any other obstetric indication
  - Vaginally if the mother is in labour or if the cervix is favourable for induction
9. Vacuum extraction may be necessary in the second stage
10. Do not use ergometrine in the third stage – use oxytocin 10 units IM
11. Expect return to full consciousness within a few hours of the last fit
12. Transfer women who remain semiconscious or unconscious to a level 2 or level 3 hospital

## POST-DELIVERY CARE

1. Observe the patient for at least 24 hours in a high care or special area
2. Take blood for FBC, urea and creatinine on the day after delivery
3. Ensure that antihypertensive medication and magnesium are continued
4. Do not discharge to a lower level of care after delivery
5. Do not discharge from hospital for at least 3 days
6. Discuss contraception, and arrange for a postnatal follow up visit in one week

### ADMINISTRATION OF MAGNESIUM SULPHATE

#### ECLAMPSIA BOX

**An 'eclampsia box' should be kept at all health institutions that manage pregnant women. The box should contain all necessities for immediate management of eclampsia: magnesium sulphate, intravenous drip equipment, a urinary catheter and a copy of a protocol for management.**

**IM regimen:** Dilute magnesium sulphate 4 g (8 mL 50% solution) with 12 mL normal saline and give slowly intravenously over 4 minutes, with 5 g IM in each buttock with 1 mL 1% lignocaine (total dose of 14 g). Continue with magnesium sulphate 5 g IM 4 hourly into alternate buttocks with 1 mL 1% lignocaine, subject to precautions below.

**IV regimen (preferable over IMI):** Dilute magnesium sulphate 4 g (8 mL 50% solution) with 12 mL normal saline and give slowly intravenously over 4 minutes. Continue with magnesium sulphate 10 g added to 200 mL normal saline and run at 20 mL/hour (1 g/hour), subject to precautions below. Use an infusion pump.

#### Precautions before continuing maintenance dosage:

Observe patellar reflexes, respiratory rate and urine output 2-hourly. Stop magnesium sulphate injections or infusion if patellar reflexes are absent, if the respiratory rate is <16 breaths/minute, or if the urine output is <25mL/hour.

#### Treatment of overdose

- The symptoms and signs of overdose are a feeling of extreme weakness, decreased respiratory rate, and absent tendon reflexes
- Give calcium gluconate 10% 10 mL IV slowly

### Box 6.4. Administration of magnesium sulphate

# LABOUR, DELIVERY AND POSTPARTUM CARE

Delivery of pre-eclamptic and eclamptic women requires skill and experience, and neonatal intensive care facilities for small or ill babies. Transfer to level 2 or level 3 hospital may be necessary. Local protocols for transfer should take into account the levels of expertise and facilities in level 1 and level 2 hospitals.

## INDUCTION OF LABOUR

Induction of labour may be undertaken in women with pre-eclampsia, using similar regimens as for other indications.

## LABOUR AND DELIVERY

### First stage

- Hourly BP, heart rate and respiratory rate, and urine output by catheter
- Give intravenous fluids at 80 mL/hour
- Use a partogram to note all observations
- Monitor the fetus with a CTG and note findings of fetal condition on the partogram
- For analgesia, use pethidine 100 mg IM with promethazine 25 mg IM 4 hourly
- Give magnesium sulphate if there is evidence of imminent eclampsia (Box 6.4)

### Oxytocin augmentation

This may be used with attention to fluid restriction as follows:

Add oxytocin to 200 mL of Ringer-Lactate, and start infusion at a rate of 5 mL/hour and double the infusion rate (5,10,20,40 mL/hour) every 30 minutes until 3 to 4 strong contractions are achieved. If this is not adequate, start a new infusion with oxytocin 10 units in 200 mL Ringer-Lactate at 40 mL/hour. This represents a 5-fold reduction of the fluid volumes shown in Box 4.1.

### Second and third stage

- Monitor maternal BP every 15 minutes
- Monitor fetal heart rate every 15 minutes
- Perform vacuum extraction if BP  $\geq$  160/110 mmHg
- Avoid using ergometrine or syntometrine during the third stage

### Caesarean section

Special anaesthetic considerations for caesarean section in pre-eclampsia and eclampsia are discussed in the chapter on anaesthesia and resuscitation.

## **POSTPARTUM CARE**

- Monitor vital signs (BP, pulse, respiratory rate) hourly for 4 hours, then 4 hourly
- Keep pre-eclamptic women in hospital for at least 24 hours after delivery
- Continue antihypertensive medication, e.g. methyldopa, and adjust dosage if necessary
- If BP remains  $\geq 160/110$ , add nifedipine 5-10 mg orally up to 4 times daily until BP has stabilized
- Diuretics, e.g. hydrochlorothiazide 25 mg, may be given
- Discharge from hospital if BP is stabilized and  $< 150/100$  mmHg for 24 hours
- Emphasise postnatal follow up at 1 week, 6 weeks and 12 weeks after delivery
- Advise on contraception – women over the age of 30 years, with 3 or more children, should be strongly advised on sterilization

## **CHRONIC HYPERTENSION**

There is a danger that patients with chronic hypertension may develop superimposed pre-eclampsia. Such patients should therefore be categorized as high risk.

### **ANTENATAL CARE**

- Antenatal care should be conducted by an experienced midwife or doctor
- Advise on lifestyle modification, e.g. exercise, stopping smoking and alcohol, high fibre, unrefined carbohydrate and low fat diet, and salt restriction after delivery
- Routine hospital admission is not required
- At the first antenatal visit, take baseline urea and creatinine levels, and consider chest X-ray, ECG and fundoscopy
- Stable chronic hypertensive women may be seen every 2 weeks
- At each visit, check for maternal weight gain, oedema and proteinuria
- Give antihypertensive drugs if necessary (Box 6.3)
- Replace diuretics, angiotensin converting enzyme (ACE) inhibitors and reserpine with methyldopa in chronic hypertensive women
- Admit to hospital if BP  $\geq 160/110$  or proteinuria is 1+ or more
- Induce labour at 38-40 weeks

### **DELIVERY AND POSTPARTUM CARE**

- Precautions and care are the same as for pre-eclampsia
- Women with chronic hypertension tend to be multiparous and greater than 35 years old, therefore contraception or sterilization must be emphasised

### **CHRONIC RENAL DISEASE**

- Pregnant women with renal disease are at risk for further kidney damage
- Close attention must be paid to renal function, and to possible development of superimposed pre-eclampsia
- At  $\geq 26$  weeks, management is the same as for pre-eclampsia
- At  $< 26$  weeks, refer to a level 2 or level 3 hospital for specialist assessment

## CHAPTER 7

# PREGNANCY PROBLEMS

<b>Intrauterine growth restriction</b>	<b>91</b>
Screening	91
Diagnosis	91
Delivery	92
<b>Intrauterine death</b>	<b>92</b>
Diagnosis	92
Expectant management	93
Induction, labour and delivery	93
Postpartum care	93
<b>Antepartum haemorrhage</b>	<b>94</b>
Causes	94
Emergency management	94
Management of placenta praevia	95
Management of abruptio placentae	95
Antepartum haemorrhage of unknown origin	96
<b>Multiple pregnancy</b>	<b>98</b>
Antenatal management	98
Delivery	98
<b>Breech presentation and transverse lie</b>	<b>99</b>
External cephalic version	99
Labour and delivery	99
Transverse lie	100
<b>Preterm labour</b>	<b>100</b>
<b>Prelabour rupture of the membranes</b>	<b>103</b>
<b>Chorioamnionitis</b>	<b>106</b>
<b>Postterm pregnancy</b>	<b>106</b>
<b>Induction of labour with a live baby</b>	<b>106</b>
Contraindications	106
Approach to induction of labour	107
<b>Previous caesarean section</b>	<b>108</b>
Indications for elective repeat caesarean section	108
Management of vaginal birth after caesarean section	109

<b>Rhesus incompatibility</b>	<b>110</b>
<b>Poor obstetric history</b>	<b>110</b>
Two or more previous second trimester miscarriages	110
Previous spontaneous preterm delivery	110
Previous unexplained stillbirth in the third trimester	111
<b>Birth defects and genetic disorders</b>	<b>112</b>
Information regarding genetic disorders and birth defects	112
Postnatal investigations on stillbirths and neonatal deaths	113
<b>FIGURES, BOXES, TABLES AND ALGORITHMS</b>	
Box 7.1. Hexoprenaline and nifedipine regimens in preterm labour	102
Box 7.2 Misoprostol titration regimen	108
Box 7.3. Indications for cervical cerclage	111
Box 7.4. List of well known teratogens	114
Table 7.1. Differences between abruptio placentae and placenta praevia	95
Table 7.2. The Bishop score for cervical assessment	107
Table 7.3. Risk factors for birth defects and genetic disorders	113
Algorithm for diagnosis and management of antepartum haemorrhage	97
Algorithm for management of preterm labour	104
Algorithm for management of prelabour rupture of the membranes	105

# **INTRAUTERINE GROWTH RESTRICTION**

Intrauterine growth restriction (IUGR) refers to the failure of a fetus to achieve its growth potential. IUGR can be classified into 2 main groups:

- Symmetric – the head and body both show growth failure. This may result from genetic or chromosomal defects, intrauterine infection or exposure to teratogenic substances. Liquor volume is usually normal
- Asymmetric – the head grows, but the body shows growth failure. This is usually associated with placental insufficiency This may result from pre-eclampsia or vascular disease, as in diabetes or lupus). Liquor volume may be reduced

Some fetuses may appear symmetrically growth impaired, but are normal small babies, or may be suspected to be small because of wrong pregnancy dates.

## **SCREENING**

### **Identifying pregnant women at risk**

- Hypertensive disorders
- History of previous IUGR or low birth weight babies
- History of previous abruptio placentae
- Substance abuse – smoking, alcohol, cocaine
- Vascular disease, e.g. lupus
- Previous history of abruptio placentae
- Poor nutrition/underweight
- Chronic infections including sexually transmitted infections

### **Serial measurement of symphysis-fundal height (SFH)**

A measurement less than the 10th centile for gestational age (as noted on the antenatal SFH graph), or failure of SFH to increase on serial measurements, should raise suspicion of IUGR, and the mother should be referred for ultrasound assessment of the fetus

### **Palpation**

Features that suggest IUGR include palpation of a relatively large hard fetal head with a small body, engagement of the head before 37 weeks, reduced liquor volume, and an irritable uterus before 37 weeks. Such findings should lead to referral for ultrasound to exclude IUGR

## **DIAGNOSIS**

Ultrasound scanning, including Doppler flow studies, is used to make a diagnosis. If ultrasound facilities are not available, clinical assessment must be used, or the mother must be referred to a level 2 or level 3 hospital.

If symmetric IUGR is diagnosed:

- Exclude a cause, especially chromosomal and congenital defect, or congenital infection
- Delivery is indicated at  $\geq 37$  weeks
- Before 37 weeks, evaluate the fetus (by ultrasound) for abnormalities
  - If there are no fetal abnormalities, the mother can go home with a fetal movement chart (Table 6.2) and return for reassessment after 2 weeks
  - If an abnormality is found, manage accordingly

### **If asymmetric IUGR is diagnosed:**

- Identify the cause
- Delivery is indicated at  $\geq 34$  weeks
- If dates or the diagnosis are uncertain, perform amniocentesis for fetal lung maturity testing (shake test, tap test or laboratory tests)
- At less than 34 weeks, admit to hospital for daily fetal movement counts (Table 6.2) and CTGs at least twice weekly, and repeat ultrasound assessment after 2 weeks. Delivery is indicated if there is any evidence of fetal distress.

## **DELIVERY**

During induction of labour for IUGR, monitor the fetus closely by CTG, because of a high risk of fetal distress. Caesarean section is recommended for delivery of small babies with severe asymmetric IUGR. If the estimated fetal weight is  $< 1500$  g, transfer the mother to a level 2 or level 3 hospital for delivery.

## **INTRAUTERINE DEATH**

### **DIAGNOSIS**

Typical clinical findings

- Absent fetal movements
- Disappearance of symptoms of pregnancy
- Symphysis-fundal height does not increase as expected
- Difficult or abnormal fetal palpation
- Fetal heart not heard

### **Making the diagnosis**

- Refer the woman to hospital to confirm the diagnosis with an ultrasound scan
- Take a relevant history to help establish the cause of intrauterine death (IUD)
- Consider blood tests such as FBC, clotting profile, rhesus factor, RPR, HIV, and a screening GTT.
- Offer immediate induction of labour, but do not discourage a woman who wants to go home for a day or two to discuss and make arrangements with her family. Some women prefer expectant management, to await spontaneous labour.

## EXPECTANT MANAGEMENT

- See the mother weekly at antenatal clinic
- Perform platelet count weekly after the presumed date of IUD, to detect coagulopathy (platelet count  $<100,000/\text{mm}^3$ ). If the patient develops coagulopathy, refer to a level 2 or level 3 hospital
- Deliver if there is rupture of membranes, vaginal bleeding, abdominal pain, pyrexia or hypertension
- Consider a diagnosis of abruptio placenta if there is accompanying bleeding and hypertension

## INDUCTION, LABOUR AND DELIVERY

- Misoprostol\* is the most effective induction agent
- If  $<24$  weeks, use 200 micrograms intravaginally
- If  $\geq 24$  weeks, use 50 micrograms intravaginally 6 hourly for 3 doses
- Do not use misoprostol with previous caesarean section or myomectomy, malpresentations, and parity  $\geq 5$
- 'Bulb induction' using a Foley catheter is a safe alternative to misoprostol
- Do not begin oxytocin infusion  $<6$  hours after the last dose of misoprostol
- Suspect extrauterine pregnancy if the induction fails, and consider transfer to a level 2 or level 3 hospital
- Give analgesia – morphine 15 mg IM and promethazine 25 mg IM 4 hourly if necessary
- Delay amniotomy until late in the first stage (cervix  $\geq 8$  cm dilated)
- Labour management follows the same principles as for normal labour – enter all observations, fluids and medications on a partogram and treat labour abnormalities appropriately
- Thoroughly examine the baby, placenta and cord for abnormalities
- Refer to the next level of care if induction fails or complications arise

*\*While misoprostol is not registered for this indication, this guideline represents collective experience and reflects current practice in South Africa*

## POSTPARTUM CARE

This differs from normal postpartum care in some aspects

- Be sympathetic and supportive at all times
- Encourage the mother, or parents, to hold and spend time with the baby
- If possible, transfer the mother to a non-maternity ward
- Take into account the normal grief responses during counseling
- Provide basic genetic counseling if an abnormality is suspected and refer appropriately (below)
- Explain the cause of fetal death to the mother, if known
- Treat breast discomfort with simple analgesics, breast binding and fluid restriction

# ANTEPARTUM HAEMORRHAGE

Antepartum haemorrhage (APH) is defined as bleeding from the genital tract from 20 weeks of pregnancy up to delivery of the baby.

## CAUSES

- Placental – abruptio placentae, placenta praevia, vasa praevia
- Non-placental – vaginal and cervical lesions including cancer, cervical infections, trauma and decidual bleeding
- Unknown – APH of unknown origin

All patients presenting with APH must be regarded as obstetric emergencies until properly assessed. Transfer urgently to hospital.

## EMERGENCY MANAGEMENT

### At a clinic or community health centre

1. Start an intravenous infusion of Ringer-Lactate solution
2. If the mother is in shock, resuscitate with 1-2 L of Ringer-Lactate
3. Do not do a digital vaginal examination, unless placenta praevia has been excluded by a previous ultrasound scan
4. Transfer urgently from a clinic or community health centre to hospital where 24 hour caesarean section services and adequate blood supply is available

### At the hospital, re-evaluate the patient

#### If bleeding is mild:

- Take blood for FBC and cross match
- Do an ultrasound scan to help with the diagnosis
- If placenta praevia is found, manage accordingly (below)
- If no placenta praevia, exclude a minor abruption by doing a full clinical examination and CTG
- Frequent uterine contractions (>5/10 minutes) suggests abruptio placentae
- If there are fetal heart rate decelerations, and the fetus is above 34 weeks, deliver the woman by a caesarean section
- Do a speculum examination to exclude a local cause
- Further management depends on the cause (below)

#### If bleeding is severe:

- Make a clinical diagnosis of whether abruptio or placenta praevia and manage according to the cause (below)

**Table 7.1. Differences between abruptio placentae and placenta praevia**

	<b>Abruptio placentae</b>	<b>Placenta praevia</b>
Patient	Often hypertensive	Often previous caesarean section
Symptoms	Pain almost always present. Fetal move-ments may be absent or reduced	Usually painless. Fetal movements usually normal
Abdominal examination	Hard, tender uterus, large for expected dates	Soft, nontender uterus, often with malpresenta-tion or high presenting part
Bleeding	Dark blood with clots, at times no external bleeding	Bright red blood
Ultrasound	Fetus may be dead, placenta normally situated. Retroplacental clot may be seen	Placenta implanted close to or over the cervix

**MANAGEMENT OF PLACENTA PRAEVIA**

- Continue resuscitation
- Check haemoglobin (Hb) level and cross match
- If less than 10G/dl, commence blood transfusion and transfer urgently to a level 2 or 3 hospital

**At a level 2 or level 3 hospital**

- Obtain consent for caesarean section and hysterectomy (should hysterectomy becomes necessary during the caesarean section)
- If bleeding is significant, perform a caesarean section (supervised or done by an experienced doctor or specialist)
- If less than 34 weeks, and bleeding subsides, manage conservatively – keep in hospital, observe vital signs and give steroids and antibiotics

**MANAGEMENT OF ABRUPTIO PLACENTAE**

Abruptio placentae is strongly associated with pre-eclampsia: the blood pressure may be normal or high even in the presence of clinical shock. Proteinuria is an indicator of underlying pre-eclampsia with abruptio placentae.

**If the fetus is alive:**

- With expected weight  $\geq 1500$  g, and fetal heart rate  $>100$ /minute as recorded on CTG, perform emergency caesarean section, unless delivery is imminent (cervix  $\geq 9$  cm dilated)
- For a baby weighing less than 1500g, rupture the membranes and augment labour with oxytocin. Monitor blood loss carefully

**If the fetus is dead:****Deliver within 8 hours. Transfer urgently to a level 2 or level 3 hospital**

1. Take blood for cross-match, FBC, INR, PTT, and urea and creatinine
2. Blood transfusion (2-4 units) is usually necessary, with fresh frozen plasma if there is a clotting disorder
3. Insert a central venous pressure (CVP) line through a cubital vein, if feasible

4. Insert an indwelling urinary catheter and monitor hourly urine output
5. Give fluids to maintain a systolic BP  $\geq$ 100 mmHg, or a CVP of 6 cm H<sub>2</sub>O
6. As soon as resuscitation is complete (within two hours), rupture the membranes
7. If there is no progress of labour within one to two hours, augment with oxytocin if not contraindicated (Box 4.1)
8. Give analgesia using morphine 15 mg IM 4 hourly if necessary
9. Caesarean section is indicated if:
  - There is lack of progress despite oxytocin augmentation, life-threatening haemorrhage, ongoing DIC, or severe oliguria
  - The patient is not near delivery within 8 hours
10. Anticipate and prepare for the second stage of labour

**Following delivery, there is a significant risk of complications:**

11. Active management of the third stage is mandatory
12. In addition, add oxytocin 20 U in 1 L Ringer-Lactate immediately after delivery and observe for bleeding. Do not remove the IV line for at least 12 hours
13. Monitor vital signs hourly, and observe for postpartum haemorrhage for at least twelve hours
14. Check Hb, platelet count, urea and creatinine on the day after delivery
15. Be aware of complications (DIC, renal failure, pulmonary oedema) and take the necessary precautions
16. Provide psychological support and advise about contraception and future pregnancies

**If delivery occurred at a level 1 hospital, transfer to a level 2 or level 3 hospital if:**

- She also has severe pre-eclampsia or eclampsia
- There is evidence of DIC – spontaneous bleeding from the mouth or puncture sites
- Urine output is less than 30 mL/hour for more than 4 hours
- There is pulmonary oedema
- There is evidence of acute renal failure – increasing urea and creatinine levels
- There is severe thrombocytopenia ( $<50,000/\text{mm}^3$ )

**ANTEPARTUM HAEMORRHAGE OF UNKNOWN ORIGIN**

This is a common problem in obstetrics, where there is no evidence of abruptio placentae, placenta praevia, or cervical or vaginal bleeding. Chorioamnionitis may be associated.

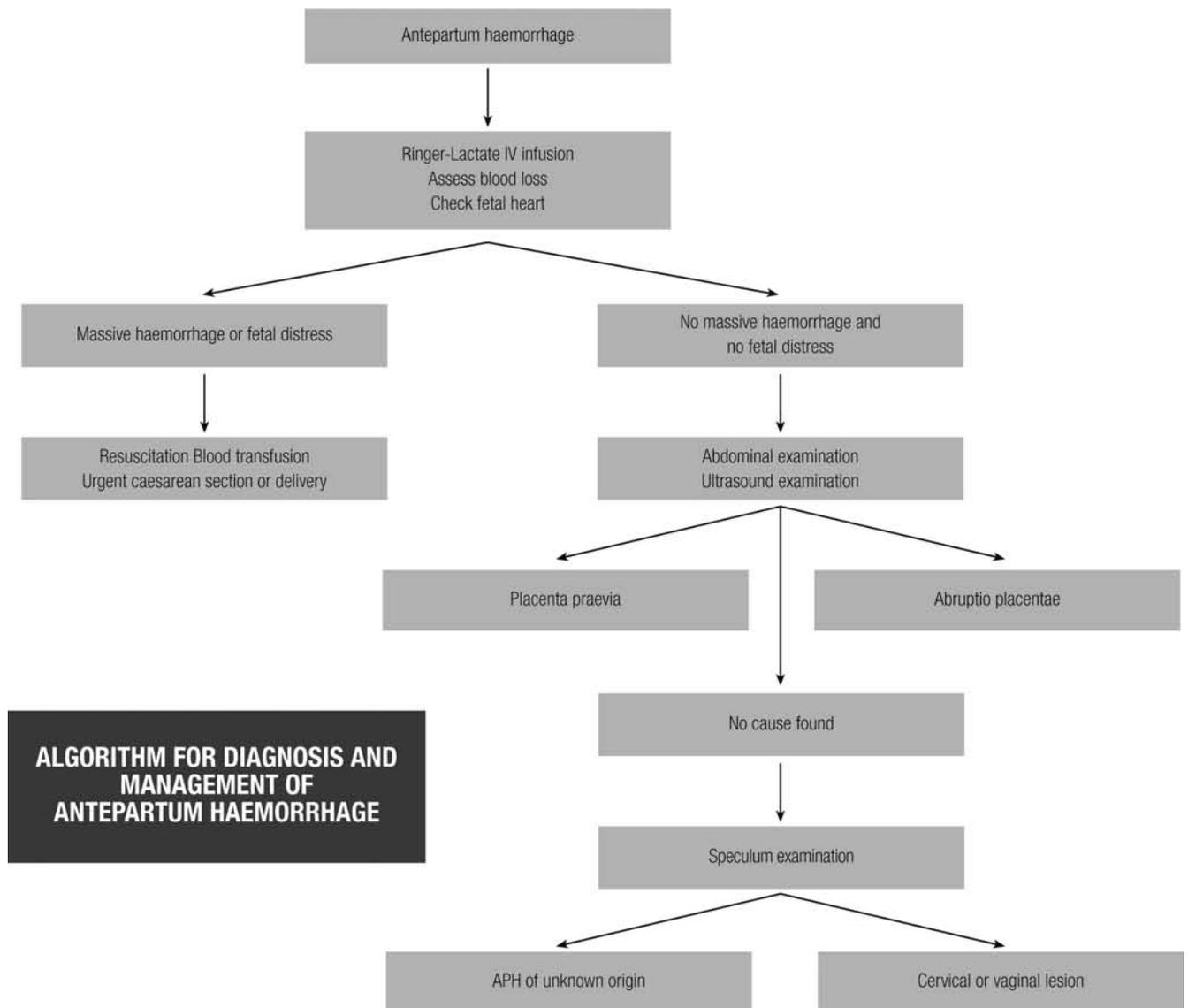
**Management at term ( $\geq$ 37 weeks)**

1. Admit the mother to hospital
2. At  $\geq$ 37 weeks pregnant, induce labour (Box 4.1)

**Management before term**

1. Admit the mother to hospital
2. Do daily CTG
3. Observe for symptoms and signs of abruptio placentae
4. Observe for any evidence of chorioamnionitis (below)
5. Discharge from hospital 24-48 hours after bleeding has stopped

6. Assess the cervix before discharge to excluded imminent preterm labour
7. Continue antenatal care at hospital, with attention to fetal growth and fetal movements (Table 6.2)
8. Consider induction of labour at 38-40 weeks



## **MULTIPLE PREGNANCY**

Multiple pregnancy is diagnosed most accurately by ultrasound examination. As this is not routinely offered to all pregnant women, multiple pregnancy needs to be suspected on history and clinical examination. A family history of multiple pregnancies and history of ovulation induction should raise suspicion. Pregnancies with the following signs need referral for ultrasound assessment:

- Exaggerated symptoms of pregnancy
- Symphysis-fundal height >90th centile for gestational age
- Abdominal girth  $\geq 100$  cm
- An unusually wide and round uterus
- Increased liquor volume
- More than 2 fetal poles felt
- Head feels smaller than expected for the uterine size

### **ANTENATAL MANAGEMENT**

- All antenatal visits must take place at a hospital
- Warn the mother of possible complications: preterm labour, anaemia, hypertension and general discomfort
- Scheduled visits are every 4 weeks to 28 weeks, then every 2 weeks to 36 weeks, and then weekly to delivery
- Give ferrous sulphate tablets 200 mg orally twice daily and folic acid 5 mg orally daily to prevent anaemia
- Ultrasound scan is done every 4 weeks from 28 weeks to follow fetal growth
- Assess the cervix at each visit, and if the cervical dilatation exceeds the length in cm, consider admission of the mother to hospital

### **DELIVERY**

All multiple pregnancies should be delivered in hospital.

#### **Indications for elective caesarean section**

- Triplets (or higher order pregnancy)
- Intrauterine growth restriction (estimated ultrasound fetal weight difference  $\geq 25\%$ )
- First twin breech or transverse lie at 37 weeks
- Previous caesarean section

#### **Principles of labour and delivery**

- Treat preterm labour as for singleton pregnancies. Beware of pulmonary oedema if hexoprenaline and steroids are used
- Induction of labour is not contraindicated
- Use a partogram for observing labour progress
- Monitor both fetuses during labour, preferably by CTG
- Oxytocin may be used for labour augmentation
- Delivery of the second twin may be facilitated by:
  - Calling for the assistance of an experienced doctor or midwife
  - External version to longitudinal lie, using hexoprenaline 10 micrograms IV, if necessary

- Internal version and breech extraction, if necessary, by an experienced doctor
- Oxytocin augmentation
- Rupture of membranes after the presenting part has engaged
- After routine management of the third stage of labour, add 20 units of oxytocin to 1L Ringer-Lactate and infuse at 120-240 mL/hour, to prevent postpartum haemorrhage

## **BREECH PRESENTATION AND TRANSVERSE LIE**

Clinics and community health centres should refer suspected breech presentations and transverse lies to hospital from 36 weeks gestation. Ultrasound scanning will confirm the presentation, and exclude associated multiple pregnancy, placenta praevia and fetal abnormality.

### **EXTERNAL CEPHALIC VERSION**

External cephalic version (ECV) should be attempted on all normal singleton breech presentations from 37 weeks gestation, with the following precautions:

1. Exclude contraindications, i.e. hypertension, scarred uterus, antepartum haemorrhage, ruptured membranes
2. Only perform ECV in a hospital
3. Give anti-D 100 micrograms IM to all rhesus-negative mothers
4. Do not anaesthetise or sedate the mother
5. Use hexoprenaline 10 micrograms IV to relax the uterus if necessary
6. Never use excessive force
7. Run a CTG tracing before and after ECV, whether successful or not
8. Observe the mother for a few hours for complications, i.e. labour, rupture of membranes, antepartum haemorrhage

### **LABOUR AND DELIVERY**

Elective caesarean section is the safest method of delivery for a baby with a breech presentation. Women with breech presentation at 38 weeks should be admitted to hospital for elective caesarean section

#### **Admission of a woman with breech presentation in labour**

1. Transfer the mother from a clinic or community health centre to hospital
2. Exclude fetal abnormality or multiple pregnancy, by ultrasound if necessary
3. Attempt external cephalic version if there are no contraindications (above)
4. Estimate fetal weight and pelvic adequacy
5. Determine cervical dilatation and station of presenting part
6. Perform caesarean section unless suitable for vaginal delivery (below)

#### **Vaginal breech delivery**

Some women may prefer vaginal breech delivery, and some may arrive at hospital or at a community health centre in advanced labour. Vaginal breech delivery must be personally supervised by the most experienced person available.

## **Breech presentation suitable for vaginal delivery**

- Mother understands and accepts vaginal delivery
- Operator experienced and confident with vaginal breech delivery
- No signs of pelvic contraction on clinical assessment
- Estimated fetal weight less than 3.5 kg
- Frank or complete breech
- Presenting part at or below the level of ischial spines
- Labour progress  $\geq 1$  cm per hour

Dead and grossly abnormal babies, and those with estimated weight  $< 1$  kg should be delivered vaginally

## **Technique of delivery**

1. Put the mother in lithotomy position
2. Cut an episiotomy after infiltration of the perineum with local anaesthetic
3. Encourage spontaneous breech delivery and only assist in keeping the fetal back facing upwards
4. For extended knees, assist by flexing at the knees and gently delivering each leg
5. After delivery of the trunk, allow the breech to hang, pull the cord down and cover the delivered parts with a cloth
6. As the scapulae appear, be ready to assist with delivery of the arms
7. Deliver the arms if necessary by running the fingers from the fetal back over the shoulder and sweeping the arms down in front of the chest, and then out
8. The neck will deliver up to the nape
9. Deliver the head by lying the fetus over the right forearm (right-handed midwife or doctor) and inserting the right middle finger into the baby's mouth, with the index and ring fingers supporting the cheek, to flex the head
10. Simultaneously, the left hand exerts suprapubic pressure to flex the head (Wigand-Martin method) or pushes directly onto the occiput to assist flexion (Mauriceau-Smellie-Veit method)
11. Ease the baby out, with gentle traction, and continuous flexion as described
12. Should the fetal back face downwards after delivery of the arms, the head may be trapped. The best chance of delivery is to swing the fetus anteriorly over the maternal abdomen to flex the head

## **TRANSVERSE LIE**

Do an ultrasound scan to exclude a cause such as placenta praevia, congenital abnormalities, or multiple pregnancy. External version may be attempted from 37 weeks' gestation. Caesarean section is required if version fails to achieve a stable longitudinal lie. Any woman presenting in labour with a transverse lie needs delivery by caesarean section by a specialist or experienced doctor. A classical or low vertical uterine incision should be considered.

## **PRETERM LABOUR**

This is defined as labour occurring before 37 completed weeks of pregnancy. Management depends on the gestational age and/or estimated fetal weight (by palpation or ultrasound).

**Gestational age  $\geq$ 34 weeks or estimated fetal weight  $\geq$ 2 kg:**

1. Exclude specific causes of preterm labour, e.g. chorioamnionitis or other infections (with fever and tachycardia), and abruptio placentae
2. Manage labour as for term pregnancies. There is no need to transfer from a clinic or community health centre to a hospital

**Gestational age 26-33 weeks or estimated fetal weight 900 g – 1999 g:**

1. Transfer from a clinic or community health centre to a hospital\*. Give hexoprenaline 10 micrograms IV to suppress contractions during transfer
2. If in doubt about the diagnosis of preterm labour, do an ultrasound scan if possible. If fetal breathing movements are seen in 30 minutes of scanning, this is unlikely to be true labour, or intrauterine infection.
3. Give ampicillin 2 g IV followed by 1 g IV 6 hourly and metronidazole 400 mg orally 3 times daily for 4 days, or until delivery (for penicillin allergy, substitute erythromycin 500 mg orally 4 times daily)
4. Give steroids (preferably betamethasone 12 mg IM repeated after 24 hours, or dexamethasone 8 mg IM 8 hourly for 3 doses)
5. Run a CTG tracing
6. If there is evidence of abruptio placentae or chorioamnionitis, allow labour to proceed under close fetal monitoring with CTG, or consider caesarean section
7. If cervix  $\geq$ 6 cm dilated, allow labour to proceed
8. If cervix  $<$ 6 cm dilated, give hexoprenaline or nifedipine regimen (Box 7.1)
9. If hexoprenaline or nifedipine fail to stop contractions, add indomethacin 100 mg suppository, followed by another dose after 12 hours if necessary
10. Deliver the baby in a slow and gentle fashion, with an episiotomy if the perineum is very tight

*\*If the estimated fetal weight is  $<$ 1500 g, transfer the mother to a hospital with neonatal intensive care facilities (level 2 or level 3)*

**Gestational age  $<$ 26 weeks or estimated fetal weight  $<$ 900 g:**

1. Transfer from a clinic or community health centre to hospital
2. Allow labour to proceed
3. If the baby is born alive, resuscitate actively and transfer it from a clinic or community health centre to hospital

## **HEXOPRENALINE REGIMEN**

1. Give hexoprenaline 10 micrograms IV, then add 300 micrograms to 1L Ringer-Lactate, to run at 60 mL/hour, increasing by 10 mL/hour every 30 minutes until contractions stop, or the maternal pulse rate reaches 120/minute, or the infusion rate reaches 120 mL/hour
2. Stop the hexoprenaline infusion after 24 hours and allow labour to proceed, or discharge the mother home if she is not in labour. No follow up doses of hexoprenaline are required.

## **NIFEDIPINE REGIMEN**

1. Give nifedipine 20 mg orally, followed by 10 mg orally after 30 minutes if painful contractions persist
2. Give nifedipine 10 mg orally after 4 hours and then 4 hourly if there are painful contractions, up to a maximum of 24 hours. Then allow labour to proceed or discharge the mother home if she is not in labour

## **Precautions**

- Do not give hexoprenaline or nifedipine to mothers with cardiac disease or pre-eclampsia
- Do not give hexoprenaline or nifedipine to women with a pulse rate  $\geq 120$ /minute
- Do not give nifedipine to women who are receiving magnesium sulphate
- Admit the mother to a labour ward for close observation
- Observe the pulse rate  $\frac{1}{2}$  hourly, or connect to a cardiac monitor if possible
- Auscultate the mother's lungs every 4 hours to exclude pulmonary oedema
- Do not allow the maternal pulse rate to exceed 120/minute
- Do not allow the hexoprenaline infusion rate to exceed 120 mL/hour

### **Box 7.1. Hexoprenaline and nifedipine regimens for suppressing preterm labour**

## PRELABOUR RUPTURE OF THE MEMBRANES

This is rupture of the membranes before the onset of labour. The diagnosis must be confirmed by visual inspection, by speculum examination, pH testing of vaginal fluid or, if necessary, liquor volume assessment on ultrasound. Digital vaginal examination must be avoided. Management depends on gestational age and/or estimated fetal weight (by palpation or ultrasound).

### **Gestational age $\geq$ 34 weeks or estimated fetal weight $\geq$ 2 kg:**

1. Transfer from a clinic or community health centre to hospital
2. Give ampicillin 1 g IV 6 hourly and metronidazole 400 mg orally 3 times daily
3. Allow labour to proceed
4. If the mother is not in labour within 12-24 hours, do CTG and induce labour with oxytocin (Box 4.1) or with oral misoprostol (Box 7.2)
5. Do not perform digital vaginal examinations until the patient has at least two hours of strong contractions

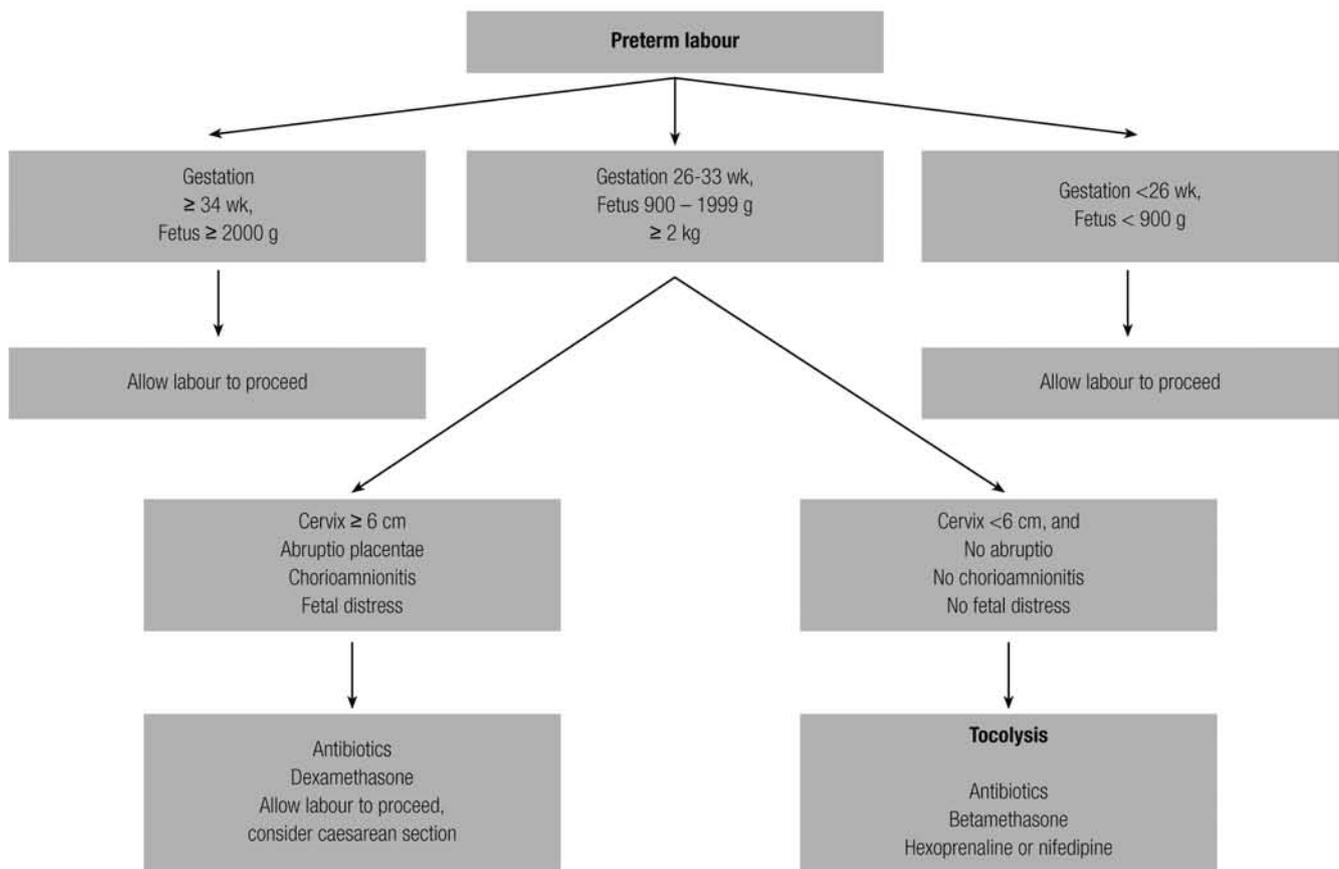
### **Gestational age 24-33 weeks or estimated fetal weight 600 g –1 999 g:**

1. Transfer from a clinic or community health centre to hospital
2. Do not do digital vaginal examination as this may contribute to fetal infection
3. Give erythromycin 250 mg orally 4 times daily and metronidazole 400 mg orally 3 times daily for 7 days
4. Give steroids (preferably betamethasone 12 mg IM repeated after 24 hours, or dexamethasone 8 mg IM 8 hourly for 3 doses)
5. Give hexoprenaline or nifedipine regimen if contractions start in the first 24 hours after admission
6. Observe temperature, pulse rate, fetal heart rate, and pad checks 4 hourly
7. Do CTG daily
8. Induce labour at 34 weeks or 2 kg, or if there are signs of chorioamnionitis\*
9. During labour, give ampicillin 2 g IV, followed by 1 g IV 6 hourly

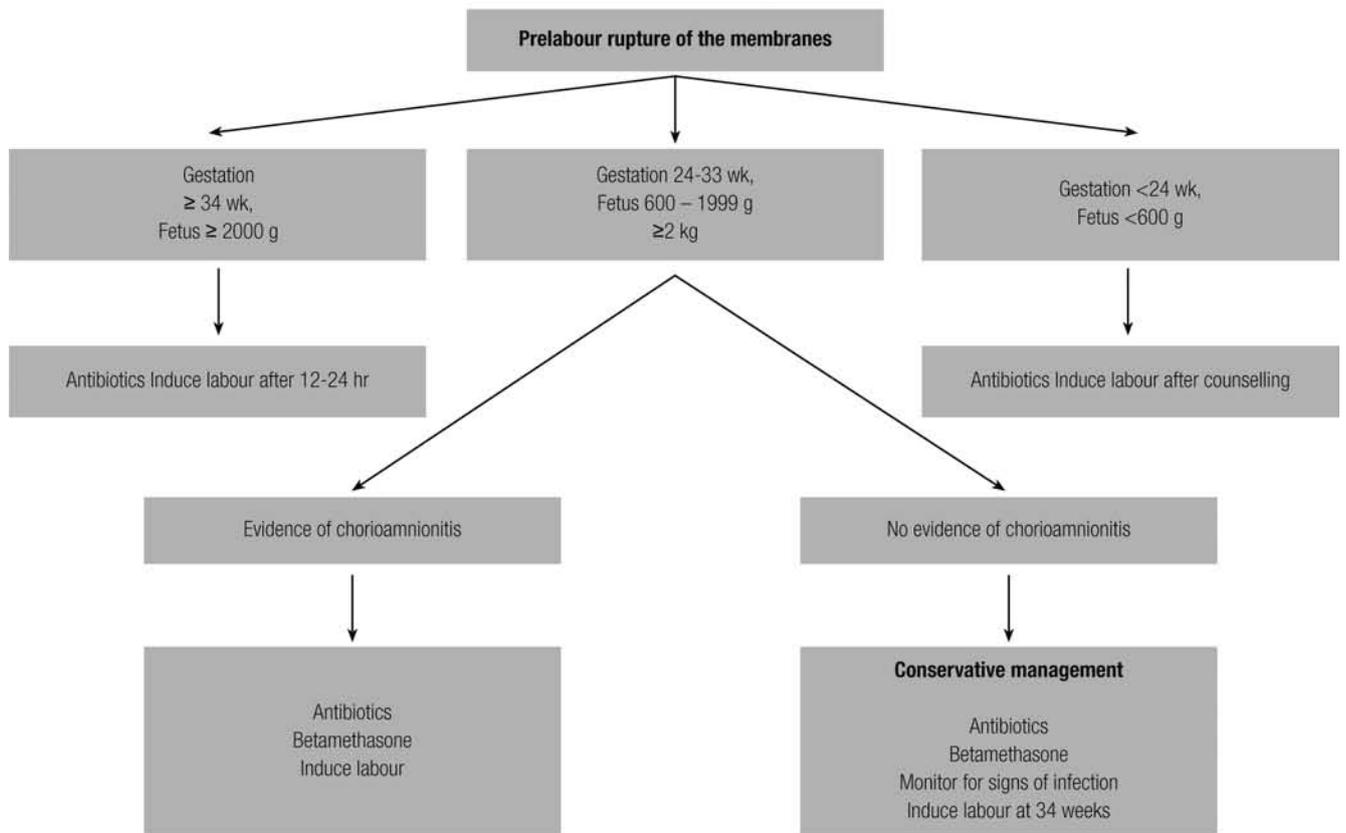
*\*If delivery is expected for a baby of weight <1500 g, transfer the mother to a hospital with a neonatal intensive care unit, (level 2 or level 3).*

Gestational age <24 weeks or estimated fetal weight <600 g:

1. Transfer from a clinic or community health centre to hospital
2. Ensure that the membranes have definitely ruptured (reduced liquor volume on ultrasound)
3. Induce labour with oxytocin 10-20 units in 1L Ringer-lactate at 120 ml/hr, after counselling the mother appropriately



**ALGORITHM FOR MANAGEMENT OF PRETERM LABOUR**



**ALGORITHM FOR MANAGEMENT OF PRELABOUR RUPTURE OF THE MEMBRANES**

## CHORIOAMNIONITIS

This infection may be associated with preterm labour, prelabour or prolonged rupture of membranes, intrauterine death or antepartum haemorrhage of unknown origin.

### Signs of chorioamnionitis include:

- Pyrexia  $\geq 37.5$  degrees
- Maternal pulse rate  $\geq 100$ /minute
- Uterine tenderness and/or irritability
- Fetal heart rate  $\geq 160$ /minute
- Offensive liquor or meconium stained liquor

### Management

1. Transfer from a clinic or community health centre to hospital
2. Give ampicillin 2 g IV followed by 1 g IV 6 hourly, with metronidazole 400 mg orally 3 times daily
3. Induce labour if the cervix is favourable (below), otherwise perform caesarean section
4. During labour, monitor the fetus closely, with CTG if possible
5. Continue ampicillin and metronidazole for 5 days after delivery

## POST TERM PREGNANCY

This is pregnancy exceeding 41 weeks' gestation. The most serious associated problems are intrapartum related birth asphyxia, meconium aspiration, fetopelvic disproportion and postmaturity syndrome. The management is as follows:

1. Ensure that the gestational age has been correctly calculated
2. Refer the mother from a clinic or community health centre to hospital
3. Induce labour (below)
4. During labour, monitor the fetus with CTG if possible

## INDUCTION OF LABOUR WITH A LIVE BABY

The most frequent indications are post term pregnancy, hypertensive disorders and pre-labour rupture of membranes. Only induce labour in a hospital.

### CONTRAINDICATIONS

- Placenta praevia
- Transverse lie persisting after attempted version
- Breech presentation
- Fetal distress
- Previous caesarean section
- Maternal parity  $\geq 5$

## APPROACH TO INDUCTION OF LABOUR

- Confirm the indication
- Examine carefully to confirm gestational age and presentation
- Assess the Bishop score
- Perform a pre-induction CTG

If all prerequisites are fulfilled, induction of labour can be performed using one of the numbers of methods

**Table 7.2. The Bishop score for cervical assessment**

Points given:	0	1	2	3
Cervical dilatation (cm)	<1	1-2	2-4	>4
Cervical length (cm)	>4	2-4	1-2	<1
Station	-3	-2	-1	≥0
Cervical consistency	Firm	Average	Soft	
Cervical position	Posterior	Mid-position	Anterior	

### **Cervix favourable – Bishop score ≥7**

- If HIV negative, rupture membranes and start oxytocin (Box 4.1)
- If HIV positive, start oxytocin with membranes intact, or use misoprostol

### **Cervix unfavourable**

- **Intravaginal prostaglandin**

- Prostaglandin E2 gel – 1 mg into the posterior fornix for a primigravida or 1 mg for a multigravida, repeated after 6-12 hours if necessary
- Prostaglandin E2 gel – 0.5 mg into the cervical, repeated after 6-12 hours if necessary
- Prostaglandin E2 tablets – 1 mg intravaginally 4 hourly for 4 doses
- If the cervix becomes favourable, do not start oxytocin infusion less than 6 hours after the last dose of prostaglandin

- **Misoprostol**

- For primigravidae – 50 micrograms intravaginally. If not in labour in 6 hours start titrated misoprostol
- For multigravidae – Start titrated misoprostol

## **MISOPROSTOL TITRATION REGIMEN**

- 1. Add a 200 microgram tablet of misoprostol to a bottle of 200 mL water**
- 2. Shake the bottle well until the tablet has dissolved**
- 3. Give 20 mL of the solution every 2 hours, for 4 doses**
- 4. If the woman reports moderate to strong contractions, do a vaginal examination and a CTG. If in labour, stop misoprostol.**
- 5. If not in labour in 24 hours, repeat the dosage**
- 6. Do not repeat the dosage more than twice**
- 7. If not in labour after 3 dosages, consider oxytocin infusion with or without rupture of the membranes, or caesarean section**
- 8. Do not give oxytocin less than 6 hours after giving misoprostol**

### **Box 7.2. Misoprostol titration regimen**

#### **Methods for induction in grande multiparae (para $\geq$ 5)**

- Do not use oxytocin, intravaginal prostaglandin, or misoprostol.
- Try sweeping of the membranes or artificial rupture of membranes. If not in labour 24 hours after rupturing membranes, do caesarean section
- Bulb induction may be successful:
  - Pass a sterile Foley catheter through the internal cervical os, and inflate it to 30 mL
  - Keep it on traction against the cervix by sticking the catheter to the thigh
  - Run normal saline 50 mL through the catheter into the extra-amniotic space until the bulb is expelled.

## **PREVIOUS CAESAREAN SECTION**

Antenatal care may be conducted at a clinic or community health centre, but labour must be managed in hospital. A doctor should see the mother at the first antenatal visit and again at 36 weeks to plan the mode of delivery. Women with previous caesarean section are at risk for ruptured uterus during labour.

### **INDICATIONS FOR ELECTIVE REPEAT CAESAREAN SECTION**

- A previous vertical uterine incision (classical and De Lee operations)
- Previous ruptured uterus
- Two or more previous caesarean sections
- Where the mother requests an elective caesarean section
- Other obstetric problem, e.g. multiple pregnancy, breech, transverse lie, APH
- Estimated fetal weight  $\geq$ 3500 g
- Previous caesarean section for a very preterm baby where the type of incision is unknown

## **MANAGEMENT OF VAGINAL BIRTH AFTER CAESAREAN SECTION (VBAC)**

Management is similar to normal labour with the following precautions:

- Exclude all contraindications listed above
- Conduct labour in a hospital that can perform caesarean sections
- Run an intravenous drip with Ringer-Lactate solution at 120 mL/hour
- Monitor with continuous CTG
- Always use of a partogram and intervene timeously
- Do not augment labour with oxytocin
- Observe carefully for signs of imminent uterine rupture:
  - Fetal tachycardia or decelerations
  - Vaginal bleeding
  - Haematuria
  - Abdominal pain between contractions
  - Sudden cessation of contractions

### **Indications for emergency caesarean section at attempted VBAC**

- The latent phase of labour exceeds 8 hours
- Progress in the active phase of labour crosses to the right of the alert line (progress <1 cm/hour)
- There are signs of imminent uterine rupture (above)

### **Postpartum observations**

Close observation is necessary during the fourth stage of labour, as the uterus may occasionally rupture during delivery of the baby. Signs of rupture, which should immediately be reported to a doctor, include:

- Rising pulse rate
- A drop in blood pressure
- Lower abdominal pain
- Moderate to severe lower abdominal tenderness
- Postpartum haemorrhage
- Haematuria

If uterine rupture is suspected, do a laparotomy to repair the uterus. Obtain consent for hysterectomy, should this become necessary.

## RHESUS INCOMPATIBILITY

Rapid rhesus (D) blood group testing is done on all pregnant women at the first antenatal visit, or at delivery in unbooked mothers. Rhesus-positive mothers need no further specific management.

### **If a mother is rhesus-negative, send blood for atypical antibody testing at 24, 32 and 36 weeks:\***

- If antibodies are found at a titre of  $<1:16$ , repeat the antibody test in 4 weeks
- If antibodies are found at a titre of  $\geq 1:16$ , send the mother to a unit that specialises in managing rhesus incompatibility (usually a level 3 hospital)
- If no antibodies are found, give prophylactic anti-D 100 micrograms IM:
  - If amniocentesis or external cephalic version is performed
  - If there is an antepartum haemorrhage
  - If the mother suffers any abdominal trauma
  - After delivery to all rhesus-negative mothers, if the baby is rhesus-positive or its rhesus status is unknown, within 72 hours
  - After abortion, miscarriage or ectopic pregnancy (give 50 micrograms)

*\*If the father of the baby is tested and also found to be rhesus-negative, no further management will be necessary, as the baby will then be rhesus-negative*

## POOR OBSTETRIC HISTORY

This is a history of poor obstetric performance in the absence of a demonstrable cause. Women with poor obstetric history should be referred from a clinic or community health centre to a hospital for assessment and further management.

### **TWO OR MORE PREVIOUS SECOND TRIMESTER MISCARRIAGES**

- Do an ultrasound scan at the first antenatal visit, including estimation of the cervical length (using transvaginal scanning) if possible. Consider referral to a level 2 or level 3 hospital for assessment
- Obtain a good history of the previous miscarriages
- On vaginal examination, feel for dilatation of the cervix and decide on the need for cervical cerclage (Box 7.3)
- If the cervix is closed, and after 26 weeks, no further specific management is required and further care may be completed at a community health centre

### **PREVIOUS SPONTANEOUS PRETERM DELIVERY**

This refers to the delivery of a preterm baby ( $<34$  weeks) that died or required special care, in the last previous pregnancy

- Do an ultrasound scan at the first antenatal visit, including estimation of the cervical length
- Obtain a good history of the preterm birth
- On vaginal examination before 24 weeks, feel for dilatation of the cervix and decide on the need for cervical cerclage
- Review the mother every 2 weeks up to 34 weeks
- Look for evidence of bacterial vaginosis or trichomoniasis and treat appropriately (metronidazole 2 g orally as a single dose)
- If the cervix is closed, and after 33 weeks, no further specific management is required and further care may be completed at a community health centre

### **INDICATIONS FOR CERVICAL CERCLAGE**

- A history suggesting cervical incompetence (rupture of membranes and rapid delivery)
- The cervical internal os admits one finger
- Three consecutive second trimester miscarriages
- Short cervix on ultrasound scan (<2.5 cm)

Cervical cerclage may be performed from 14 to 24 weeks and the MacDonald method should be used at level 1 hospitals

### **Box 7.3. Indications for cervical cerclage**

### **PREVIOUS UNEXPLAINED STILLBIRTH IN THE THIRD TRIMESTER**

- Do an ultrasound scan at the first antenatal visit
- Ask the mother to count fetal movements from 28 weeks (Table 6.2)
- Perform blood glucose screening (Chapter 8)
- Review the mother weekly or at least every 2 weeks from 36 weeks
- Consider induction of labour at 38 weeks

## **BIRTH DEFECTS AND GENETIC DISORDERS**

Taking a family history can identify women at risk of having a child with a birth defect or genetic disorder. Table 7.3 shows which women are at risk and the tests that can be performed. The tests are shown only as a guideline and each individual should be assessed by a health care provider trained in the management of birth defects and genetic disorders.

All institutions offering maternity care should have trained health care providers to offer screening, pretest counselling, appropriate referral and post test counselling for birth defects and genetic disorders.

### **INFORMATION REGARDING BIRTH DEFECTS AND GENETIC DISORDERS**

The following information should be provided to all women of child bearing age before conception:

- The risks of having a baby with chromosomal abnormalities with increasing maternal age
- The risks to the fetus of alcohol and recreational drug use by the mother
- The increased risk of abnormality when the parents are related
- The risks associated with a family history of genetic disorders
- The risks to the fetus of poorly controlled medical conditions in pregnancy
- The value of periconceptual folate in prevention of neural tube defects (5 mg daily 3 months prior to conception continuing into the pregnancy)
- The risks to the fetus of maternal infections, e.g. rubella and syphilis, during pregnancy
- The risks to the fetus of taking teratogenic medications during pregnancy (Box 7.4)

#### **Women at risk for having a child with a birth defect or genetic disorder**

- Refer as early as possible in the pregnancy for counseling regarding management and the performance of prenatal tests
- Chorionic villus sampling is done at 10-12 weeks (level 3 hospitals)
- Amniocentesis is done at 16-20 weeks (level 2 or level 3 hospitals)
- Ensure that referrals are made in time for these tests to be performed

**Table 7.3. Risk factors for birth defects and genetic disorders**

<b>Women at risk</b>	<b>Tests</b>
Advanced maternal age ( $\geq 35$ years)	Ultrasound Amniocentesis CVS
Three or more first trimester miscarriages	Parental blood Ultrasound Amniocentesis
Maternal genetic disorder	Ultrasound Amniocentesis Cordocentesis CVS
Previous child with a birth defect or genetic disorder, or family members affected by a specific genetic disorder.	Ultrasound Amniocentesis Cordocentesis CVS
Alcohol and/or other drug exposure during pregnancy	Ultrasound Amniocentesis
Exposure to teratogen during pregnancy	Ultrasound Amniocentesis
Maternal infection during pregnancy	Maternal blood Ultrasound
Maternal illness e.g. pregestational diabetes mellitus	Ultrasound Amniocentesis
Couples in consanguineous relationships and women from ethnic groups at high risk for specific recessive disorders	Parental blood Amniocentesis CVS

## **POSTNATAL INVESTIGATION OF STILLBIRTHS AND NEONATAL DEATHS**

Where a birth defect or genetic disorder is suspected, the following steps should be followed to obtain a diagnosis so that appropriate postnatal counselling may be provided about risks of recurrence of the condition in a future pregnancy.

### **History and basic external examination**

- This may be done by a doctor or nurse
- Obtain a full pregnancy history
- Obtain a full family history
- Ask about possible exposure to teratogens
- Note whether there was oligohydramnios or polyhydramnios
- Record head circumference, weight, length, right foot length, and all abnormal external clinical features
- With the mother's consent, take photographs to show all the clinical features clearly

## Special investigations (where possible)

- Always check or repeat RPR
- Take a full body X-ray (babygram)
- Send skin (full thickness, in sterile saline, submitted within 48 hours) for karyotyping, or a blood sample if the baby is not macerated
- Request an autopsy for suspected cardiac and renal disorders, and for all multiple congenital anomaly syndromes in which a definitive postnatal diagnosis can not be confirmed following the steps above

### LIST OF WELL KNOWN TERATOGENS

#### Maternal infections

Syphilis, Toxoplasmosis, Rubella, Cytomegalovirus, Varicella-Zoster virus, Herpes simplex type 2, Human parvovirus B19, Human immunodeficiency virus

#### Maternal medical conditions

Insulin-dependent diabetes mellitus, epilepsy, hypothyroidism, hyperthyroidism, iodine deficiency, systemic lupus erythematosus, phenylketonuria

#### Drugs/chemicals/radiation

Ethyl alcohol, cocaine, warfarin, misoprostol, anticonvulsants (phenytoin, carbamazepine, valproic acid, lamotrigine), antineoplastic drugs (methotrexate, cyclo-phosphamide, aminopterin), tetracycline, diethylstilbestrol, lithium, thalidomide, retinoids, X-ray radiation in large doses, heavy metals, e.g. mercury and lead.

**Box 7.4. List of well known teratogens.** The safety of any medication considered for use in pregnancy must be established. The risks and benefits of a drug used for chronic conditions must be considered before adjusting medication.

## CHAPTER 8

# MEDICAL DISORDERS IN PREGNANCY

<b>Anaemia</b>	<b>116</b>
Prevention	116
Management	116
Blood transfusion	117
<b>Diabetes mellitus</b>	<b>118</b>
Screening and diagnosis	118
Management	119
<b>Cardiac disease</b>	<b>120</b>
Symptoms and signs	120
Antenatal care	120
Management of labour	120
Management of pulmonary oedema	121
<b>Asthma</b>	<b>121</b>
<b>Thromboembolism</b>	<b>122</b>
<b>Epilepsy</b>	<b>122</b>

# ANAEMIA

Anaemia is defined as a haemoglobin level  $<11.0$  g/dL

All pregnant women should have an Hb measurement at the first antenatal visit, and again at 28 and 36 weeks. A portable haemoglobinometer or copper sulphate test should be used, so that the result is available at the same visit.

Most cases of anaemia in South Africa are caused by iron deficiency, although a large number are the result of infections (urinary tract infection, tuberculosis, malaria, HIV and AIDS).

## PREVENTION

Give all women with Hb  $\geq 11$  g/dL ferrous sulphate 200 mg orally daily and folic acid 5 mg orally daily for the duration of the pregnancy.

## MANAGEMENT

Take blood for full blood count (FBC) from all women with anaemia.

### Mild anaemia (haemoglobin 7.0-10.9 g/dL)

- Start treatment with ferrous sulphate 200 mg orally 3 times daily, and continue with folic acid 5 mg orally daily
- Take blood for full blood count and smear: the mean cell volume (MCV) may be used to indicate the probable cause of anaemia:
  - A below-normal MCV suggests iron deficiency anaemia
  - A normal MCV suggests infection as the cause of anaemia
  - An above-normal MCV suggests folate or vitamin B12 deficiency anaemia
- Refer women with normal or high MCVs to hospital
- Refer women  $\geq 36$  weeks pregnant to hospital for follow up every 2 weeks and for delivery
- Follow up all women  $< 36$  weeks pregnant with repeat Hb after 4 weeks
- Failure to respond to iron treatment requires investigation as for severe anaemia
- Intravenous iron may be used in iron-deficient women who cannot tolerate oral iron (hospitals only)

### Severe anaemia (haemoglobin $< 7.0$ g/dL):

- Refer the mother from a community health centre to hospital
- Investigate the anaemia:
  - FBC and smear, and HIV serology, before starting treatment
  - Urine for microscopy and culture
  - Chest X-ray and stool for occult blood and parasites, if necessary
- Start treatment for anaemia with ferrous sulphate 200 mg orally 3 times daily, and continue with folic acid 5 mg orally daily
- Transfuse ill or symptomatic mothers, or those  $\geq 36$  weeks pregnant
- Failure to respond to iron therapy will necessitate further investigation (iron studies, red cell folate, vitamin B12 levels) and/or referral to a level 2 or level 3 hospital

## **Advice to anaemic mothers**

The following advice may help in improving compliance with oral iron treatment:

- Encourage honesty about compliance with medication
- Encourage consumption of meat (iron) and fresh fruit (vitamin C)
- Discourage consumption of ash or soil
- Discourage excessive consumption of tea or coffee
- Advise taking iron tablets during meals to prevent side effects

## **BLOOD TRANSFUSION**

Packed cells are normally used, but whole blood may be given for acute severe haemorrhage. Transfusion volume should be just enough to reverse symptoms or reach a satisfactory level for delivery or operation.

Indications for blood transfusion are:

- Anaemia with cardiac failure
- Severe symptoms of anaemia
- Anaemic mothers before delivery or caesarean section (Hb <7-8 g/dL)
- Anaemic mothers at high risk of haemorrhage e.g. with placenta praevia
- Acute severe haemorrhage

# DIABETES MELLITUS

## Pregestational diabetes mellitus

This is diabetes that has been present before the current pregnancy. These women require tight control of their blood glucose levels from the time of conception and should book for antenatal care as soon as pregnancy is confirmed.

Diabetic pregnant women should be referred to a specialist clinic with expertise in managing diabetes in pregnancy, usually at a level 2 or level 3 hospital. Follow up care may be continued at a level 1 hospital, in accordance with instructions from the specialist clinic, depending on facilities and levels of skill.

## Gestational diabetes mellitus

This is glucose intolerance that develops during pregnancy, or is noted for the first time during the current pregnancy.

## SCREENING AND DIAGNOSIS

All pregnant women with risk factors for diabetes in pregnancy should be screened at the first antenatal visit and again at 26-28 weeks if the initial screen is normal.

### Risk factors for gestational diabetes

#### Previous history:

- Previous history of gestational diabetes
- First degree relative with diabetes
- Previous unexplained intrauterine fetal death
- Previous babies with macrosomia (birth weight  $\geq 4$  kg)

#### Current pregnancy:

- Polyhydramnios
- Fetus large for gestational age
- Persistent glycosuria

### Screening methods

#### Option 1: Do a random blood glucose (RBG)

- RBG  $\geq 11$  mmol/L indicates gestational diabetes
- RBG  $< 8$  mmol/L indicates that the woman is unlikely to be diabetic and that RBG testing should only be repeated if glycosuria recurs
- RBG of 8.0-10.9 mmol/L requires fasting blood glucose (FBG) testing:
  - FBG  $\geq 8$  mmol/L indicates that the woman is a gestational diabetic
  - FBG  $< 6$  mmol/L indicates that the woman is unlikely to be diabetic and that RBG testing should only be repeated if glycosuria recurs

- An FBG of 6.0-7.9 mmol/L necessitates admission for blood glucose profiles before and after meals. Profiles with fasting levels  $\geq 8$  mmol/L or postprandial levels  $\geq 11$  mmol/L indicate that the woman is a gestational diabetic

### **Option 2: Do a 75 g glucose screen:**

- Give oral glucose 75 g dissolved in 250-300 mL water
- Take blood glucose after one hour
- If blood glucose  $\geq 7.8$  mmol/L, do a full glucose tolerance test (GTT)
- Full GTT:
  - After an overnight fast, take a morning fasting blood glucose level
  - Give oral glucose 75 g dissolved in 250-300 mL water
  - Take blood for glucose levels at 1, 2 and 3 hours after giving glucose
  - Normal values: FBG  $< 5.0$  mmol/L, 1 hour  $< 9.2$  mmol/L, 2 hours  $< 8.1$  mmol/L, 3 hours  $< 6.9$  mmol/L
  - If at least 2 of these levels are abnormally high, this indicates gestational diabetes

### **Option 3: WHO 2 hour GTT**

- After an overnight fast, take a morning fasting blood glucose level
- Give oral glucose 75 g dissolved in 250-300 mL water
- Take blood for glucose level 2 hours after giving glucose:
  - FBG  $\geq 7.8$  mmol/L or 2 hour blood glucose level  $\geq 11.1$  mmol/L indicates gestational diabetes
  - 2 hour blood glucose level  $\geq 7.8$  mmol/L indicates impaired glucose tolerance

## **MANAGEMENT**

All pregnant women with pregestational diabetes, gestational diabetes or impaired glucose tolerance should be referred to a specialist clinic with expertise in managing these conditions in pregnancy, usually at a level 2 or level 3 hospital. Follow up care may be continued at a level 1 hospital, in accordance with instructions from the specialist clinic.

# CARDIAC DISEASE

At the first antenatal visit, all women should be asked about a history of heart disease, and undergo a clinical examination of the cardiovascular system. Auscultation of the heart is routinely carried out where possible.

## SYMPTOMS AND SIGNS

- Shortness of breath with mild effort
- Shortness of breath when lying flat
- Haemoptysis
- Palpitations
- Chest pain
- Dizziness
- Rapid ( $\geq 100/\text{min}$ ) or irregular heart rate
- Heart murmurs

## ANTENATAL CARE

All women with a history or symptoms and signs of heart disease must be referred to a specialist clinic with expertise in the management of cardiac conditions in pregnancy, usually at a level 2 or level 3 hospital.

Further management of the pregnancy and delivery should follow the instructions of the specialist clinic. Women with mild cardiac disease may be able to deliver at a level 1 hospital

## MANAGEMENT OF LABOUR

### First stage

- Nurse the mother in a semi-Fowler position
- Restrict intravenous fluids to Ringer-Lactate 70 mL/hour
- Give adequate analgesia – pethidine 100 mg IM with promethazine 25 mg IM 4 hourly
- Give ampicillin 1 g IV 6 hourly for 4 doses and gentamicin 240 mg IV as a single dose, or vancomycin 1 g IV as a single dose (for women allergic to penicillin)
- Observe colour and respiratory rate hourly
- Auscultate the lung bases 2 hourly
- If oxytocin augmentation of labour is necessary, use a fluid restricting regimen:
  - Add oxytocin to 200 mL of Ringer-Lactate
  - Start infusion at a rate of 5 mL/hour and double the infusion rate (5,10,20,40 mL/hour) every 30 minutes until 3 to 4 strong contractions are achieved
  - If this is not adequate, start a new infusion with oxytocin 10 units in 200 mL Ringer-Lactate at 40 mL/hour.
  - This represents a 5-fold reduction of fluid volumes shown in Box XXX

### Second and third stage

- Avoid the lithotomy position: the mother must sit up with her legs supported below the level of her body, by assistants or on chairs

- Perform vacuum extraction unless delivery is rapid and easy
- Local anaesthetics for episiotomy should not contain adrenaline
- Do not give ergometrine in the third stage; use oxytocin 10 units IM
- Give furosemide 20 mg IV after delivery of the baby

### **Fourth stage and puerperium**

- Immediately report evidence of pulmonary oedema (cough, dyspnoea) to a doctor
- Do hourly observations of general condition, respiratory rate, heart rate and blood for 24 hours
- Offer contraception: long acting depot progestagens (medroxyprogesterone acetate, norethisterone enanthate) are safe for women with cardiac disease
- Delay postpartum sterilisation until at least one month after delivery
- Discharge the mother when she is well, with follow up arrangements for her cardiac condition

### **MANAGEMENT OF PULMONARY OEDEMA**

- Nurse in the semi-Fowler position
- Give oxygen by mask
- Restrict intravenous fluid
- Give furosemide 20-40 mg IV, and repeat if necessary
- Attach an ECG monitor
- Attach pulse oximeter if available
- Transfer to a level 2 or level 3 hospital for further care

### **ASTHMA**

Most pregnant women with asthma can be looked after by their normal health care providers

- Management of asthma in pregnancy does not differ from that of nonpregnant women
- Optimise treatment to prevent attacks, which may cause fetal hypoxia and intrauterine death
- Use peak flow meters to monitor response to drug therapy
- Beta2-stimulants (e.g. salbutamol), inhaled and systemic steroids, theophylline, sodium cromoglycate and ipratropium bromide are all safe in pregnancy
- Avoid giving anti-asthmatic capsules containing barbiturates and ephedrine
- Admit women who continue to wheeze, despite receiving appropriate treatment, and call for help from a doctor with expertise in managing asthma
- Manage labour and delivery according to normal obstetric principles
- Women who have used oral steroids for treatment of asthma should receive hydrocortisone 100 mg IV 6 hourly during labour or at the time of caesarean section

## THROMBOEMBOLISM

Women are at increased risk of thromboembolism in pregnancy and in the puerperium. The following problems are occasionally encountered:

- A woman with a history of previous deep vein thrombosis
  - Heparin 5000 units SC 12 hourly throughout the pregnancy and for 2 weeks after delivery, OR
  - Enoxaparin 0.5 mg/kg/day SC as a single daily dose throughout the pregnancy and for 2 weeks after delivery
- A woman with symptoms and signs of deep vein thrombosis – unilateral leg pain and swelling
  - Therapeutic heparin - 5000 units IV as a bolus, followed by heparin 10 000 units in 200 mL normal saline, infused at 20 mL/hour (1000 units/hour), OR
  - Heparin 10 000 units SC 12 hourly, OR
  - Enoxaparin 1mg/kg SC 12 hourly,
  - Then refer to a level 2 or level 3 hospital for ultrasound investigation and a plan for further management
- A woman with symptoms and signs of pulmonary embolism – acute shortness of breath and chest pain, haemoptysis, cyanosis and tachycardia.
  - If other causes (e.g. pulmonary oedema, hypovolaemia, pneumonia, pleural effusion) have been excluded, give heparin 5000 units IV as a single dose, followed by an infusion of heparin 1000 units/hour, as above for deep vein thrombosis, OR
  - Enoxaparin 1mg/kg SC 12 hourly

Then transfer urgently to a level 2 or level 3 hospital by ambulance for further investigations and management

## EPILEPSY

Epileptic women may be managed under the care of a doctor at a level 1 hospital

- Encourage prepregnancy counselling to optimise control and ensure compliance
- Do a second trimester ultrasound scan to exclude fetal abnormalities
- The drug of choice is carbamazepine, usually at 200 mg orally 3 times daily
- Use carbamazepine blood levels, if available, to monitor therapy: the therapeutic range is 8-12 micrograms/mL
- Use monotherapy wherever possible
- Do not change non-carbamazepine treatment (e.g. phenytoin) if it is effective
- Give folic acid 5 mg orally once daily throughout the pregnancy
- From 36 weeks, add vitamin K 20 mg orally once daily
- If convulsions occur in a compliant patient, increase the evening dose of carbamazepine and add phenobarbitone 30-60 mg as an evening dose if necessary. Always exclude eclampsia as a possible cause of convulsions.
- Treat status epilepticus as for nonpregnant women. Always give mask oxygen to prevent fetal hypoxia
- Obstetric care, i.e. labour and delivery, is the same as for nonepileptic women
- Breastfeeding is safe with the anticonvulsants mentioned
- Readjust treatment to pre-pregnancy doses after delivery

## CHAPTER 9

# INFECTIONS IN PREGNANCY

<b>Abnormal vaginal discharge</b>	<b>124</b>
<b>Genital ulcers</b>	<b>124</b>
<b>Genital warts</b>	<b>124</b>
<b>Syphilis and positive RPR tests</b>	<b>124</b>
Syphilis serology testing in pregnancy	124
Management of women with positive RPR tests	125
<b>Malaria</b>	<b>125</b>
Uncomplicated malaria	125
Severe malaria	125
<b>Urinary tract infection</b>	<b>127</b>
Cystitis	127
Acute pyelonephritis	127
<b>Pneumonia and tuberculosis</b>	<b>127</b>

## ABNORMAL VAGINAL DISCHARGE

Wherever possible, use a vaginal speculum to observe the discharge and inspect the cervix.

- For vaginal candidiasis (thrush), give clotrimazole single-dose pessary 500 mg to be inserted in the vagina that evening
- For a nonspecific yellow-green or offensive discharge, give metronidazole 2 g orally as a single dose (for trichomoniasis or bacterial vaginosis). In the first trimester, give clotrimazole pessary 500 mg instead of metronidazole
- For a mucopurulent discharge from the cervical os, add ceftriaxone 250 mg IM (or spectinomycin 2 g IM if sensitive to cephalosporins) as a single dose, with erythromycin 500 mg orally 4 times daily for 7 days\*.

Add ceftriaxone and erythromycin if, on follow up, the discharge has not responded to treatment

*\*Do not prescribe ciprofloxacin and doxycycline for pregnant women*

## GENITAL ULCERS

### Initial management

- Give benzathine penicillin 2.4 million units IM as a single dose (for syphilis) and erythromycin 500 mg orally 4 times daily for 5 days (for chancroid)
- Give erythromycin 500 mg orally 4 times daily for 14 days to women who are allergic to penicillin
- Take blood for RPR
- Notify partner to come for examination and treatment

If the ulcer or ulcers have not responded to treatment in one week, refer to a hospital or to a doctor with experience in the management of genital ulcers.

## GENITAL WARTS

These are caused by the human papilloma virus (HPV) and are sexually transmitted.

- Do not attempt to treat the warts
- Podophyllin is contraindicated in pregnancy
- Reassure the mother that the warts may resolve after the pregnancy and can be treated then if necessary
- Refer women with extensive warts from a community health centre to hospital
- Consider elective caesarean section when warts are so large as to obstruct vaginal delivery

## SYPHILIS AND POSITIVE RPR TESTS

### SYPHILIS SEROLOGY TESTING IN PREGNANCY

- RPR testing must be done at the first antenatal visit. If the first test is performed before 20 weeks and is negative, a second test should be done at 36 weeks
- A rapid card test, done by the antenatal clinic staff, gives a result before the mother goes home. This allows immediate treatment of RPR-positive women
- Specific treponemal tests such as FTA-Abs and TPHA are not normally used in the management of syphilis in pregnancy in South Africa.

## MANAGEMENT OF WOMEN WITH POSITIVE RPR TESTS

- Treat all women with positive RPR, irrespective of titre values
- Administer benzathine penicillin 2.4 million units IM once weekly for 3 doses
- Give erythromycin 500 mg 4 times daily for 28 days to women who are allergic to penicillin. Penicillin desensitisation (in hospital) may also be considered. If erythromycin is used, the baby should be treated with penicillin after delivery
- Congenital or neonatal syphilis must be excluded.
- Notify partner to come for examination and treatment

## MALARIA

Malaria in pregnancy is associated with serious complications, such as cerebral malaria, hypoglycaemia, pulmonary oedema and death. Malaria is a notifiable disease.

### UNCOMPLICATED MALARIA

Patients with uncomplicated malaria include those who have mild symptoms, are ambulant and have no evidence of organ dysfunction either clinically or on laboratory tests, and in whom the mother has a parasite count of less than 5%, haemoglobin  $\geq 6$  g/dL, and no organ dysfunction (e.g. no jaundice).

1. Admit to hospital
2. Take blood for FBC, urea and creatinine
3. Give quinine 600 mg orally 3 times daily, (IV if the patient is vomiting), for 7-10 days
4. About 2-3 days after starting quinine, prescribe clindamycin 10 mg/kg orally twice daily for 7 days
5. Do 4 hourly finger-prick blood glucose tests, at least for the first 24 hours
6. Ensure adequate hydration by mouth or IV, but avoid overhydration, as pregnant women with malaria are at increased risk of pulmonary oedema
7. Use a fan or tepid sponge to control pyrexia
8. Regularly monitor mental status, respiratory rate and urine output, as complications may develop and the clinical condition may deteriorate rapidly despite adequate malaria chemotherapy
9. After 28 weeks, perform CTG daily if possible
10. Follow up at hospital antenatal clinic after discharge, as there is a risk of impaired fetal growth

### SEVERE MALARIA

The clinical course of severe malaria is unpredictable, and deterioration may be rapid. Severe malaria is diagnosed if the mother has at least one of the complications outlined below

#### Features of severe malaria

##### Clinical:

- Coma, depressed consciousness or convulsions
- Respiratory distress (acidosis, ARDS, pulmonary oedema)
- Jaundice
- Bleeding from puncture sites or mucous membranes

- Shock
- Anaemia

### **Biochemical:**

- Renal impairment – serum creatinine >265 micromol/L, or rapidly rising creatinine, or urine output <400 mL/day
- Acidosis (plasma bicarbonate <15 mmol/L, serum lactate >5 mmol/L)
- Hepatic impairment - (serum transaminase levels >3 times normal)
- Hypoglycaemia (blood glucose < 2.2 mmol/L)
  - Associated with malaria infection or decreased glucose intake
  - Complication of quinine
- Hypoxia (PaO<sub>2</sub> <8 kPa, <60 mmHg in room air)

### **Haematological:**

- Parasitaemia >5%
- Haemoglobin <6 g/dL or haematocrit <20%
- > 5% neutrophils contain malaria pigment
- Presence of schizonts of *P.falciparum* in peripheral blood smear
- Evidence of DIC or severe thrombocytopenia (<50,000/mm<sup>3</sup>)

**Hypoglycaemia, anaemia and ARDS are common complications, and ARDS tends to occur several days after treatment commences.**

### **Management of severe malaria**

The mother should ideally be admitted to an intensive care unit or to the highest level of care available. Good nursing care is vital. If it is not possible to transfer the patient immediately (no transport, lack of beds at referral center, problems of communication etc), care as outlined below should be provided until such time that it is possible to transfer the patient.

### **Treatment of severe malaria**

1. Give a loading dose of quinine (20 mg/kg in 5 mL/kg 5% dextrose saline) by slow intravenous infusion over 4 hours.  
The loading dose is given strictly according to body weight. Never give an IV bolus injection of quinine
2. Exclude other treatable causes of coma such as hypoglycaemia
3. It may be difficult to differentiate cerebral malaria from eclampsia. In malaria-endemic areas, it may be necessary to treat both conditions, i.e. magnesium sulphate and delivery in addition to malaria treatment
4. Monitor blood glucose level 4 hourly and manage hypoglycaemia with IV glucose
5. Reduce high body temperatures (>39 degrees C) by tepid sponging and fanning. Antipyretics may also be given. Avoid aspirin and non-steroidal anti-inflammatories
6. Take blood daily for FBC, urea and creatinine (or more frequently if indicated)
7. Add a broad spectrum antibiotic e.g. 3rd generation cephalosporin. Secondary bacterial sepsis is common in severe malaria
8. Transfuse if Hb <6 g/dL
9. Accurately record and monitor all intake and output. Avoid over- and underhydration. Fluid overload is common in pregnancy and may precipitate potentially fatal respiratory failure. Hypovolaemia however, may potentiate renal failure, metabolic acidosis and circulatory collapse. Keep CVP at ≤5 cm H<sub>2</sub>O.

10. Closely monitor temperature, respiratory rate, blood pressure and level of consciousness using the Glasgow Coma Scale
11. Transfer to a centre with an intensive care unit, at a level 2 or level 3 hospital, as soon as possible. Document all fluids and medications given on the transfer letter
12. Once the patient has improved clinically the 7-10 day course of quinine should be completed orally with the addition of clindamycin as for uncomplicated malaria.

## **URINARY TRACT INFECTION**

### **CYSTITIS**

This presents with urinary discomfort and/or frequency. There may be some lower abdominal tenderness. The patient usually has no fever and does not appear ill. Urine dipstick testing may show leukocytes, nitrites and protein.

Asymptomatic bacteriuria is a condition in pregnancy which sometimes precedes acute pyelonephritis. If detected on urine culture, this should be treated in the same way as cystitis.

#### **Management**

- If possible, send a midstream urine specimen for microscopy, culture and sensitivity (MC&S)
- Give nitrofurantoin 100 mg orally 4 times daily for 7 days (only before 36 weeks), amoxicillin 3 g or cotrimoxazole 4 tablets as a single dose, or give antibiotics as indicated by MC&S results
- Encourage a high oral fluid intake
- A positive culture will indicate whether treatment is needed and which antibiotics will be effective

### **ACUTE PYELONEPHRITIS**

This is a common and serious cause of pyrexia in pregnancy. The patient usually appears ill and has a pyrexia and tachycardia. There is almost always renal angle tenderness.

#### **Management**

- Admit the mother to hospital
- Obtain a midstream urine specimen for MC&S
- Take blood for urea and creatinine, FBC and smear, and blood culture
- Start cefazolin 1 g IV 8 hourly, changing to oral treatment 24-48 hours after the fever subsides. Adjust the medication if necessary according to the MC&S results. Total duration of treatment should be 10 days
- Give Ringer-Lactate solution IV 3 L/day, or more if the mother is vomiting
- Following recovery, take 2 consecutive midstream urine specimen for MC&S at least a week apart to confirm clearance of the infection

## **PNEUMONIA AND TUBERCULOSIS**

The investigations and treatment of these conditions does not differ from that of nonpregnant patients. Streptomycin is the only commonly used antituberculous drug that is absolutely contraindicated in pregnancy. Tuberculosis is a notifiable disease. Always offer counseling and testing for HIV.

## CHAPTER 10

# PREVENTION OF MOTHER-TO-CHILD HIV TRANSMISSION AND MANAGEMENT OF HIV POSITIVE (APRIL 2008)

<b>Acronyms</b>	<b>129</b>
<b>Summary</b>	<b>130</b>
<b>Introduction</b>	<b>131</b>
<b>Background</b>	<b>131</b>
<b>Risk factors for Mother-to-child HIV Transmission</b>	<b>132</b>
<b>Antenatal Care</b>	<b>133</b>
<b>Management of Labour</b>	<b>138</b>
<b>Post- Delivery</b>	<b>139</b>
<b>Termination of Pregnancy</b>	<b>142</b>
<b>Other Considerations</b>	<b>142</b>
<b>FIGURES, BOXES, TABLES AND ALGORITHMS</b>	
Table 1 - Management of opportunistic infections	135
Table 2 - Antiretroviral Protocols for Pregnant Women and Infants	136
Table 3 - HAART Adult Dosing Guide	137
Table 4 - PMTCT Infant Dosing Guide	137
Table 5 - Contraindications for AZT / Toxicity monitoring when using AZT	138
Table 6 - Operationalising the AFASS criteria	140
Table 7 - AFASS criteria to assist with infant feeding choices in HIV positive women	141
Table 8 - Summary of factors affecting mother-to-child transmission of HIV	142
Table 9 - Possible uses of AROM and recommendations to reduce the risk of MTCT	143
Table 10 - Summary of Interventions to Prevent Mother-to-child HIV Transmissions	143

## ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretroviral
AROM	Artificial Rupture of Membranes
AZT	Azidothymidine (zidovudine)
CD4+	Cluster designation 4 positive lymphocytes
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
IgA	Immunoglobulin A
IgM	Immunoglobulin M
IVIG	Intravenous immunoglobulin
MTCT	Mother-to-child-transmission
OI	Opportunistic Infections
PCP	Pneumocystis jiroveci pneumonia
PCR	Polymerase Chain Reaction
STI	Sexually Transmitted Infections
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
VCT	Voluntary HIV counselling and testing
WHO	World Health Organisation

## SUMMARY

Mother-to-child transmission (MTCT) is the overwhelming source of HIV infection in young children. In the absence of preventive intervention, the probability that an HIV-positive woman's baby will become infected is approximately 25% to 35%. HIV may be transmitted during pregnancy, labour, delivery, or after the child's birth during breastfeeding.

Various studies that have been conducted on the programme suggest that the transmission rates range from 10 to about 30 percent and are even lower in the Western Cape where coverage of target population is above 90% since dual therapy was introduced. A report on the evaluation of the National programme should be released before the end of 2008.

In line with the International standards for a comprehensive strategy, the PMTCT policy recognises that in order to prevent HIV among women and children, the four elements of PMTCT are integral: -

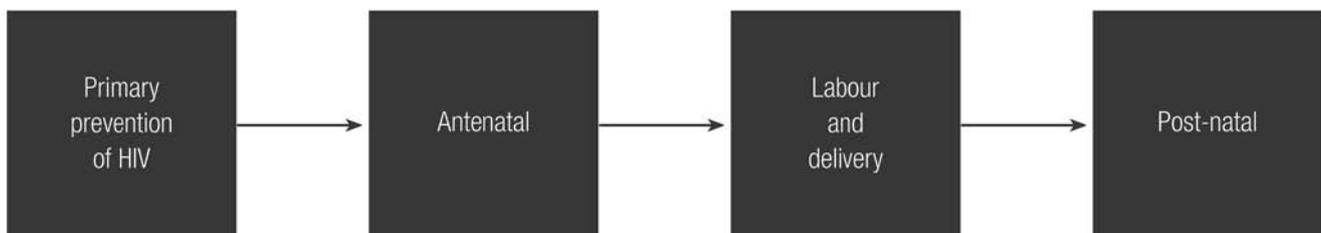
- Primary prevention of HIV especially among women of childbearing age;
- Preventing unintended pregnancies among women living with HIV
- Preventing HIV transmission from a woman living with HIV to her infant; and
- Providing appropriate treatment, care and support to women living with HIV and their children and families.

The National PMTCT programme aims to: -

- Ensure primary prevention of HIV especially among women of childbearing age.
- Integrate PMTCT interventions into routine maternal, child and women's health services. (For specific interventions of the PMTCT programme refer to P13 of Policy and Guidelines for the implementation of the PMTCT Programme)

### THE FOUR STAGES OF PMTCT INTERVENTION OUTLINED IN THE GUIDELINE ARE AS FOLLOWS:

**Figure 1: Four stages of PMTCT**



## **INTRODUCTION AND BACKGROUND**

The commonest route of HIV infection for HIV positive children under 5 years is through mother to child transmission. Preventing mother-to-child transmission of HIV would be the main intervention to reduce HIV infection amongst children. Transmission of HIV from a mother to her infant can take place during pregnancy, labour and delivery, and after birth via breastfeeding, especially mixed feeding. It is thought that the risk of transmission varies at the different stages with the risk during pregnancy ranging from 5-10%, 10-20% during labour and delivery and 10-20% through mixed feeding. In the absence of any interventions to prevent MTCT, it is estimated that in about thirty percent of cases, the virus will pass from the mother to the infant.

The national PMTCT programme is available in about 3000 primary health care facilities countrywide. The package includes; primary HIV prevention programmes for women of child-bearing age, routine offer of voluntary HIV counselling and testing to pregnant women, safe infant feeding counselling and support, safe obstetric practices, dual therapy to the mother and to the infant, as well as the provision of infant formula to women who choose this route and who will be able to do it safely, in an acceptable, feasible, affordable and sustainable manner.

# **RISK FACTORS FOR MOTHER-TO-CHILD HIV TRANSMISSION (MTCT)**

The following factors have been shown to increase the risk of MTCT.

## **2.1 Maternal Factors**

### **2.1.1 Immune status:**

The risk for MTCT is increased with the severity of immune deficiency. Women with low CD4 counts (<200 cells/ml or less) are more likely to transmit HIV to their infants.

### **2.1.2 Maternal clinical status**

The more advanced the HIV disease, the higher the risk of MTCT.

### **2.1.3 Maternal nutrition status**

Malnutrition weakens the immune system leading to increased vulnerability to infections and may hasten the progression of HIV to AIDS. HIV on the other hand, compromises the nutritional status of infected people and increases their susceptibility to other infections

### **2.1.4 Vitamin A deficiency:**

#### **2.1.4.1**

Studies on MTCT have suggested an association between Vitamin A deficiency in the mother and risk of MTCT. Vitamin A deficiency in HIV- infected mothers is associated with a higher risk of HIV transmission from mother to child. Vitamin A supplementation has, however not been found to reduce MTCT. Alternatively, low vitamin A levels may be a marker for other deficiencies or behavioural factors, which influence transmission. Other micronutrients, including zinc and selenium have been suggested as having a possible role.

## **2.2 Behavioural factors**

Cigarette smoking, drug use, and unprotected sexual intercourse during pregnancy has been associated with an increased risk of MTCT.

## **2.3 Obstetrical Factors**

### **2.2.1 Placental infection:**

Chorioamnionitis may increase the chance of MTCT. Genital infections and especially STI's may result in chorioamnionitis. Prolonged rupture of membranes during labour is another common cause of infection.

### **2.2.2 Mode of delivery:**

The mode of delivery may also influence the risk of MTCT. Elective Caesarean section has births have been shown to reduce the risk of MTCT. However, in the public sector, it is currently not feasible to offer elective C/S to all HIV positive women.

## 2.4 Obstetric procedures

The factors listed below have been implicated as risk factors for MTCT in some studies but not in others (HIV In Pregnancy: A review. WHO and UNAIDS 1999). These should be avoided and only performed where absolutely necessary

1. Amniocentesis
2. External cephalic version
3. Invasive fetal monitoring
4. Epistiotomy
5. Operative vaginal deliveries (vacuum extraction)

## 2.5 Fetal and Infant Factors

### 2.5.1 Breastfeeding:

HIV is transmittable through breastmilk. Subsequently, breastfeeding is associated with at least one-third of all MTCT.

### 2.5.2 Fetal trauma:

Traumatic births and births where the fetal skin is traumatised from obstetrical procedures increase the risk of MTCT.

### 2.5.3 Prematurity:

Preterm births tend to place the infant at higher risk for MTCT as compared to full term births.

## 2.6 Viral Factors

### 2.6.1 HIV Viral load:

A high level of circulating virus (viral load) is an important contributor to MTCT. The higher the viral load the more likelihood that MTCT will occur. There is a higher risk of MTCT in women with advanced HIV disease (AIDS) or documented high viral loads (e.g. >50,000 copies/ml).

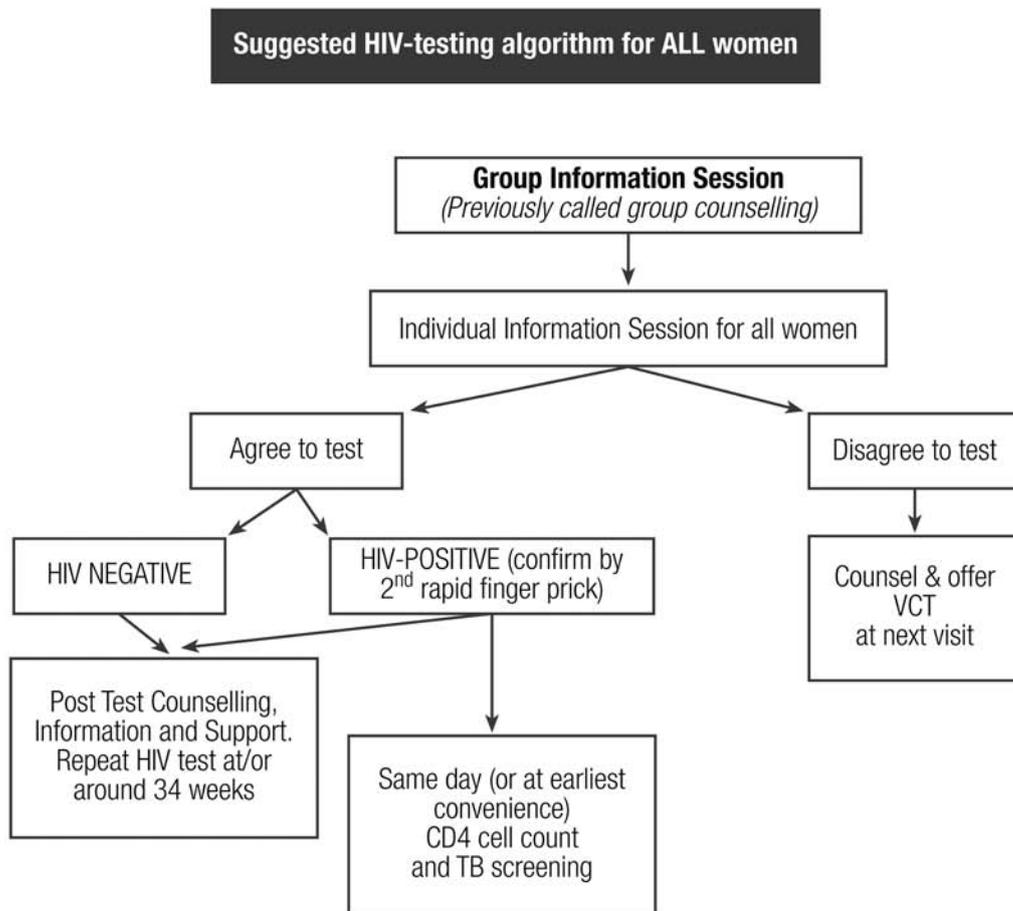
## 3. ANTENATAL CARE

The essential components of antenatal care provided to HIV negative women should be provided to HIV positive women as well. These include complete physical examinations, assessment for high-risk obstetric factors, and antepartum fetal surveillance.

### 3.1 Routine offer of VCT:

- All women attending antenatal care (first attendees and women attending follow-up visits) should be given routine information about voluntary HIV testing and the PMTCT programme
- The initial information on HIV and its transmission should be given in a **'Group Information Session'**
- Thereafter all women who have not previously been tested or those who require repeat testing should go to a counsellor for a one on one **'Individual Information session'**
- At the individual information session, each woman should be informed of the routine voluntary HIV testing procedure and the option of not accepting for whatever reason. She should be given the opportunity to ask further questions. The woman should then be offered an HIV test and asked to provide verbal and written consent to the testing. A woman may refuse an HIV test
- Women who refuse to have an HIV test should be offered routine voluntary HIV testing on every subsequent clinic visit
- All women who test HIV-positive on the screening rapid test should have their HIV status confirmed using a second rapid finger prick test with a different kit.
- Post-test counselling should be offered to both HIV positive and negative women; HIV-positive women should only be counselled after the second rapid HIV test has been performed and confirmed a positive HIV status

The flow chart below summarises the processes involved in routine voluntary counselling and testing



### 3.2 Primary Prevention of HIV:

Preventing HIV infection among women of childbearing age is the best method to reduce the possibility of MTCT.

Preventing new HIV infections during pregnancy and breast-feeding may increase HIV viraemia which will increase the risk of MTCT. Pregnant women should be advised on safer sexual practices, including the importance of correct and consistent condom use.

Treatment of sexually transmitted infections (STI's). Effective treatment of any STI and of any other genital infection will reduce the likelihood of chorioamnionitis and thereby reduce the risk for MTCT

### 3.3 Nutritional Interventions

Nutritional supplements (iron, folate, multivitamins ) should be routinely given from the initial diagnosis of pregnancy until delivery. These supplements have been shown to result in improved pregnancy outcomes, including reducing the incidence of stillbirth, prematurity and low birthweight.

Vitamin supplementation must be started at the first antenatal care visit. Multivitamins in particular has been shown to be effective in improving immunity.

#### 3.3.1 Recommendations:

- Multivitamin 1 three times a day
- Ferrous sulfate 1 two times a day
- Folic acid 1 daily

### 3.4 Medical Interventions

**Table1 - Management of opportunistic infections**

Opportunistic infection	Treatment	Prophylaxis
Urinary Tract Infection	Uncomplicated cystitis: Amoxicillin/clavulanic acid, oral, 375 mg 8 hourly for 7 days.	
Pneumocystis jiroveci Pneumonia (PCP)	Trimethoprim/sulfamethoxazole 80/400, oral, 6 hourly for 21 days: < 60kg three tablets; > 60kg four tablets	<b>SECONDARY PROPHYLAXIS</b> Continue for at least 6 months and until CD4 count increases to >200 on HAART or life long if patient is not on HAART. • Trimethoprim/sulfamethoxazole 80/400, oral, 1 tablet daily
Cervicitis	Ceftriaxone 250mg imi stat and Erythromycin 500mg 4 times a day and Metronidazole 400mg BD. 500 mg Ampicillin four times a day and 400mg Metronidazole three times a day over 5 days.  This will be managed as part of the syndromic management of STI (vaginal discharge syndrome) with: • <b>Cefixime</b> , oral, 400 mg single dose <b>AND</b> • <b>Amoxicillin</b> , oral 500 mg 8 hourly for 7 days <b>AND</b> • <b>Metronidazole</b> 2 g immediately as a single dose	
Vaginal or vulva candidiasis	<b>Clotrimazole</b> vaginal pessary 500 mg inserted immediately as a single dose <b>AND If vulval irritation:</b> <b>Clotrimazole</b> vaginal creams applied thinly to vulva twice daily and continue for 3 days after symptoms resolve. (Maximum 2 weeks).	
Systemic Candidiasis	Ketoconazole 200 -400 mg orally daily for 5-7 days, and Clotrimazole 100mg pessaries every night for 7-10 days (or longer for severely immune-compromised women) • Fluconazole, IV/oral, 200 mg daily for 14 days The usual route is oral, but give IV if patient unable to swallow. An early relapse should be treated with a 4-week course of fluconazole as above. <b>Note:</b> Fluconazole prophylaxis is discouraged.	

Diarrhoea	<p>If infective, give cotrimoxazole orally twice a day for 5 days.</p> <p>For <b>cryptosporidiosis</b></p> <p>Rehydration</p> <p>Antimotility agents are partially effective, e.g.</p> <ul style="list-style-type: none"> <li>• Loperamide, oral, 4 mg initially, followed by 2 mg as required up to four times daily</li> </ul> <p>There is no specific antimicrobial therapy for <b>cryptosporidiosis</b>.</p> <p>As with other opportunistic diseases it responds well to HAART.</p> <p>For <b>Isosporiasis</b>:</p> <ul style="list-style-type: none"> <li>• Trimethoprim/sulfamethoxazole 80/400, 4 tablets 12 hourly for 10 days</li> </ul>	<p><b>For Isosporiasis:</b></p> <p>Secondary prophylaxis</p> <p>Continue for at least 6 months and until CD4 count increases to &gt;200 on HAART or life long if patient is not on HAART:</p> <ul style="list-style-type: none"> <li>• Trimethoprim/sulfamethoxazole 80/400, 2 tablets daily</li> </ul>
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**Table 2 - Antiretroviral Protocols for Pregnant Women and Infants**

CLINICAL DECISION	Regimen for woman	Regimen for infant
<b>PMTCT regimen for ALL</b> groups of women from 28 weeks of pregnancy unless already on HAART		
<p>CD4 cell count &gt;200, continue with this PMTCT regimen</p> <p>CD4 cell count ≤200 continue AZT up to point HAART initiated.</p>	<ul style="list-style-type: none"> <li>• AZT started from 28 weeks onwards AND</li> <li>• sd NVP + AZT at onset of labour on a 3 hourly basis</li> <li>• If in false labour continue with AZT</li> </ul>	<p><b>Sd-NVP + AZT for 7 days*</b></p> <p><b>AZT for 28 days if</b></p> <ul style="list-style-type: none"> <li>• Mother received &lt; 4 weeks AZT during pregnancy</li> <li>• Mother received &lt; 4 weeks HAART or</li> <li>• Mother only received sdNVP</li> </ul>
<b>HAART regimens (1a and 1b).</b> If on AZT as above need to switch to regimens below		
<p>CD4 cell count ≤200 or WHO stage IV HAART group</p>	<ul style="list-style-type: none"> <li>• d4T + 3TC + NVP (Regimen 1b)</li> <li>• Preferred regimen for pregnant women</li> <li>• Begin at any gestation</li> <li>• d4T + 3TC + EFV (Regimen 1a),</li> <li>• For pregnant women on regimen 1a, switch EFV to NVP in the first trimester</li> <li>• If presenting after first trimester, continue regimen 1a</li> <li>• Continue through labour, delivery and postnatal periods</li> <li>• After the first trimester, if women develop NVP-associated toxicity, then NVP should be substituted with EFV</li> </ul>	<p><b>Sd-NVP + AZT for 7 days*</b></p> <p><b>AZT for 28 days if</b></p> <ul style="list-style-type: none"> <li>• Maternal HAART &lt; 4 weeks</li> </ul>
<b>Unbooked woman presents in labour</b>	Also includes women of known status who have had no ARVs during pregnancy. Do not require testing.	

Consent and test for HIV only in stage 1 labour.	<b>If HIV positive</b> <ul style="list-style-type: none"> <li>sd NVP + AZT at onset of labour and on AZT at 3 hourly basis</li> </ul>	<b>Sd-NVP + AZT for 28 days</b>
If in advanced stage of labour, defer maternal testing until after delivery.	If she is in false labour continue with AZT.	

**Table 3 - HAART Adult Dosing Guide**

Drug	Dosage	Notes
d4T (Stavudine)	30mg 12hrly po	All adult patients must receive 30mg regardless of weight
3TC (Lamivudine)	150mg 12 hourly po	
NVP (Nevirapine)	200mg dly po X 2 weeks then 200mg 12 hourly po  For PMTCT purposes single dose (sdNVP) is used as a 200mg tablet given once.	Should not be prescribed with TB treatment or if CD4>200
EFV (Efavirenz)	600mg nocte	Avoid in pregnancy (first trimester) and psychiatric conditions
AZT (Zidovudine)	300mg 12 hourly po	Avoid if severe anaemia (Hb <7g/dl)

Doses and frequency will remain the same when used intrapartum.

**Table 4 - PMTCT Infant Dosing Guide**

Drug	Weight	Dose	Notes
NVP syrup (10mg/ml)	>2kg	0.6ml (6mg) Stat	To be administered as soon as possible after birth as a single dose (sdNVP)
	< 2kg	0.2ml/kg stat (2mg/kg)	
AZT syrup (10mg/ml)	>2kg	1.2ml 12 hrly (12mg 12 hrly)	For 1 week if mother received 28 days of AZT or HAART, otherwise for 4 weeks. Administered with a 2ml syringe

**Table 5 - Contraindications for AZT / Toxicity monitoring when using AZT**

- Women who are on AZT and who appear pale should have blood taken to measure haemoglobin. The results should be discussed with a doctor trained in HIV & AIDS management.
- If a woman is clinically pale, follow the guidelines below:
  - o If the Hb is **<7g/dl**, do NOT START AZT – Investigate causes of severe anaemia
  - o If the Hb is **between 7g/dl and 10g/dl**, continue AZT and give Ferrous Sulphate 1 tds. Repeat Hb in 2 – 4 weeks. If there is no response, or the Hb is dropping, continue AZT BUT urgently refer the woman to a doctor for investigation of the anaemia.
  - o If the Hb is **10g/dl**, continue AZT AND give Ferrous Sulphate 1 bd. Re-check Hb after 4 weeks on AZT.
- All women commencing AZT (not clinically pale or Hb>**7g/dl**) should have baseline haemoglobin taken.
- During subsequent visits the baseline haemoglobin results of women on AZT should be reviewed by a doctor, and used to determine the next set of actions, if any, to be taken. These actions are listed in the bullets above.

## **4. MANAGEMENT OF LABOUR**

The mode of delivery should be planned and discussed beforehand. Discuss the option of elective caesarean section with pregnant women having following conditions: 1) previous caesarean section; 2) gross fetopelvic disproportion; or, 3) any other contra-indication to vaginal delivery. Although elective caesarean section has been shown to reduce the risk of MTCT, in resource constrained settings it has been found to be costly and impractical with an increased risk of post-operative complications. Routine elective caesarean sections are therefore not recommended

The following principles should be followed:

1. Labour and delivery should be as natural as possible
2. Vaginal cleansing:  
MTCT may occur during delivery due to the presence of blood and mucus in the birth canal. Studies have shown that vaginal cleansing with an antiseptic solution is associated with reduced MTCT and improved perinatal outcome
3. Avoid artificial rupture of membranes. Shorten length of ruptured membranes to less than 4 hours; augment labour if there is any evidence of slow progress. AROM should only be done if there are specific obstetric indications and as late as possible. In HIV-positive women other methods of augmenting labour should be considered instead of AROM (e.g. oxytocin augmentation).
4. Administer prophylactic antibiotics in women with CD4 counts of less than 200/ml; where there are signs of AIDS or severe immune deficiency; or rupture of membranes for more than 4 hours.
5. Administer ARVs 3 hourly as per schedule
6. Avoid episiotomy, invasive monitoring and other procedures
7. Observe aseptic techniques throughout labour. Use Chlorhexidine 0.25% for vulval and vaginal toilet when performing internal digital examination.
8. Check for and manage urinary tract infection at the start of labour

### **4.1 Technique for vaginal cleansing**

Prior to vaginal examination in labour, cleanse vulva area with the chlorhexidine solution using a spray bottle or swabs. The vaginal canal is cleansed with 0.25% chlorhexidine solution during vaginal examinations. Adding 12.5ml chlorhexidine with 5 litres of water makes a 0.25% chlorhexidine preparation.

Wrap a thick or double gauze swab around the two examining fingertips, securely pinching the free edges between the two fingers. Soak the swabs with chlorhexidine solution by dipping in galley pot, pouring over swabs or by thoroughly spraying the swabs with a swab bottle.

Part the vulvae with gloved left hand and carefully clean whole vaginal surface with soaked swabs.

Discard the swabs and keep the vulva area parted while inserting examining fingers, preferably using chlorhexidine obstetric cream, for vaginal examination

## **4.2 Use of prophylactic antibiotics in labour**

Prophylaxis for:

- Caesarean section, both elective and emergency
- Rupture of membranes for more than 4 hours

Following caesarean section, prophylaxis consists of the following:

- Cefazolin 1 – 2 g intravenously at induction of general anaesthesia. It may be repeated after completion of surgery, OR
- Ampicillin 1 g IV at induction of general anaesthesia, and
- Metronidazole 400 mg orally three times a day over 5 days or 500mg suppository every 12 hours for three days.

## **5. POST-DELIVERY**

The third stage of labour must be managed actively at all times. HIV positive women in the postpartum period must be closely monitored. Women with AIDS or severe immune deficiency must be given antibiotics over 7-10 days.

### **5.1 Safe Infant Feeding Options**

#### **5.1.1 Principles of safe infant feeding**

- Health care personnel, lay counsellors and community caregivers should receive standardized training on infant feeding counselling and HIV.
- Trained health care personnel should provide high quality, unambiguous, unbiased information about risks of HIV transmission through breastfeeding and risks of replacement feeding.
- Counselling on infant feeding must commence after the first post-test counselling session.
- Infant feeding should be discussed with women during every antenatal visit,
- Mixed feeding should be strongly discouraged as it predisposes to childhood infections and increases the risk of HIV transmission in HIV-positive women.
- Mass mobilization and communication on infant feeding and HIV should be done through mass media, distribution of IEC materials and community-based activities including door-to-door campaigns.
- In an attempt to optimize child survival HIV positive pregnant women should be prioritized for HAART or PMTCT regimens in order to keep them healthy and reduce their viral load.

#### **5.1.2 HIV-negative women**

- At every antenatal visit, HIV negative women or women of unknown HIV status (every effort should be made to get all pregnant women tested or re-tested as stated in the testing section of this document) should be counselled to exclusively breastfeed their babies during the first 6 months of life and continue breastfeeding for at least 2 years.

### 5.1.3 HIV-positive women

- At every antenatal visit HIV-positive women should be counselled on infant feeding options
- Each pregnant HIV-positive woman should receive at least four antenatal counselling sessions on infant feeding.
- The feeding options for the first 6-months of life are exclusive breastfeeding or exclusive formula feeding. All HIV-positive infants should continue breastfeeding for at least 2 years, regardless of whether the mother meets the AFASS criteria
- For each woman, the Aceptability, Feasibility, Affordability, Safety and Sustainability criteria (AFASS) should be assessed and discussed, and the woman should be assisted to make the feeding choice that would be most appropriate for her individual situation. The summary table 6 below table 5 contains more details on what questions to ask to determine if the AFASS criteria are met.

**Table 6 – Operationalising the AFASS criteria**

#### **AFASS criteria to assist with infant feeding choice in HIV-positive women**

##### **Acceptable:**

The mother perceives no barrier to choosing and executing the option for cultural or social reasons, or for fear of stigma and discrimination.

Feasible:

**The mother (or family) has adequate time, knowledge, skills and other resources to prepare and feed the infant, and the support to cope with family, community and social pressures.**

##### **Affordable:**

The mother and family, with available community and/or health system support, can pay for the purchase/production, preparation and use of the feeding option, including all ingredients, fuel and clean water and equipment, without compromising the health and nutrition spending of the family.

Sustainable:

**Availability of a continuous and uninterrupted supply and dependable system of distribution for all ingredients and commodities needed to safely implement the feeding option, for as long as the infant needs it.**

Safe:

**Formula milk would be correctly and hygienically prepared by clean hands, using clean, safe water and clean utensils. Nutritionally adequate quantities of formula milk would regularly be available. Clean water and fuel would be regularly available. Formula milk would be fed using clean hands and utensils, and preferably with cups rather than bottles.**

**Use the questions in the table below to check the AFASS criteria**

**Table 7 - AFASS criteria to assist with infant feeding choices in HIV positive women**

<b>CRITERION</b>	<b>Questions to ask to see if mother is able to follow through with Exclusive Formula Feeding (avoiding all breastfeeding)</b>
<p><b>Acceptability</b></p> <p>Is EFF acceptable for the mother?</p>	<p>Are there cultural or social reasons that could create a problem if the mother were to choose formula feeding?</p> <p>Does the mother have fear of stigma or discrimination if she were to choose replacement feeding?</p>
<p><b>Feasibility</b></p> <p>Is the mother able to begin EFF correctly for the required six-month period of time?</p>	<p>Does the mother or caregiver have enough time, knowledge, skills, resources and support to correctly prepare breast-milk substitutes?</p> <p>Is she able to feed the infant 8-12 times in 24 hours?</p>
<p><b>Affordability</b></p> <p>Is the mother able to afford the costs of EFF?</p>	<p>Can the mother pay for the costs of buying, preparing, storing, the ERF without compromising the health and nutrition of the family?</p> <p>NOTE: Costs include those for ingredients/supplies, fuel, clean water, and medical expenses that may result from unsafe preparation and feeding practices.</p>
<p>Sustainability</p> <p>Will the mother be able to continue with EFF for the recommended 6 month period, once she has begun?</p>	<p>Will the mother be able to have a continuous, uninterrupted supply of replacement food (e.g. formula)?</p> <p>Will the mother have the products (e.g. ability to boil water) needed to safely practice ERF?</p>
<p>Safety</p> <p>Will the mother be able to practice EFF safely?</p>	<p>Will the mother be able to prepare and feed the EFF with clean water, clean hands, clean cups and other utensils, but not bottles or teats?</p> <p>Will the mother be able to store the replacement food correctly and in a place that is hygienic?</p>

**5.3. Recommended medications in HIV positive pregnant women postpartum:**

- Multivitamin tablets 1 twice a day
- Vitamin A gel capsule 200 000
- Ferrous sulfate 1 twice a day
- Amoxicillin 500 mg three times a day for 5 – 7 days
- Metronidazole 400 mg three times a day for 5 – 7 days

**5.4 Contraception and Prevention of STIs**

Barrier methods for the prevention of genital infections and future pregnancies, after comprehensive counseling is recommended. Also discuss other forms of contraception, including permanent sterilisation, both male (vasectomy) and female (tubal ligation).

## 6. TERMINATION OF PREGNANCY

HIV positive pregnant women who have undergone termination of pregnancy must receive antibiotics. Treatment of any obvious genital infection is mandatory before the procedure is undertaken.

### Recommendation

- DOXYCLINE 100mg po 12hourly
- CIPROBAY 500mg stat
  
- Metronidazole 400 mg orally three times a day over 5 days or 500mg suppository every 12 hours for three days.

## 7. OTHER CONSIDERATIONS

### Community Involvement and the Reduction of Stigma

Successful implementation of programmes to reduce MTCT of HIV requires not only improvements within health services but also a climate of social support and community involvement. A package of care tailored to the needs of the mother must include ongoing support for the mother, her infant and the family.

Human rights, including reproductive rights and the rights to informed choices and confidentiality, should be respected. This means that the social environment must enable women and families to make informed choices and cope with the choices they make.

**Table 8. Summary of factors affecting mother-to-child transmission of HIV**

Maternal	Maternal immunological, nutritional, and clinical status, behavioural factors
Obstetrical	Prolonged rupture of membranes (>4 hours), mode of delivery, intrapartum haemorrhage, obstetrical procedures, invasive foetal monitoring
Fetal	Prematurity, genetic, multiple pregnancy
Infant	Breastfeeding, gastrointestinal tract factors, immature immune system
Viral	Viral Load Viral genotype and phenotype Viral resistance

**Table 9. Possible uses of AROM and recommendations to reduce the risk of MTCT**

<b>Use of AROM</b>	<b>Recommendation/modification</b>
Poor progress of labour	Oxytocin augmentation or Caesarean section
Diagnosis of meconium stained liquor (MSL) as an indicator of fetal distress	MSL is an inaccurate marker of fetal distress and AROM should not be used for this purpose
For diagnosis of MSL to enable suctioning of the new-born airways	AROM should only be done for this purpose during the second stage for labour, just before suctioning is required.
For internal fetal monitoring	Only if foetal distress is suspected and external monitoring is unsuccessful. The risk and benefits from this procedure must be carefully considered and weighed up in each case. In HIV positive women internal monitoring should be avoided.
For amnio-infusion	The benefits and risks must be considered and evaluated on an individual basis

**Table 10. Summary of Interventions to Prevent Mother-to-child HIV Transmissions**

<p><b>Behavioural Interventions</b></p> <p>Reduction in the frequency of unprotected sexual intercourse</p> <p>Reduction in the number of sexual partners</p> <p>Lifestyle changes, including avoidance of drug use and smoking</p>
<p><b>Therapeutic Interventions</b></p> <p>ARV</p> <p>NEVIRAPINE and AZT (dual therapy)</p> <p>Multivitamins and other micronutrients</p> <p>Treatment of STIs</p>
<p><b>Obstetrical Interventions</b></p> <p>Avoidance of invasive tests</p> <p>Birth canal cleansing</p> <p>Caesarean delivery</p>
<p><b>Modification of Infant Feeding Practice</b></p> <p>Avoid mixed breastfeeding</p> <p>Early cessation of breastfeeding</p> <p>Heat treatments of expressed breast milk</p>

# CHAPTER 11

## AUDIT

<b>Collection of essential data</b>	<b>145</b>
Antenatal care	145
Labour and delivery	145
Perinatal review meetings	145
<b>Essential statistics</b>	<b>146</b>
<b>Maternal death notification</b>	<b>147</b>

## **COLLECTION OF ESSENTIAL DATA**

Audit in maternity care is more than just the gathering of statistics: it is the use of these statistics to identify problems and devise solutions to those problems. All levels of maternity care from clinic to community health centre, to level 1, level 2 and level 3 hospitals, should audit their performance on a regular basis by collecting essential data and holding audit (perinatal review) meetings of all the staff involved in maternity care.

The following information should be collected on a regular basis (weekly or monthly) at all centres providing maternity care:

### **ANTENATAL CARE**

- Number of first visits
- Number of subsequent visits
- RPR test results
- Haemoglobin test results
- Referrals in from other levels of care
- Referrals out to other levels of care

### **LABOUR AND DELIVERY**

- Number of admissions
- Number of deliveries
- Number of low birth weight babies (<2.5 kg)\*
- Number of stillbirths\*
- Number of neonatal deaths (died in the first 28 days)\*
- Number of babies with genetic disorders and major birth defects
- Number of caesarean sections and assisted deliveries
- Number of unbooked deliveries
- Number of babies 'born before arrival'
- Emergency referrals in from other levels of care
- Emergency referrals out to other levels of care
- Maternal deaths

*\*Babies weighing less than than 1 kg may be excluded from these data in some institutions*

The above data are best summarised on a single spread sheet and should be presented to the maternity staff at regular audit meetings (below) and also sent to the provincial maternal and child health directorates to facilitate planning of health services.

### **PERINATAL REVIEW MEETINGS**

All institutions providing maternal care should hold regular perinatal review meetings. Specific guidelines for preparation and conduct of such meetings are provided in Appendix II

## ESSENTIAL STATISTICS

All community health centres and hospitals should calculate their low birth weight rates, stillbirth rates, early neonatal death rates and perinatal mortality rates on a monthly basis. Annual summaries can be made at the end of each year. Babies that weigh <1 kg at birth are usually excluded from these calculations

**Low birth weight rate** = number of babies <2.5 kg at birth divided by all births in the month. This is expressed as a percentage (e.g. 15%).

**Stillbirth rate** = number of stillborn babies divided by all births in the month. This is expressed as a proportion of a thousand (e.g. 17/1000).

**Early neonatal death rate** = number of babies who died in the first 7 days after delivery divided by all live births in the month. This is expressed as a proportion of a thousand (e.g. 13/1000).

**Neonatal death rate** = number of babies who died in the first 28 days after delivery divided by all live births in the month. This is expressed as a proportion of a thousand (e.g. 16/1000).

**Perinatal mortality rate\*** = number of stillborn babies plus the number of early neonatal deaths divided by all births in the month. This is expressed as a proportion of a thousand (e.g. 30/1000).

*(\*Some institutions may define perinatal mortality rate as the number of stillbirths plus all neonatal deaths (not only early neonatal deaths)*

The perinatal mortality rate is the best measure of total perinatal care in a region and reflects the characteristics of the community served and its obstetric health service. Perinatal mortality rates in South Africa range from less than 10/0000 in affluent and well served communities to 80/1000 in impoverished areas with poor health services. As the low birth weight rate is a measure of the socioeconomic status of a community, the perinatal index may be calculated to control for the influence of socioeconomic conditions.

**Perinatal care index** = perinatal mortality rate (per thousand) divided by the low birth weight rate (as a percentage). A high perinatal care index indicates problems in perinatal care in a region or hospital. From the above examples, the perinatal care index is 30 divided by 15 = 2.0. A perinatal care index <2.0 is satisfactory for most South African government hospitals, but all institutions should strive for an index of 1.

## **MATERNAL DEATH NOTIFICATION**

Maternal deaths are, by law, notifiable. A maternal death is defined as the death of a pregnant woman, irrespective of gestation, or the death of a woman less than 42 days after the end of her pregnancy. Whether or not the death is related to the pregnancy, notification is mandatory. At each institution that offers care to pregnant women, a person (doctor or midwife) should be nominated to take responsibility for the notification of maternal deaths, and should keep a supply of maternal death notification forms, which are available from provincial directorates of maternal and child health.

Every maternal death must be discussed at an audit or review meeting in the institution where it occurred, ideally before notification. The objective is to assign cause of death, possible avoidable factors (patient, administrative and/or health worker related) and suggest solutions to the problems identified.

### **Procedure for maternal death notification**

1. Complete the maternal death notification form (appendix III)
2. Attach photocopies of all the deceased's clinical notes
3. Place the notification form and the photocopied notes in an envelope, clearly labelled 'confidential'
4. Send the envelope by courier (if possible) to the provincial maternal and child health directorate, within 7 days of the death
5. Keep the original clinical notes in a safe and locked place
6. Keep a photocopy of the notification form in a safe and locked place, separate from the clinical notes

All maternal deaths are assessed by provincial assessors who forward their assessments to the National Committee for Confidential Enquiries into Maternal Deaths (NCCEMD). All notifications and assessments are treated in strict confidence and are destroyed after entry into the Confidential Enquiries database. The hospital and health workers involved in the maternal death cannot be identified from the Confidential Enquiries database.

The NCCEMD regularly releases publications in which maternal death statistics and trends are presented.

## APPENDIX I

### List of abbreviations used in the guidelines

ABC	Airways, breathing, circulation
ACLS	Advanced cardiac life support
AIDS	Acquired immune deficiency syndrome
APH	Antepartum haemorrhage
ARDS	Adult respiratory distress syndrome
ARV	Antiretroviral treatment
AST	Aspartate transaminase
BMV	Bag mask ventilation
BP	Blood pressure
CCMT	Comprehensive HIV and AIDS Care Management and Treatment
CPD	Cephalopelvic disproportion
CSF	Cerebrospinal fluid
CTG	Cardiotocograph
CVP	Central venous pressure
CVS	Chorion villus sampling
DIC	Disseminated intravascular coagulation
ECG	Electrocardiograph
ECV	External cephalic version
FBC	Full blood count
FBG	Fasting blood glucose
FTA-Abs	Fluorescent treponemal antibody absorption
GA	General anaesthesia
GTT	Glucose tolerance test
Hb	Haemoglobin
HELLP	Haemolysis, elevated liver enzymes and low platelets
HIV	Human immunodeficiency virus
HR	Heart rate
IM	Intramuscular
INR	International normalised ratio
IUD	Intrauterine death
IUGR	Intrauterine growth restriction
IV	Intravenous
MC&S	Microscopy, culture and sensitivity
MCV	Mean cell volume
NCCEMD	National Committee on Confidential Enquiries into Maternal Deaths
PMTCT	Prevention of mother-to-child transmission
PTT	Partial thromboplastin time
RBG	Random blood glucose
RPR	Rapid plasma reagin
SC	Subcutaneous
SFH	Symphysis-fundal height
TPHA	Treponema pallidum haemagglutination
TT	Tetanus toxoid
VDRL	Venereal disease research laboratories
WHO	World Health Organisation
WR	Wassermann reaction

**GUIDELINES FOR PREPARING  
AND CONDUCTING A PERINATAL  
REVIEW MEETING**

## Acknowledgements

This package was developed by Professor Hugh Philpott and Ms Anna Voce.

## Guidelines for preparing and conducting a Perinatal Review Meeting

### 1. Introduction

From time to time there is need to pause in our work and reflect on what are we doing, how well are we performing, whether we are doing the right thing, and questioning whether what we are doing is going to making a difference. It has long been realized that if we do not do this, we are likely to continue doing unnecessary and incorrect things, inefficiently day after day.

#### PURPOSE OF PERINATAL REVIEW

Perinatal review meetings enable us to look at:

- “WHAT WE DO” as measured by a data collection through information system that is continuously being analysed and discussed at different levels.
- “HOW WELL ARE WE DOING” as measured by AUDIT process.
- “WHAT WE DO” and “HOW WELL ARE WE DOING” measure quantitatively the QUALITY of our work.
- Outcomes are used for decision making, management guidelines and protocols, planning and resource allocation
- Maternal and perinatal review meetings also serve as QUALITY ASSURANCE PROGRAM. All institutions should adhere to conducting these meetings to measure the quality of care.

NB: To facilitate this process, quality data should be collected, analysed and compared to set standards and targets.

There are 4 main steps in this process

- Data collection and review of all maternal and perinatal deaths within 24 hours of occurrence
- Preparation for perinatal review meeting
- Conduct perinatal review meeting
- Dissemination of information from the perinatal review meeting

Valid and accurate information for the perinatal review meeting can only be ensured if every perinatal and maternal death has been reviewed within 24 hours of the death and all deaths have been reviewed in a preparatory meeting.

### 2. Overall statistics

- The statistics must be presented for at least the previous month
- The statistics presented at the sub district/ district should be inclusive of the hospital deliveries and those of its catchment area (the health centres/clinics and at home)
- The presentation of the statistics must be of total numbers and of the rates.
- Give a possible explanation for these variations
- Make a list of your problem areas for the month as well as a list of the priorities
- The statistics are best presented in tabular form. An example is provided in Table 1 overleaf.
- It is also useful to make a graph of your important rates and display them on your walls (in admissions, labour ward), so that you can see a trend over the year
- At least 2 people should be responsible for data collection

## **Important definitions and calculations**

- Maternal Mortality Ratio (MMR)
- Neonatal Death Rate (NNDR)
- Stillbirth Rate (SBR)
- Perinatal Mortality Rate (PNMR)
- Low Birth Weight Rate (LBWR)
- Stillborn: Neonatal Deaths (SB:NND) Ratio
- Perinatal Care Index (PCI)
- Booked Status Rate
- Caesarean Section Rate
- Assisted Delivery Rate

### **3. Summary of perinatal deaths**

- This is a very brief summary of all the perinatal deaths that have occurred in the previous month.
- The summary should provide the information requested in each column of Table 2.
- The purpose is to enable a discussion of the quality of the service in that month rather than a detailed discussion of each patient.

### **4. Summary of referrals to next level of care**

- This is a very brief summary of the patients referred to the next level of care in the previous month
- The summary should provide the information requested in each of the columns in Table 3.
- This is to ensure that you have got a complete picture of the maternal health service during that month

### **5. Details of maternal deaths**

- All maternal deaths that have occurred in the previous 1 or 2 months must be presented in detail at the maternal and perinatal review meetings
- Sufficient and accurate information must be provided to enable an informed discussion and to enable the identification of the cause of death and the avoidable factors.
- Very careful consideration needs to have been given to the causes of death and to the avoidable factors. To do this thoroughly it is essential that, in addition to the documentation of the events leading to the death, there is also a preparatory study of the subjects raised, by perusing the literature in textbooks and journals.
- To answer any questions that may arise during the perinatal review meeting it is important to bring the patient's full record to the meeting. The true test of the adequacy of the presentation is that all questions can be answered.

### **6. Details of perinatal deaths**

- There is not sufficient time to discuss all perinatal deaths in detail in the perinatal review meeting (they would all have been discussed in detail at the preparatory meeting). Thus perinatal deaths should be selected for presentation at the perinatal review meeting.
- The deaths selected should ideally be:
  - Preventable
  - Of educational value
  - Include a still birth and an early neonatal death
- The comments made above in point 5, bullet 3 also applies

Component	Purpose	Who involved	When
Review of maternal and perinatal deaths within 24 hours	Ensure complete documentation of the death and the events around the death Initial assessment of primary cause of death, final and contributory causes of death and avoidable factors/missed opportunities as well as areas of substandard care. Complete the necessary forms eg MDNF / PPIP	Doctor and Midwife-in-charge of maternity and those involved.	Within 24 hours
Preparatory meeting (CHC/ Hospital),	Ensure all statistics are prepared and interpreted Audit all deaths – perinatal and maternal Prepare for PRM	Doctor, Midwife-in-charge of maternity, Midwife doing statistics, For CHC: visiting Dr, Staff( all categories), Reps from feeder clinics, EMS.	A few days before the Perinatal Review Meeting
Perinatal Review Meeting ( sub-district/ District)	Presentation and discussions on: <ol style="list-style-type: none"> <li>1. Monthly statistics</li> <li>2. Maternal and perinatal deaths (selected cases)</li> <li>3. Audit of QoC</li> <li>4. Educational – topic for the day</li> </ol>	<ol style="list-style-type: none"> <li>1. All available midwives and doctors involved in maternity care – antenatal, Intrapartum, Postnatal and neonatal</li> <li>2. Visiting obstetrician</li> <li>3. Representative from hospital management, EMS, district and sub-district management etc</li> </ol>	Monthly/ Bi-monthly or Quarterly
Epidemiological review (MD & PPIP)	Analyse trends in maternal and perinatal indicators, common causes of death and avoidable factors	Midwife/ADM/MO responsible, Sub district and District managers, MD assessors, CHC/ Clinic and Hospital managers, PPIP users	Six monthly / Annually

## 7. How to conduct perinatal review meetings

The meetings should not be used to identify “culprits” as this discourages honesty and prevents identification of problems. In the discussion of a possible avoidable factor that lead to a death, what was done is much more important than who did it. The emphasis should be on identifying problems and finding solutions to these problems.

- All present at the meeting should be provided with copies of the statistics, graphs and summaries of perinatal deaths
- Present the statistics and rates
- Compare with your statistics for the previous period and with provincial, national and international norms
- Give your opinion on the variations. Involve the audience in the discussion
- Ask the house which are the priority problems
- Discuss briefly about possible solutions.
- Present summary of all perinatal deaths using table 2. At least two perinatal case presentations should be made
- All maternal deaths must be presented

- When discussing maternal or perinatal deaths look at the following areas
  - o The primary cause of death
  - o The final and contributory cause of death
  - o Avoidable factors (Patient orientated, administrative and health worker related)
  - o What can be done to prevent a similar situation happening again
- Summarise at the end on the key issues
- Present the outcome of quality of care assessments for both ANC and intrapartum care
- The managers should give a progress report on the handling of the previous months problems
- Discussion of the topic for the day

Ensure minutes of the discussions are recorded and circulated to all.

## **8. Dissemination of information**

- All monthly statistics should go to the matrons office and a yearly report should be compiled
- A six monthly annual summary report outlining clearly the successes, problems, priorities and the possible solutions should go to the managers of the institution and the district manager's office
- The PHC/District MCWH should discuss this summary at the monthly meetings of all clinic sisters
- The managers of the institutions should facilitate the implementation of interventions and give feedback to the staff

## **9. Summary of record reviews/Assessing the quality of care**

- Provide a brief description of what you are doing to improve the quality of record keeping
- Include in your presentation the summary of the record reviews of the previous two months. This should be inclusive of the ANC record review and labour record review report guided by the checklists provided: (Annexure A for ANC and Annexure B for labour record)
- Include an average of the total scores as well as an analysis of the individual items.

The steps taken in conducting the Quality Check are as follows:-

- Each month, examine 100 (or fewer if this is not possible) consecutive, antenatal records of all clients who are 36 or more weeks pregnant, as the clients leave the antenatal clinic. For each ANC record, give 1 point for each of the items listed in the Quality Check form that have been recorded on the ANC record. This will give a maximum score of 25 points, which, if multiplied by 4, will give a percentage score.
- Record the commonest items missing in the records
- Record the major reasons for:
  - o Incomplete record keeping
  - o Incomplete decision-making
- What will you do to improve the quality of record keeping and decision-making?

The same steps should be followed for assessing the quality of intrapartum care.

Example of a minimum data collection tool

## MONTHLY SUMMARY STATISTICS

Name of institution: \_\_\_\_\_

Level of care: \_\_\_\_\_

Health district: \_\_\_\_\_

Rural/peri-urban/urban \_\_\_\_\_

Health region: \_\_\_\_\_

Month: \_\_\_\_\_

Year: \_\_\_\_\_

Weight Category (g)	Stillborn	Neonatal death		Alive on discharge	Total
		Early	Late		
500 – 999					
1000 – 1499					
1500 – 1999					
2000 – 2499					
2500 +					
TOTAL					

Total number of births: \_\_\_\_\_

Age less than 20: \_\_\_\_\_

Age more than 34: \_\_\_\_\_

Syphilis status: Negative \_\_\_\_\_

Positive \_\_\_\_\_

Unknown \_\_\_\_\_

Route of delivery:

Normal vaginal birth: \_\_\_\_\_

Assisted birth: \_\_\_\_\_

Caesarean section: \_\_\_\_\_

Attended antenatal care: \_\_\_\_\_

Maternal deaths: \_\_\_\_\_

Compiled by: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Tel/fax: \_\_\_\_\_

This provides an example of data to be collected on monthly basis. It should be possible to collect more data if so required, for example, Limpopo Province reports on PMTCT activities as well. The data elements for monitoring the PMTCT program would then be included as well as the relevant indicators.

Perinatal statistics														
District: .....							Municipality: .....							
Hospital (and its catchment area): .....														
Year: .....														
Item	Month												Total	Prev. 12 mths
	1	2	3	4	5	6	7	8	9	10	11	12		
<b>Total births</b>														
	Hospital													
	Clinic													
	Home													
	<b>TOTAL</b>													
<b>Perinatal deaths &gt; 1000g</b>														
<b>MSB</b>	Hospital													
	Clinic													
	Home													
<b>FSB</b>	Hospital													
	Clinic													
	Home													
<b>ENN</b>	Hospital													
	Clinic													
	Home													
	<b>TOTAL</b>													
<b>Perinatal Mortality Rate</b> (Total perinatal deaths/Total births X 1000)														
<b>SB : ENND ratio</b> (MSB + FSB/NND)														
<b>Low birth weight &lt;</b>														
	Hospital													
	Clinic													
	<b>TOTAL</b>													
<b>Low birth weight rate</b> (Total Low birth weight/total births X 100)														
<b>Perinatal Care</b> (Perinatal mortality rate/low birth weight rate)														
<b>Caesarean</b>														
	Elective													
	Emergency													
	<b>TOTAL</b>													
<b>Caesarean section</b> (Total Caesarean sections/total births X)														
<b>Assisted</b>														
	V/E													
	Forceps													
	<b>TOTAL</b>													
<b>Assisted delivery</b> (Total assisted births/total births X)														
<b>Maternal deaths</b>														
	Hospital													
	Clinic													
	Home													
	<b>TOTAL</b>													
<b>Maternal mortality</b> (Total MDs/total births X 100)														

Monthly summary of perinatal deaths													
Hospital (inclusive of catchment area):					Municipality					Month:..... Year:.....			
Mother		Baby		Cause of death			Avoidable factors			Actions to be taken by			
Case #	Age	Parity	Birth Weight	FSB/MSB/ENND	Primary cause of death	Final cause of death	Health worker related	Admin related	Patient related				
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													

**Summary of referrals to the next level of care**

<b>Hospital (inclusive of catchment area:</b>				
<b>Municipality:</b>			<b>Subdistrict:</b>	
<b>Month:</b>			<b>Year:</b>	
<b>Case #</b>	<b>Age</b>	<b>Parity</b>	<b>Indication for referral</b>	<b>Outcome</b>
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

## Quality Check for Antenatal Records

**Each month, examine 100 (or fewer, if this is not possible) consecutive, antenatal records of all clients who are 36 or more weeks pregnant. Examine their records as they leave the ANC.**

For each record, give 1 point for each of the items listed below that have been recorded. Half points can be given where a recording is incomplete.

### History

1. Age, parity and gravidity
2. Details of previous pregnancies, including causes of death and indications for operations
3. Previous illnesses that might influence this pregnancy, including cardiac, renal and diabetic disease
4. History of the present pregnancy
5. The date of the first day of the last menstrual Period (LMP) and the estimated date of delivery (EDD)
6. The estimated period of gestation by dates (POGD) correctly recorded or plotted on the antenatal graph at each visit

### Examination

7. Maternal height and weight
8. Blood pressure recorded at each visit
9. Heart examination for cardiac disease
10. Estimation of period of gestation by palpation (POGP) (using SFH in cms, fetal size, hardness of the head, amount of liquor) recorded or plotted on the graph.
11. Estimation whether POGP=POGD or whether there is evidence of IUGR, recorded at each visit.
12. Fetal presentation, recorded from 36 weeks onwards
13. Fetal heart heard or fetal movements felt
14. Urinalysis for proteinuria and glycosuria
15. Haemoglobin and Rh group
16. Syphilis test result recorded
17. Has the client been counselled for HIV testing?
18. Has tetanus toxoid been given?

### Interpretation and decisions

19. Identification and recording of risk factors, their severity and significance
20. Record of action plan, including interventions and referral if indicated
21. Decision on place for delivery discussed with mother and recorded
22. Transport arrangements for when she goes into labour discussed with mother
23. Decision taken by mother re future family planning
24. Have the findings at 1st visit and 36 weeks visit been double-checked and countersigned by an ADM or doctor or senior, experienced midwife.
25. Date of next visit.

This will give a maximum score of 25 points.

**For each ANC record assessed, record: Total: \_\_\_\_\_**

**25**

**Multiply by 4 = \_\_\_\_\_%**

## QUALITY CHECK OF LABOUR RECORDS

Examine 100 (or fewer, if this is not possible) consecutive labour records. Do this after labour has been completed. Use the following scoring system for each patient's record:

**For each 'yes' answer, score 1 point. You can give half points where the information is incomplete.**

### Admission assessment form

1. Is there evidence that the health worker has reviewed and summarised the ANC record and listed the maternal and fetal risk factors?
2. Check the items on the admission form. Are all completed?
3. At the end of the form, is there a decision on diagnosis and management?
4. Were the admission findings checked and counter-signed by an Advanced Midwife (or doctor or experienced midwife if no ADM available)?

### Labour graph

5. Is the list of risk factors recorded at the top of the labour graph?
6. Has the fetal heart rate been recorded half-hourly?
7. Has the state of the liquor (as recognised by a pad check) been recorded at least 4-hourly?
8. Has the degree of moulding been recorded when a P.V. has been done?
9. Have the contractions been recorded half-hourly?
10. Has the cervical dilatation been recorded at least 4-hourly during the Latent Phase and at least two-hourly in the Active Phase.
11. Has the cervical been plotted in relation to the lines drawn for the Latent and Active Phases, and for the Alert and Action Lines?
12. Has the level of the head in relation to the brim of the pelvis been recorded at least 4-hourly since admission?
13. Have the maternal BP and pulse been recorded at least hourly?
14. Have the maternal temperature and urinary output been recorded at least 4-hourly?
15. Is there a record of drugs and IV fluids given?

### Management of Labour Form (On a page separate from the Labour Graph)

16. Is this recorded after doing each vaginal examination, or at least 4-hourly?
17. Is the summary of fetal condition recorded?
18. Is the summary of labour progress recorded?
19. Is the summary of maternal condition recorded?
20. Is the decision on further action recorded?
21. Is the time of next intended review stated?
22. Were these assessments checked 4-hourly by an ADM (or doctor or senior midwife)?

### he Assessment of the Newborn

23. Has this form been completed?

### Final Summary of Labour

24. Has this form been completed?

**TOTAL out of 25:** \_\_\_\_\_

**Multiply by 4:** = \_\_\_\_\_ %

**APPENDIX III**  
**MATERNAL DEATH NOTIFICATION FORM**

**DEPARTMENT OF HEALTH**  
**CONFIDENTIAL**

**2008 version**

**MATERNAL DEATH NOTIFICATION FORM**

For office use only: Department of Health Office case number

- NOTE:**
- This form must be completed for all deaths in pregnant women or within 42 days after termination of pregnancy, including abortions, ectopic gestations, motor vehicle accidents, and suicide related deaths irrespective of duration or site of pregnancy.*
  - Mark with an (X) where applicable (? means unknown)*
  - Attach a copy of the complete case records and anaesthetic forms to this form*
  - Complete the form within 7 days of a maternal death. The completed form is sent to the person responsible for maternal health in the province*
  - All maternal deaths must be discussed at an institutional mortality meeting. Such meetings will assist in the completion of sections 10,11 and 12 of this form*

Address of contact person (Person responsible for Maternal Health in the Province)

Case discussed at Institutional mortality meeting? YES  NO  If YES: Date \_\_\_\_\_

**1. LOCALITY WHERE DEATH OCCURRED**

Province  Health District

Institution  Locality

CHC Clinic	Level 1 Hospital	Level 2 Hospital	Level 3 Hospital	Private Hospital	Other - Specify
---------------	---------------------	---------------------	---------------------	---------------------	--------------------

**2. DETAILS OF DECEASED**

Name  Inpatient No.

Address

Age (yr)  Race  AF = African; CO = Coloured; In = Indian; WH = White; OT=Other

Gravida  Para  at delivery Gestation (weeks) (or at delivery)  Days since delivery/miscarriage (if not applicable enter 99)

**3. ADMISSION AT INSTITUTION WHERE DEATH OCCURRED OR FROM WHERE IT WAS REPORTED**

Date of admission: <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; text-align: center;">d</td><td style="border: 1px solid black; width: 20px; text-align: center;">d</td><td style="border: 1px solid black; width: 20px; text-align: center;">m</td><td style="border: 1px solid black; width: 20px; text-align: center;">m</td><td style="border: 1px solid black; width: 20px; text-align: center;">y</td><td style="border: 1px solid black; width: 20px; text-align: center;">y</td></tr> <tr><td style="border: 1px solid black; width: 20px;"></td><td style="border: 1px solid black; width: 20px;"></td></tr> </table>	d	d	m	m	y	y							Time of admission <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 40px; text-align: center;">24h</td><td style="border: 1px solid black; width: 40px; text-align: center;">min</td></tr> <tr><td style="border: 1px solid black; width: 40px;"></td><td style="border: 1px solid black; width: 40px;"></td></tr> </table>	24h	min		
d	d	m	m	y	y												
24h	min																
Date of death: <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 20px; text-align: center;">d</td><td style="border: 1px solid black; width: 20px; text-align: center;">d</td><td style="border: 1px solid black; width: 20px; text-align: center;">m</td><td style="border: 1px solid black; width: 20px; text-align: center;">m</td><td style="border: 1px solid black; width: 20px; text-align: center;">y</td><td style="border: 1px solid black; width: 20px; text-align: center;">y</td></tr> <tr><td style="border: 1px solid black; width: 20px;"></td><td style="border: 1px solid black; width: 20px;"></td></tr> </table>	d	d	m	m	y	y							Time of death <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 40px; text-align: center;">24h</td><td style="border: 1px solid black; width: 40px; text-align: center;">min</td></tr> <tr><td style="border: 1px solid black; width: 40px;"></td><td style="border: 1px solid black; width: 40px;"></td></tr> </table>	24h	min		
d	d	m	m	y	y												
24h	min																

On admission:	Aborting/ectopic	Antenatal	Intrapartum	Postpartum	
Condition on admission:	Stable	Critically ill	Dead on arrival	Other - specify	
Diagnosis at moment of death:	Abortion	Ectopic pregnancy	Not in labour	In labour	Postpartum
Reason for admission:					
Referral from another centre?	Y	N	If "Y" from		

#### 4. ANTENATAL CARE

Did she receive antenatal care?	Y	N	?	If "Y", at what locality?	?	Primary	Secondary	Tertiary	Private	Other
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Antenatal care provider	Specialist	Med.Off/GP	Adv. Midwife	Midwife/Reg. nurse	Other - Specify	Gest. age at booking < 20wks	Y	N
						Total number visits.		

Antenatal Risk Factors	Risk	Y	N	?	
	Past Medical History				Specify:
	Hypertension				Other - Specify
	Proteinuria				
	Glycosuria				
	Anaemia				
	Abnormal lie				
Previous C/Section					

Comments on antenatal complications and management - List any medication

**5. HIV status: (Make a cross in one box only)**

Test declined	Unknown	HIV neg	HIV pos (not AIDS)	AIDS (on HAART)	AIDS (not on HAART)
---------------	---------	---------	-----------------------	--------------------	------------------------

(Note: AIDS =CD4<200 &/or AIDS defining illness)

CD4 count = \_\_\_\_\_

**6. DELIVERY, PUERPERIUM AND NEONATAL INFORMATION**

Did Labour occur?	<input type="checkbox"/> Y	<input type="checkbox"/> N	If "Y", was a partogram used	<input type="checkbox"/> Y	<input type="checkbox"/> N	<input type="checkbox"/> ?	Duration of labour ?	Latent phase	Active phase	Second stage	Third stage
							(hours:min)				

Delivery (Tick appropriate box)	Undelivered	Vaginal (unassisted)	Vaginal Vacuum/forceps	Caesarean section
------------------------------------	-------------	----------------------	---------------------------	-------------------

Baby	Birthweight (g)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	5 min Apgar	<input type="text"/>	<input type="text"/>	Outcome	Stillborn	Neonatal death	Alive
------	--------------------	----------------------	----------------------	----------------------	----------------------	-------------	----------------------	----------------------	---------	-----------	-------------------	-------

Comments on labour delivery and puerperium

**7. INTERVENTIONS (Tick appropriate box)**

Early pregnancy		Antenatal		Intrapartum		Postpartum		Other	
Evacuation	<input type="checkbox"/>	Transfusion	<input type="checkbox"/>	Instrumental del.	<input type="checkbox"/>	Evacuation	<input type="checkbox"/>	Anaesthesia - GA	<input type="checkbox"/>
Laparotomy	<input type="checkbox"/>	Version	<input type="checkbox"/>	Symphysiotomy	<input type="checkbox"/>	Laparotomy	<input type="checkbox"/>	Epidural	<input type="checkbox"/>
Hysterectomy	<input type="checkbox"/>		<input type="checkbox"/>	Caesarean section	<input type="checkbox"/>	Hysterectomy	<input type="checkbox"/>	Spinal	<input type="checkbox"/>
Transfusion	<input type="checkbox"/>		<input type="checkbox"/>	Hysterectomy	<input type="checkbox"/>	Transfusion	<input type="checkbox"/>	Local	<input type="checkbox"/>
				Transfusion	<input type="checkbox"/>	Manual removal	<input type="checkbox"/>	Invasive monitoring	<input type="checkbox"/>
Other - specify								ICU ventilation	<input type="checkbox"/>

Comments on interventions

**8. CASE SUMMARY (please supply a short summary of the events surrounding the death)**

.....

.....

.....

.....

.....



Primary (underlying) cause of death: Specify:
Final cause of death: Specify:
Contributory (or antecedent) cause/s: Specify:

**11. IN YOUR OPINION DID ANY OF THE FOLLOWING FACTORS CONTRIBUTE TO THE DEATH OF THIS PATIENT?**

System	Example	Y	N	?	Specify
Personal/Family	Delay in woman seeking help				
	Declined treatment or admission				
Logistical systems	Lack of transport from home to health care facility				
	Lack of transport between health care facilities				
	Health service - Health service communication breakdown				
Facilities	Lack of facilities, equipment or consumables( drugs,infusion sets,blood,fluids etc..)				
Health personnel problems	Lack of human resources				
	Lack of expertise, training or education				

Comments on potential avoidable factors, missed opportunities and substandard care

Please note that substandard care includes inadequate monitoring as well as substandard management.

**12. WHAT HAS YOUR INSTITUTION LEARNT FROM THIS CASE AND HOW HAS IT CHANGED PRACTICE? (If applicable)**

**13. THIS FORM COMPLETED BY:**

Name (print)			Rank	
Telephone			Fax	
Date	<div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> d         </div> <div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> d         </div> <div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> m         </div> <div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> m         </div> <div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> y         </div> <div style="width: 15%; text-align: center;"> <input style="width: 100%; height: 20px;" type="text"/> y         </div>		Signature:	

# APPENDIX IV

## EQUIPMENT LISTS, DRUGS AND SUPPLIES

### EMERGENCY TROLLEY EQUIPMENT, DRUGS AND SUPPLIES

#### Adult resuscitation

##### 1. Equipment

- a. Anaesthetic face masks
- b. Oropharyngeal airways
- c. Laryngoscopes
- d. Endotracheal tubes: with cuffs (8 mm and 10 mm)
- e. Intubating forceps (Magill): in an emergency, ovum forceps can be used instead
- f. Endotracheal tube connectors:
- g. 15 mm plastic (can be connected directly to the breathing valve) (3 for each tube size)
- h. Suction apparatus: foot-operated or electrically operated

##### 2. Drugs and supplies

- a. Adrenaline
- b. Aminophylline
- c. Atropine sulfate
- d. Calcium gluconate
- e. Digoxin
- f. Diphenhydramine
- g. Ephedrine
- h. Frusemide
- i. Naloxone
- j. Prednisolone
- k. Prednisone
- l. Promethazine
- m. Sodium citrate

##### 3. Supplies

- a. Blood administration sets
- b. IV administration sets
- c. IV solutions: Ringer's lactate, normal, saline, glucose
- d. Large bore needles or cannula (16 gauge)
- e. Needles, syringes
- f. Scissors
- g. Tape

#### Neonatal Resuscitation

##### 1. Neonatal Resuscitation Trolley equipment

- a. Mucus extractor (1)
- b. Infant face mask (2 different sizes)
- c. **Neonatal Resuscitation**

- d. Ventilatory bag (1)
- e. Suction catheter Ch 12 (2)
- f. Suction catheter Ch 10 (2)
- g. Infant laryngoscope with spare bulb and batteries (1)
- h. Endotracheal tubes 3.5 (1)
- i. Suction apparatus: foot-operated or electrically operated

**2. Neonatal emergency trolley drugs and supplies**

- a. Adrenalin
- b. Atropine
- c. Diphenhydramine
- d. Glucose
- e. Naloxone
- f. Prednisone
- g. Blood administration sets
- h. IV administration sets
- a. IV solutions: ringer's lactate, normal, saline, glucose
- b. IV needles and cannulae
- c. Needles, syringes
- d. Scissors
- e. Tape

**Contents of different sets**

**1. Delivery** (for all levels)

- a. Artery forceps (2)
- b. Episiotomy scissors
- c. Cord scissors
- d. Cord ties (2)
- e. Gloves (2 pair)

**2. Perineal/Vaginal/Cervical Repair** (for all levels)

- a. Sponge forceps (1)
- b. Needle holder (1)
- c. Stitch scissors (1)
- d. Dissecting forceps, toothed (1)
- e. Vaginal speculum, large (bivalve) (1)
- f. Vaginal speculum (bivalve) (1)

**3. Vacuum Extraction or Forceps Delivery** (for type II health centre and hospital)

- a. Vacuum extractor
- b. Obstetric forceps

**4. Obstetric Laparotomy/Caesarean Section** (for hospital)

- a. Stainless steel instrument tray with cover (1)
- b. Towel clips (6)
- c. Sponge forceps, 22.5 cm (6)
- d. Straight artery forceps, 16 cm (4)
- e. Uterine haemostasis forceps, 20 cm (8)
- f. Hysterectomy forceps, straight, 22.5 cm (4)

- g. Mosquito forceps, 12.5 cm (6)
- h. Tissue forceps, 19 cm (6)
- i. Needle holder, straight, 17.5 cm (1)
- j. Surgical knife handle
  - a. No. 3 (1)
  - b. No. 4 (1)
- k. Surgical knife blades (2)
- l. Surgical knife blades (2)
- m. Triangular point suture needles, 7.3 cm, size 6 (2)
- n. Round-bodied needles No. 12, size 6 (2)
- o. Abdominal retractors, double-ended (Richardson) (2)
- p. Curved operating scissors, blunt pointed (Mayo), 17 cm (1)
- q. Straight operating scissors, blunt pointed (Mayo), 17 cm (1)
- r. Suction apparatus foot-operated or electrically operated
- s. Suction nozzle (1)
- t. Suction tubing
- u. Intestinal clamps, curved (Dry), 22.5 cm (2)
- v. Intestinal clamps, straight, 22.5 cm (2)
- w. Dressing (non-toothed tissue) forceps
  - a. 15 cm (2)
  - b. 25 cm (1)

**5. Craniotomy** (for hospital)

- a. Decapitation hook (1)
- b. Cranial perforator (Simpson) (1)
- c. Scalp forceps (Willet) (4)

**6. Basic Equipment for Uterine Evacuation** (for type II health centre and hospital)

- a. Vaginal speculum (bivalve) (1)
- b. Sponge (ring) forceps or uterine packing forceps (1)
- c. Single tooth tenaculum forceps (1)
- d. Long dressing forceps (1)
- e. Uterine dilators, sizes 13-27 (French) (1 set)
- f. Sharp and blunt uterine curettes, size 0 or 00 (1)
- g. Malleable metal sound (1)

**h. Manual vacuum aspiration**

- i. Basic uterine evacuation instruments PLUS:
  - a. Vacuum syringes (single or double valve)
  - b. Silicone lubricant
  - c. Adapters
  - d. Flexible cannulae, size 4 to 12 mm
- j. Vacuum aspiration with electric pump
- k. Basic uterine evacuation instruments PLUS:
  - a. Vacuum pump with extra glass bottles
  - b. Connecting tubing
  - c. Cannulae (any of the following): flexible: 5 - 12 mm, curved rigid: 7 - 14 mm, straight rigid: 7 - 12 mm

**7. Mini-laparotomy** (to be used with basic laparotomy/caesarean section pack) (for hospital)

- a. Tissue forceps (Babcock), 19.5 cm (2)
- b. Tenaculum forceps (1)
- c. Uterine elevator (1)
- d. Tubal hook (1)
- e. Abdominal retractor (Richardson-Eastman) (2)

**8. Insertion and Removal of IUD** (for all levels)

- a. Bivalve speculum - small, medium, large
- b. Sponge forceps (1)
- c. Long straight artery forceps (1)
- d. Uterine sound (1)
- e. Vulsellum forceps (1)
- f. Scissors dissecting bluntpointed (1)

Ref:

- 1. Mother –Baby-Package
- 2. EmOC

## ESSENTIAL EQUIPMENT FOR MATERNAL HEALTH SERVICES

1. Equipment					
Level one				Level two	Level three
A: Mobile services	B: Day clinic (no 24 hour service):	C: 24 hour clinic and community health centres	D: District hospital	E: Regional hospital	F: Tertiary / quaternary hospital
	As for A +	As for B +	As for C +	As for D +	As for E +
<ol style="list-style-type: none"> <li>1. BP machine and different size cuffs</li> <li>2. Working scale for both adults and neonate</li> <li>3. Tape measure</li> <li>4. Thermometer</li> <li>5. Adult stethoscope</li> <li>6. Fetal stethoscope</li> <li>7. Haemoglobinometer?</li> <li>8. Good light source</li> <li>9. Vaginal specula of different sizes</li> <li>10. Cold box (for storage of drugs and vaccines)</li> </ol>	<ol style="list-style-type: none"> <li>1. Haemoglobinometer</li> <li>2. Glucometer</li> <li>3. Hand held Doppler?</li> <li>4. Emergency delivery pack</li> <li>5. Watch or clock with second hand that can be seen easily</li> <li>6. Refrigerator or cold box (for storage of drugs and vaccines)</li> <li>7. Equipment for IUCD insertion and removal</li> <li>8. Effective communication system</li> <li>9. Instrument sterilizer and Forceps sterilizer</li> <li>10. Jar for forceps</li> <li>11. Dressing forceps</li> <li>12. Kidney basins</li> <li>13. Sponge bowls</li> <li>14. Scissors</li> <li>15. Surgeon's hand brush</li> <li>16. Heat source</li> </ol>	<ol style="list-style-type: none"> <li>1. Hand held doppler</li> <li>2. Bedpans</li> <li>3. Delivery pack</li> <li>4. Episiotomy/tears repair set</li> <li>5. Fixed/Mobile suction</li> <li>6. Vacuum extractors and cups? (for use by advanced midwives)</li> <li>7. Equipments for neonatal resuscitation – mucous extractor and infant face mask</li> <li>8. Overhead radiant heater</li> <li>9. Equipment for adult resuscitation?</li> <li>10. Adult ventilator bag and mask and Mouth gag</li> </ol>	<ol style="list-style-type: none"> <li>1. CTG</li> <li>2. Ultrasound scan</li> <li>3. Oxygen source (portable cylinder or central wall supply) together with Mask or nasal cannula, Tubing and Flow meter</li> <li>4. Intravenous infusion pumps</li> <li>5. Functioning theatre with equipment</li> <li>6. Equipment for resuscitation of adults including defibrillator</li> <li>7. Equipments for neonatal resuscitation</li> <li>8. Craniotomy equipment?</li> <li>9. Theatre packs for C/S, minilaparotomy, evacuation of the uterus</li> </ol> <p>Also include</p> <ol style="list-style-type: none"> <li>10. X-Ray facilities</li> <li>11. Laboratory facilities</li> </ol>	<ol style="list-style-type: none"> <li>1. Forceps?</li> <li>2. Facilities for major surgery (e.g hysterectomy)</li> <li>3. High care and ICU</li> <li>4. Blood bank?</li> </ol>	

2. Drugs and supplies					
Level one				Level two	Level three
A: Mobile services	B: Day clinic (no 24 hour service):	C: 24 hour clinic and community health centres	D: District hospital	E: Regional hospital	F: Tertiary / quaternary hospital
	AS for A +	As for B +	As for C +	As for D +	As for E +
<ol style="list-style-type: none"> <li>1. Urine dipstix</li> <li>2. Intravenous infusion sets?</li> <li>3. Intravenous fluids?</li> <li>4. Venepunctures supplies</li> <li>5. Alcohol/Betadine/ Savlon</li> <li>6. Gloves – both examination and utility or heavy-duty household gloves for cleaning</li> <li>7. Puncture-proof-container for sharps disposal</li> <li>8. Disinfectant</li> <li>9. Chlorine for making decontamination solution</li> <li>10. Condoms both male and female</li> <li>11. Hormonal contraception – pills and injectables</li> <li>12. Vaccines for immunisation (both mothers and children)</li> <li>13. Haematinics – Fe, folate</li> <li>14. Supplies to take pap smear</li> </ol>	<ol style="list-style-type: none"> <li>1. Oxygen</li> <li>2. Drugs for obstetric emergencies</li> <li>3. IV administration sets</li> <li>4. IV solutions: Ringer’s lactate, normal saline, glucose</li> <li>5. On site testing kits for: Pregnancy Test, Rh D Syplillis, HIV, Urinalysis, Others?</li> <li>6. Supplies for drawing blood – (Tourniquets, Syringes and needles, Tubes, Labels)</li> <li>7. Soap at all sinks</li> <li>8. Drugs for obstetric emergencies – MgSO<sub>4</sub>, tocolytics, oxytocic, antibiotics</li> <li>9. Antimalaria (in affected provinces)</li> </ol>	<ol style="list-style-type: none"> <li>1. Drugs for resuscitation of neonates</li> <li>2. Drugs for resuscitation of adults</li> <li>3. Urine catheters and bags</li> <li>4. Oxytocic drugs for active management of third stage of labour</li> <li>5. Local anaesthetic</li> <li>6. Suture needles and suture material</li> <li>7. Antibiotics</li> <li>8. Tocolytics</li> <li>9. Analgesia</li> </ol>	<ol style="list-style-type: none"> <li>1. Emergency blood</li> <li>2. Drugs to manage hypertension, diabetes and other pregnancy-related / medical complications</li> <li>3. Induction of labour drugs</li> <li>4. Tubal ligation facilities</li> <li>5. Insertion of IUCD facilities</li> <li>6. Antihypertensive drug</li> <li>7. Diuretics</li> <li>8. Antiallergy</li> </ol>	<ol style="list-style-type: none"> <li>1. Antidiabetic drugs</li> <li>2. Anticoagulants and antidote</li> <li>3.</li> </ol>	

<b>3. Tools</b>					
Level one				Level two	Level three
A: Mobile services	B: Day clinic (no 24 hour service):	C: 24 hour clinic and community health centres	D: District hospital	E: Regional hospital	F: Tertiary / quaternary hospital
1. Appropriate documentation sheets for narrative notes, referrals, etc. 2. Antenatal cards 3. Antenatal register 4. Guidelines 5. EDL	AS for A + 1. Referral forms 2. Laboratory request forms	As for B + 1. Maternity case record 2. Delivery register 3. Postnatal register	As for C +	As for D +	As for E +

Ref:

3. Mother –Baby-Package

4. EmOC



health

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