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Wits Obstetrics

Introduction

This booklet is an update and expansion of the original guidelines for the Department of Obstetrics and Gynaecology at Chris Hani Baragwanath Hospital, ‘Obstetrical Handbook for Doctors’ produced in 1998, rewritten in 2003 as ‘CHB Obstetrics’. This edition is based on the same format, with much of the content in line with the national Department of Health’s Guidelines for Maternity Care in South Africa. The booklet attempts to unify obstetric care guidelines for all three referral hospitals attached to the University of the Witwatersrand, viz. Johannesburg, Coronation and Chris Hani Baragwanath.

It recommends management of common obstetric conditions based on local experience and modern evidence-based practice. It is not intended as a strict protocol, nor as a textbook, but rather as a guide to safe effective practice in our hospitals. It should be most useful to interns, medical officers and registrars.

Profuse gratitude is extended to all the consultants and registrars at Chris Hani Baragwanath Hospital who assisted in producing the guidelines in 1998, 2003 and now. These include Professors Ermos Nicolaou and James McIntyre, and Drs Jenny Hull, Kiran Kalian, Billy Jacobs, Anil Nagar, Roger Schackis, Mbulelo Mtoba and Mohmeena Maauthor-Hosanee. Special thanks go to the Academic Head, Professor Franco Guidozzi, for his detailed, critical and constructive suggestions. Professor Simon Levin and Dr Haroun Rhemtula also made very useful suggestions to improve the clinical content. Thanks are also due to Drs Bronwyn Moore and Norma Pirani for checking early drafts of the manuscript, and to Dr Karlyn Frank for careful review of the final draft.

It is hoped that this guidelines booklet will be useful to all doctors working in obstetrics at all Johannesburg provincial hospitals, and to doctors and midwives who refer patients to these centres.

Prof Eckhart Buchmann (editor)
On behalf of all the consultant Obstetrics and Gynaecology staff

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1 January 2007
Chapter 1  Antenatal Care

OBJECTIVES OF ANTENATAL CARE

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 – high or low risk
- Management of problems that may arise during the antenatal period
- Administration of medications that may improve pregnancy outcome
- Provision of information to pregnant women
- Physical and psychological preparation for childbirth and parenthood

ANTENATAL CLINIC

Ideally, only high risk pregnancies and midwife referrals should be attended to at the hospitals. Patients with risk factors are best seen at midwife-run clinics from which they can be referred if necessary. Where a hospital manages low risk mothers, these should be separated from the high risk group and be seen by midwives. A list of high risk conditions is given on pages 17-18.

THE ANTENATAL CARD

This fold-up card is the essential record of the pregnancy and must be completed at each antenatal clinic visit and retained by the mother until delivery, after which it will be kept with her file in the hospital. Women who present with a card from another province should have that card completed at the clinic, rather than be issued with a new card which would duplicate or mask information from earlier in the pregnancy. The content of antenatal cards varies between provinces, but most formats are adequate for essential antenatal care.

THE FIRST ANTENATAL VISIT

Pregnant women should book for antenatal care as soon as pregnancy is detected, even as early as 6 weeks’ gestation.

Make a complete assessment of gestational age and risk factors at the first antenatal 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’.
**HISTORY TAKING**

This follows the check-list on the antenatal card.

- Gestational age – last menstrual period, cycle regularity and previous contraception
- Current pregnancy, especially last menstrual period
- Previous pregnancies, any complications and outcomes
- Medical conditions, previous surgery and psychiatric problems
- Familial and genetic disorders
- Allergies
- Use of medications, alcohol, tobacco and other substances
- Family and social circumstances
- Plans for contraception after the pregnancy

**PHYSICAL EXAMINATION**

- General examination, including weight, heart rate, colour of mucous membranes, blood pressure, and a check for oedema.

- Systemic examination, including teeth and gums, breasts, thyroid, and heart examination

- Pregnancy examination, including inspection and palpation of the pregnant uterus, with measurement of the symphysis-fundal height (SFH) in cm. Palpation should be done systematically using Leopold’s method – fundal, lateral, Pawlik and pelvic palpation

**ESTIMATION OF GESTATIONAL AGE**

Indicate clearly on the antenatal card (top left above the symphysis-fundal height graph – pages 9 and 10) how the gestational age was estimated. The first estimation of gestational age, with the expected date of delivery, will be used for the remainder of the pregnancy and must not be changed unless important new information becomes available.

**Ultrasound**

This is extremely useful for measuring gestational age. An ultrasound scan at \( \leq 24 \) weeks is an accurate indicator of gestation, and overrides other methods of gestational age estimation. An ultrasound estimate of \( >24 \) weeks is less reliable but is still useful when there is uncertainty about the date of a woman’s last menstrual period.
Last menstrual period (LMP)

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 (page 9). Use Naegel’s rule: Estimated date of delivery (EDD) = first day of last menstrual period + 9 months + 7 days. Example: If LMP is on 5 June 2006, EDD will be on 12 March 2007.

Symphysis-fundal height (SFH) measurement

This is used if the dates from the last menstrual period are unknown or wrong, and if there is no ultrasound estimation of gestational age, provided that the pregnancy is otherwise normal. 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 (page 10).

Palpation

The SFH measurement is of little value at <20 cm and ≥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 may be helpful. Gestational age assessment by palpation requires care, skill and experience.

SCREENING INVESTIGATIONS

The following are offered as routine:

- Syphilis serology (RPR)
- Rhesus (D) blood group, using a rapid card test
- Haemoglobin (Hb) level
- HIV serology, following principles of voluntary counselling and testing (VCT). A rapid test is done, with confirmation of positive results using a different kit. Post-test counselling follows immediately. CD4 counting is done on all patient who are HIV positive
- Urine dipstick for protein and glucose
- Ultrasound for any woman presenting at ≤24 weeks, the earlier the better
- Nuchal translucency screening (done from 11 to 14 weeks) may be offered to all women who are for sent ultrasound scan at ≤14 weeks

All of the above tests should ideally be performed at the antenatal clinic, with the results available to the pregnant women before they complete their first visits.
**MEDICATIONS**

The following are given to all pregnant women:

- Ferrous sulphate or ferrous fumarate tablets 200 mg daily, to prevent anaemia
- Folic acid tablets 5 mg daily, only in the first trimester of pregnancy, to help prevent fetal neural tube defects

**FINAL ASSESSMENT**

The final assessment should include:

- A problem list in the upper right box of the card, next to the symphysis-fundal height graph.
- A note on how the problems should be managed further
- The next follow-up date entered on the symphysis-fundal height graph corresponding the gestational age at that visit
- A delivery plan: the estimated date, and the planned place and mode of delivery
SFH graph of a woman with correct menstrual dates. At booking (27/5/05), 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.
SFH graph of a woman whose menstrual dates are unknown. At booking (5/8/05), the SFH of 28 cm was entered on the 50\textsuperscript{th} centile line, giving a gestational age of 29 weeks. SFH growth is above the 50\textsuperscript{th} centile line, but is normal as it has not crossed above the 90\textsuperscript{th} centile line.
**INFORMATION FOR PREGNANT WOMEN**

Certain essential information must be provided to all pregnant women, verbally or in the form of written or illustrated cards or pamphlets. Midwives provide much of this information, but doctors may need to emphasise some of these points.

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, exercise, sexual intercourse, travel, work etc
   - Personal hygiene and breast care
   - Use of medications
   - Avoidance 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

4. **Newborn and infant care**
   - Plans for infant feeding and techniques, whether breast or formula
   - Details of follow up care: immunization and where this can be obtained

5. **Future pregnancies and contraception**
   - Contraception that will be used after the pregnancy
   - Return to normal activities e.g. work, sexual intercourse
SUBSEQUENT ANTENATAL VISITS

SCHEDULE FOR RETURN VISITS

The schedule shown provides a framework for a minimum number of visits. More frequent visits may be appropriate for certain high risk women.

Minimum schedule for return antenatal visits

<table>
<thead>
<tr>
<th>Gestational age at current visit (weeks)</th>
<th>Scheduled return visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-19</td>
<td>24 weeks</td>
</tr>
<tr>
<td>20-23</td>
<td>28 weeks</td>
</tr>
<tr>
<td>24-28</td>
<td>32 weeks</td>
</tr>
<tr>
<td>29-36</td>
<td>After 4 weeks</td>
</tr>
<tr>
<td>37-38</td>
<td>After 2 weeks</td>
</tr>
<tr>
<td>39-40</td>
<td>41 weeks</td>
</tr>
<tr>
<td>41</td>
<td>42 weeks</td>
</tr>
</tbody>
</table>

CONTENT OF VISITS

- Ask about general health, fetal movements, danger symptoms, and problems
- Check the blood pressure, pulse rate and colour of the mucous membranes
- Measure the symphysis-fundal height (SFH) in cm, and palpate the pregnant uterus. Exclude breech presentation and twin pregnancy in all women >34 weeks. Plot the SFH on the graph against the gestational age and interpret this in accordance with the centile lines and previous measurements
- Urine test for protein and glucose
- Repeat blood tests: Hb at 28 and 36 weeks
- Where appropriate, repeat information for pregnant women as for the first visit
ASSESSMENT OF FETAL WELL BEING

ULTRASOUND SCANS

Ultrasound scans are done only for certain clinical indications.

- Mothers who book before 24 weeks
- Doubt about gestational age after clinical assessment, i.e. wrong dates, or possible twin pregnancy, etc.
- Suspected IUGR (intrauterine growth restriction)
- Fetal movements not felt and fetal heart not heard after 22 weeks
- Significant risk for IUGR (e.g. hypertensive) or macrosomia (e.g. diabetic)
- Previous or family history of congenital abnormalities
- Poor obstetric history (two or more previous pregnancy losses)
- History of antepartum haemorrhage
- Malpresentation from 34 weeks
- Two or more previous caesarean sections

NON-STRESS TESTS

Very few antenatal attenders will require a non-stress test (NST). Indications for NST include:

- Reduced fetal movements at any time after 28 weeks
- Previous unexplained stillbirth at term: weekly from 36 weeks
- Conditions where the fetus is considered to be at risk, e.g. suspected IUGR or suspected post-term pregnancy
- Antepartum bleeding

There is no indication for routine NST at 40 weeks

FETAL MOVEMENT COUNTING

This is only indicated for high risk pregnancies, e.g. diabetes mellitus, suspected IUGR, previous unexplained still birth.

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
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…
5. In the second hour, if there are still less than 4 movements or less than half of the hourly average, NST is indicated to assess fetal well-being. Delivery may be necessary

**Fetal movement chart**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time Started</th>
<th>Movements in first hour</th>
<th>N.B.</th>
<th>Movements in second hour</th>
<th>N.B.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>If less than 4 movements in the first hour go on to the second hour and count again</td>
<td>If less than 4 movements in the second hour please go to your clinic for a further test</td>
<td></td>
</tr>
</tbody>
</table>
MANAGEMENT OF COMMON ANTENATAL PROBLEMS

Proteinuria
Proteinuria + or more should raise suspicions of pre-eclampsia or urinary tract infection. Check the blood pressure again and ask for repeat testing of a mid-stream urine (MSU) specimen. A high blood pressure in the presence of proteinuria indicates pre-eclampsia, and will necessitate hospital admission. If the blood pressure is normal and proteinuria is confirmed, ask the mother if she has symptoms of urinary tract infection and send an MSU specimen to the laboratory for culture. Follow up the woman in one week.

Vomiting
Exclude any illness (e.g. appendicitis, hepatitis, pyelonephritis) that may cause vomiting. Mild vomiting in a healthy woman requires no more than reassurance, dietary advice (avoidance of large or very fatty meals), and at times metoclopramide 10 mg orally 3 times daily when necessary. Vomiting that follows all meals or drinks and causes dehydration (hyperemesis gravidarum) requires hospital admission.

Heartburn
Heartburn is a very common symptom in pregnancy. Advise on avoiding large and fatty meals. Prescribe available antacid - aluminium hydroxide 10-20 mL or magnesium trisilicate 1 to 2 tablets orally when necessary.

Constipation
Reassure the woman that mild constipation is normal in pregnancy, discourage the use of laxatives, and recommend a high intake of fibre and fluid. If a laxative is required, suggest using natural bran, or prescribe bulk-forming laxatives such as Ispaghula husk (Agiolax). It is best not to prescribe irritants (e.g. senna, bisacodyl) in pregnancy.

Haemorrhoids
Distended veins around the anus are relatively frequent in pregnancy. Suggest measures to prevent constipation and discourage straining at stool. If the haemorrhoids are asymptomatic, reassure but explain that they will persist at least until the pregnancy is completed. Mild pain from thrombosed haemorrhoids can be managed with local anaesthetic creams. Refer severe and difficult cases for surgical opinion.

Urinary incontinence
Mild stress urinary incontinence may occur for the first time in pregnancy. Exclude urinary tract infection by performing dipstick testing and/or sending urine for MC&S. Teach pelvic floor (Kegel's) exercises – squeezing for 3 seconds and releasing for 10, repeated 10 times. This is done 10 times per day.
**Striae gravidarum**  
Public hospitals have no creams or medications that are known to be effective in preventing striae gravidarum. Even expensive creams available from private pharmacies are of doubtful value.

**Varicose veins**  
Reassurance and advice on leg elevation may be sufficient. Treat troublesome varicose veins by prescribing elastic stockings.

**Nonspecific aches and pains**  
Try to establish a cause for the pain and advise on adjustments in work and lifestyle. Common causes of pain include low back ache, sacroiliac strain, round ligament pain, symphysis pubis pain, painful knees and painful ankles. Prescribe paracetamol 1 g orally when necessary.

**Leg cramps**  
No specific measures have been proven to prevent cramps. Light exercise may be of value. Some practitioners give calcium and magnesium supplements.

**Skin rash**  
Always consider chickenpox, herpes zoster and syphilis as causes. Seek consultant advice and refer to a dermatologist if necessary.

**Domestic violence**  
This is defined as the intentional abuse inflicted on one partner by another in an intimate relationship. This may be physical, psychological or sexual. Pregnant women are at increased risk for undergoing such abuse. Women at particular risk for domestic violence may have unwanted or unplanned gestations, or be unbooked or book late in pregnancy (third trimester).

It may be worthwhile to ask women privately if all is well at home and if they are getting all the support they need from their partners. Inquire tactfully about domestic circumstances in women who present frequently with unexplained symptoms or who have multiple trivial injuries. Where domestic violence is reported, the woman must be counseled and referred to the social work department.
LIST OF PRE-EXISTING RISK FACTORS

High risk (antenatal care and delivery at hospital)

Primigravida aged 35 years or more
Previous infertility treatment
Previous myomectomy
Previous cervical or vaginal surgery including cerclage
Previous surgery for urinary incontinence
Previous hysterotomy or classical caesarean section
Previous stillbirth or early neonatal death
Previous baby with obstetric related cerebral palsy
Risk of genetic problems (in women booking before 24 weeks)*
Last baby preterm delivery at 7 months or less*
Last pregnancy severe pre-eclampsia*
Three or more previous miscarriages*
Two or more mid-trimester miscarriages*
Diabetes mellitus
Chronic hypertension or renal disease
Currently symptomatic asthma
Epilepsy on treatment
Active tuberculosis
Malignant disease e.g. cervix, breast
Heart disease
Autoimmune disease
History of venous thrombo-embolism
Psychiatric illness, including previous postpartum depression or psychosis
Thyroid disease or thyroidectomy
Serious disease or deformity of the spine, pelvis or hip, and paraplegia
Any other serious medical condition

*These risk factors may fall away as pregnancy advances

Intermediate risk (antenatal care by midwives, delivery at hospital)

Previous postpartum haemorrhage requiring blood transfusion
Previous lower segment caesarean section†
Short stature (less than 1.5 metres)
Parity ≥5

†These women should be seen at least once by an obstetric doctor during antenatal care, preferably early in the pregnancy
LIST OF RISK FACTORS THAT ARISE DURING ANTENATAL CARE

Requiring non-urgent referral

Anaemia (according to protocol – page 99)
Uterus large for dates (>90th centile symphysis-fundal height)
Uterus small for dates (<10th centile symphysis-fundal height)
Symphysis-fundal height decreasing
No maternal weight gain in a woman <60 kg
Known or suspected multiple pregnancy
Breech or transverse lie at 36 weeks or more
Rhesus negative blood group with antibodies
Extensive vulval warts that may obstruct vaginal delivery
Pregnancy at 41 weeks or more
Abnormal glucose tolerance test
Mild hypertension

Requiring urgent (same day) referral

Reduced fetal movements at 28 weeks or more
Pre-eclampsia
Antepartum haemorrhage
Prelabour rupture of the membranes
Any obstetric emergency
Severe illness, e.g. with pyrexia, shortness of breath or abdominal pain

Many of the above categories of patients may be sent back to their local clinics for further antenatal care if their problems are resolved at (examples: suspected breech presentation at term found to be cephalic, or suspected IUGR found to be wrong dates)
Chapter 2  Labour, delivery and puerperium

**DIAGNOSIS OF LABOUR**

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

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

The latent phase is defined as labour with the cervix dilated 3 cm or less, not fully effaced. The active phase is defined as labour with the cervix dilated 3 cm or more, fully effaced.

**ADMISSION OF A WOMAN IN LABOUR**

Enter all relevant clinical findings in the maternity file, and enter labour findings on the partogram if the woman is in the active phase of labour.

**HISTORY TAKING**

1. Carefully review the antenatal card. Clearly note all risk factors. Interview unbooked mothers as if they were attending antenatal clinic for the first time.

2. Note the nature of labour pains, vaginal bleeding, fetal movements, passage of liquor and any other relevant symptoms.

**PHYSICAL EXAMINATION**

1. General examination includes psychological state, pulse rate, temperature, blood pressure, and any oedema or pallor.

2. Abdominal examination:
   - 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. Vaginal examination:

- Vulva and vagina: abnormal discharge, warts or sores
- Cervix: length (effacement), position, consistency, and dilatation in cm
- Membranes: ruptured or not
- Liquor, if the membranes have ruptured: meconium staining and grade
- The presenting part: its position, the degree of moulding and caput
- Station

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. Offer HIV testing only after appropriate pre-test counselling
3. Measure Hb level in women who do not have a recent result (<6 weeks old). A ward haemoglobinometer result is acceptable.

CARDIOTOCOGRAPHY (CTG) ON ADMISSION

Most women who present to a referral hospital in labour should have risk factors as defined on page 27, and will require continuous CTG in labour. If CTGs are available, an admission tracing should be done, for at least 10 minutes. If no CTGs are available, this should be noted in the file, with instructions that continuous CTG should be done if possible. Low risk women do not require CTG monitoring. Intermittent auscultation using a hand-held Doppler instrument or a fetal stethoscope should be utilized for patients not on CTG.

WOMEN TRANSFERRED FROM CLINICS AND OTHER HOSPITALS

These women need careful attention on admission, as they are being transferred for a problem or risk factor. The most common reasons for transfer are poor labour progress, hypertension, and suspected fetal distress (fetal heart rate abnormalities or thick meconium staining of the liquor). Carefully read the notes from the clinic and assess the progress of labour from the time the woman first presented. Enter progress on the partogram from the clinic, not on a new partogram.
GENERAL CARE OF WOMEN IN LABOUR

1. Low risk women who present to hospitals in labour
   Many women turn up in labour at hospitals even though they have no risk factors to qualify for hospital delivery. Do not turn these women away or transfer them to midwifery clinics, because this could lead to litigation or unwelcome publicity.

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. Women should be allowed visitors to provide companionship during labour, subject to the discretion of the midwife in charge of labour ward.

3. Diet and fluids
   Low risk women can be allowed to eat and drink during labour. An intravenous infusion is not needed. In general, high risk women should not eat or drink during the active phase of labour and require an intravenous infusion of Ringer-Lactate solution to run at 120 mL/hour, or 70 mL/hour for cardiac or hypertensive patients.

4. Antisepsis during vaginal examination
   Ensure that the vulva and perineum are clean before vaginal examination. Use a mild antiseptic (e.g. 0.25% chlorhexidine) to spray or swab the vulva.

5. Posture
   Encourage women to walk around in the latent phase of labour. Any posture (sitting, standing, kneeling, lying) is acceptable in both phases of the first stage of labour except the flat supine position which causes aortocaval compression by the pregnant uterus.

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
   In the active phase of labour, all clinical observations must be entered on the partogram. If an adequate entry has been made on the partogram, there is no need to make duplicate written notes. Examples are shown on pages 24, 29 and 30. A clinical assessment and plan should however be written separately in the notes after each labour progress examination.
ROUTINE MONITORING OF THE FIRST STAGE OF LABOUR

Latent phase (cervix ≤3 cm dilated):

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

Active phase (cervix ≥4 cm dilated):

- **Maternal condition**
  - Blood pressure 2 hourly
  - Pulse rate ½ hourly
  - Temperature 4 hourly
  - Urine volume and test when urine is passed

- **Fetal condition**
  - Fetal heart rate ½ hourly – between, during and after contractions
  - Colour of the liquor 2 hourly if the membranes have ruptured
  - CTG in high risk situations

- **Progress of labour**
  - Frequency and strength of uterine contractions ½ hourly
  - Level of the presenting part (in fifths above the brim) 4 hourly, then 2 hourly with cervix >6 cm dilated
  - Cervical dilatation 4 hourly, then 2 hourly with cervix >6 cm dilated
  - Caput and moulding 4 hourly, then 2 hourly with cervix >6 cm dilated

- **Treatment given**
  - All medications
  - All fluids administered, by whatever route

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 ≥4 cm dilated. Alternatively, if the partogram has a pre-drawn alert line, the cervical dilatation should be moved up to coincide with that line.
The action line is drawn 4 hours to the right of 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 on pages 24, 29 and 30.

**ANALGESIA IN LABOUR**

Analgesia should not be withheld from women in labour

- Support and companionship have been shown to reduce the need for analgesic medication in labour
- Pethidine 100 mg IM with hydroxyzine (Aterax) 100 mg IM 4 hourly is acceptable in both the latent and active phases, even close to full dilatation of the cervix. There is no need to run a CTG tracing prior to administration of pethidine
- Inhaled entonox (50/50 oxygen/nitrous oxide mixture) by mask is useful in the late first stage. This is frequently not available in local government hospitals
- Intrapartum epidural analgesia, if available, may be useful in women with excessive pain, prolonged labour, hypertensive disorders, preterm labour and twin gestation. The anaesthetic department will be responsible for administration and monitoring of epidural anaesthesia

**FETAL MONITORING**

For low risk labour, listen to the fetal heart with a stethoscope or hand-held Doppler instrument every 30 minutes, between, during and after contractions. Cardiotocography (CTG) is used for high risk labour. CTG monitors are however in short supply in government hospitals.

**Some indications for CTG monitoring in labour**

- Previous caesarean section
- Offensive liquor or thick meconium stained liquor
- Maternal pyrexia
- Labour progress which has crossed the action line
- Suspected intrauterine growth restriction
- Suspected fetal distress
- Oxytocin infusion
- Prolonged rupture of membranes (>24 hours) or chorioamnionitis
- Pre-eclampsia
- Induction of labour for post-term pregnancy
- Antepartum haemorrhage
- Multiple pregnancy
Correct completion of a partogram – normal labour. This woman presented in the active phase of labour and made good progress to delivery. Progress crossed neither the alert nor the action line, and head descent was rapid from 3/5 above to 0/5 above the brim in 3 hours.
**THE SECOND STAGE OF LABOUR**

The second stage commences when the cervix reaches full dilatation (10 cm). This is usually managed by midwives. 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 be allowed for the head to descend onto the pelvic floor only if fetal distress and cephalopelvic disproportion are ruled out. Empty the bladder, using a catheter if necessary. Continue with observations as for the first stage of labour. Encourage bearing down only 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 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 pregnant uterus may compress the aorta and inferior vena cava
- During contractions, tell the mother to take a deep breath, put her chin on her chest and bear down for as long as possible (up to 10 seconds) to deliver the baby. She should bear down towards her anus, as if to pass stool.
- Listen to the fetal heart rate between contractions
- 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, bearing down and delivery

**EPISIOTOMY**

**Indications for episiotomy include:**

- 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 easy and rapid delivery is required, e.g. cardiac disease
- Breech or assisted delivery
- Delivery of preterm babies where the perineum is tight

Inject local anaesthetic (lignocaine 1% solution, maximum 20 mL) into the perineum before cutting the episiotomy. Mediolateral episiotomy is preferred, to prevent extension to a third degree tear. Cut the episiotomy as the head is crowning, i.e. when the fourchette is stretched and thin.
Repair of episiotomy

1. Explain the procedure to the patient
2. Use 1/0 to 2/0 absorbable suture; polyglactin (Vicryl) is recommended
3. Place a vaginal tampon (‘mouse’) – high in the vagina with an artery forceps attached to the tape
4. Make sure that the anal sphincter is not disrupted
5. Insert a suture to close the apex of the episiotomy in the vaginal epithelium
6. From the apex close the vaginal epithelium with a continuous suture up to the vaginal-perineal junction
7. Ensure correct alignment by checking the apposition of the hymen and the vaginal-perineal junction
8. Approximate the perineal muscles and fascia with interrupted sutures
9. Close the perineal skin with interrupted sutures
10. Remove the vaginal tampon and record this in the notes
11. Do a rectal examination to check for any stitches placed in the rectum and record this in the notes

THE THIRD STAGE OF LABOUR

This stage starts immediately after delivery of the infant and ends with delivery of the placenta. The active method must 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 into the thigh or buttock
- Await uterine contraction and place the left hand on the mother’s abdomen over 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

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
- Observe continuously for excessive vaginal bleeding
- Check and record the mother’s pulse rate, blood pressure and temperature

During this time, the baby can be given to the mother. Record the pulse rate and blood pressure again after one hour. At the conclusion of the fourth stage, the mother can be given something to eat and be sent to the postnatal ward.
HOME DELIVERY – ‘BORN BEFORE ARRIVAL’

After home delivery, the woman requires a full assessment and examination to detect any risk factors or problems.

- Check the antenatal card carefully for risk factors and problems
- If the woman is unbooked, do RPR and Rh blood tests, and offer HIV testing
- Ask about the circumstances of the delivery
- Examine the woman for evidence of infection, severe blood loss, retained products of conception and perineal injury, and manage appropriately
- Give oxytocin 10 units IM

HIGH RISK CONDITIONS REQUIRING HOSPITAL DELIVERY

Nullipara of age ≥35 years
Parity ≥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 ≥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 ≥37.5 degrees
Vulvovaginal sores 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 (≥8 hours)
Poor progress in the active phase of labour (crossing partogram action line)
Poor progress in the second stage of labour (≥1 hour)
Any woman who is in shock, short of breath or appears very ill
ABNORMALITIES OF THE FIRST STAGE OF LABOUR

POOR PROGRESS IN THE LATENT PHASE

The latent phase is prolonged when it exceeds 8 hours.

Management of suspected prolonged latent phase is as follows:

- Exclude other causes of abdominal pain, e.g. abruptio placentae, urinary tract infection, chorioamnionitis

- 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

- If the woman is in the latent phase of labour, and after excluding fetal distress and obvious cephalopelvic disproportion, rupture the membranes and/or start an oxytocin infusion as for the active phase of labour (page 31)

POOR PROGRESS IN THE ACTIVE PHASE

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 on pages 29 and 30.

- Use the rule of 3 Ps in the assessment (powers, passage, passenger)

- **Exclude cephalopelvic disproportion** (increasing grade of moulding with no descent, or grade 3 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 (non-cardiac, non-hypertensive women)

- Ensure that the bladder is empty; catheterise if the mother cannot pass urine easily

- Give analgesia, epidural or pethidine/hydroxyzine

- Rupture the membranes if still intact (not in an HIV positive woman)

- If there are no contraindications, consider oxytocin infusion (page 31).
Partogram – poor progress due to cephalopelvic disproportion. This woman presented in the active phase of labour. Her labour is prolonged as a result of cephalopelvic disproportion. Note the increase in moulding score with failure of descent of the fetal head.
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 AUGMENTATION OF LABOUR

1. Add 2 units oxytocin to 1 litre of Ringer-Lactate
2. Start infusion at a rate of 60 mL/hour – equivalent to 2 mU/min
3. Increase by 60 mL/hour every 30 minutes until a minimum of 3 strong contractions (>40 seconds) in 10 minutes is achieved
4. The infusion rate should not exceed 240 mL/hour
5. If the infusion rate reaches 240 mL/hour and strong contractions are not achieved, increase the dose by starting an infusion of 5 units in 1 litre at 120 mL/hour, increasing to 180 then 240 mL/hour after 30 minute intervals to achieve strong contractions
6. Consider caesarean section after 12 hours of oxytocin infusion

Precautions

- There must be no evidence of cephalopelvic disproportion
- There must be no evidence of fetal distress
- Use CTG monitoring wherever possible
- Use with caution in multiparas, not more than 2 units/L
- Do not use oxytocin with parity $\geq 5$ or previous caesarean section

Hypertensive and cardiac patients

- Reduced volumes of fluid must be used
- Add 2 units of oxytocin to 200 mL of Ringer-Lactate
- Start infusion at a rate of 12 mL/hour, increasing to 24, 36 and 48 mL/hour as above

MECONIUM STAINING OF THE LIQUOR

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

- Monitor the fetus with a cardiotocograph (CTG) if available
- When the head extends at delivery, wipe or gently suction the infant’s mouth and then nose, then deliver
- Have a paediatric doctor in attendance for immediate resuscitation
FETAL DISTRESS

This is suspected when one or more of the following signs are observed:

- Baseline fetal heart rate >160 beats per minute
- Baseline fetal heart rate <110 beats per minute
- Baseline variability persistently ≤5 beats per minute on CTG (in the absence of sedating drugs)
- Late decelerations of the fetal heart rate
- Severe variable decelerations

Management of fetal distress

1. Explain the problem to the mother
2. Lie the mother in a left lateral position
3. Ensure that the baby is viable (estimated fetal weight ≥1kg) and has no obvious lethal congenital abnormalities
4. Administer oxygen by face mask
5. Start an intravenous infusion of Ringer-Lactate to run at 240 mL/hour
6. Perform 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 µg IV or salbutamol 0.1-0.2 mg IV and prepare for immediate caesarean section
7. Call a paediatric doctor to be present at the birth
CORD PROLAPSE

Cord prolapse is commonly associated with preterm labour, a high presenting part or a malpresentation. It should be suspected where there is sudden onset of severe variable decelerations on CTG.

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 mother can push the head down to the pelvic floor, immediately deliver the baby, by assisted delivery if necessary
   - If the cervix is not fully dilated, arrange an urgent caesarean section 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 presenting part the cord is compressed
     4. Start an intravenous infusion of Ringer-Lactate at 240 mL/hour
     5. Give hexoprenaline 10 µg IV or salbutamol 0.1-0.2 mg IV as a single dose over 5 minutes
     6. Insert an indwelling urinary catheter, at least size 18 Fr
     7. Fill the mother's bladder with 500 mL saline and then clamp the catheter
     8. Place the mother in a left lateral Sims position*
     9. Make accurate notes of all that was done, with times
     10. Before starting the caesarean section, make sure the baby is still alive (heart beat or ultrasound)
     11. At caesarean section, bear in mind the full bladder and remove the catheter clamp as soon as the uterus is ready for incision

*If the head is engaged in the pelvis or bladder filling fails to relieve cord compression, put the mother in a knee-elbow position
ABNORMALITIES OF THE SECOND STAGE OF LABOUR

SHOULDER DYSTOCIA

This occurs with large babies (usually >3.5 kg) when delivery of the head is not followed by delivery of the shoulders. To anticipate shoulder dystocia, be aware of risk factors such as are an obese mother, diabetic mother, previous large baby, prolonged labour, and SFH >40 cm. Frequently, shoulder dystocia occurs without any identifiable risk factor.

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. Hold the head with two hands but do not apply strong downward traction, as this may cause serious brachial plexus injury to the baby.
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
12. After delivery, carefully inspect the perineum for damage, especially third degree tear
13. Make clear notes about the actions taken

Alternative methods

- Hyperextension of hips with legs over the edge of the bed
- All-fours (Gaskin) maneuver – turn the patient onto a hands and knees position
- Cephalic replacement using the Zavanelli maneuver, followed by caesarean section
- Symphysiotomy
POOR PROGRESS IN THE SECOND STAGE

The labour ward midwives should call a doctor:

- If a mother has not started pushing after 1 hour of full dilatation, or
- If delivery has not occurred after 45 minutes of pushing in a primipara, 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. Exclude cephalopelvic disproportion, fetal distress or breech presentation: these will necessitate caesarean section
5. Start oxytocin infusion (page 31)
6. Continue routine monitoring of labour
7. Re-assess after one more hour: if not delivered, caesarean section or assisted vaginal delivery will be required (below)
8. With epidural analgesia, the second stage may be allowed to extend to three hours, provided there is no evidence of disproportion or fetal distress

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:

- Perform assisted vaginal delivery if the head is 0/5 or 1/5 palpable above the pelvic brim, with episiotomy and/or oxytocin infusion if necessary
- Perform caesarean section if the head is 2/5 or more palpable above the pelvic brim

INSTRUMENTAL DELIVERY

VACUUM EXTRACTION

Vacuum extraction (ventouse) may be performed by advanced midwives and doctors

Indications for vacuum extraction

- Maternal cardiac, hypertensive or respiratory disease
- Fetal distress in the second stage of labour
- Prolonged second stage
- Poor maternal effort
Conditions for safe vacuum extraction

- Vertex presentation
- Estimated fetal weight $\geq 2$ kg
- Head not more than 1/5 palpable above the pelvic brim
- Certainty about position of the presenting part
- Cervix fully dilated
- Membranes ruptured
- Bladder empty
- Strong uterine contractions (>40 seconds) – use oxytocin if necessary
- Mother fully informed and co-operative

Techniques vary. Silc cups (50 and 60 mm) and New Generation Bird metal cups (anterior 50 and 60 mm, and posterior 50 mm) are available. Disposable units are becoming fashionable and are effective. The metal cups give better traction force, and for these at least 5 minutes should be given for the cup to be securely attached by the vacuum. A negative suction pressure of 0.7 to 0.8 Bar is needed for effective traction.

Important practical points and precautions

- Check the equipment thoroughly before using it
- Only pull on the head during contractions
- Traction must be in a direction perpendicular to the vacuum cup
- No more than 3 pulls (during 3 contractions) are allowed
- There should be noticeable descent with each pull
- During traction with the right hand, keep the left hand on the vacuum cup and head to detect incipient cup detachment
- No more than 2 cup detachments are allowed
- Failed vacuum extraction is an indication for caesarean section
- Write up the procedure fully: time taken, cup type and size, number of pulls, number of detachments, and neonatal condition at birth

FORCEPS DELIVERY

Forceps delivery is associated with greater maternal trauma and pain than vacuum extraction. If forceps delivery is chosen, the following precautions must be observed:

- Forceps delivery must be done or supervised by an experienced person
- Fetal head position must be direct occipito-anterior
- The head must be 0/5 palpable above the brim (outlet forceps)
- Use pudendal block for analgesia
PUDENDAL BLOCK

This is preferred for forceps delivery, but can be employed for vacuum extraction or any vaginal delivery where analgesia is needed. The transvaginal method is described here.

1. Use a guarded needle with an introducer if available
2. Use lignocaine 1% solution
3. For the right pudendal nerve, identify the right ischial spine with the right index and middle fingers
4. Pass the needle next to the fingers and inject about 2 mL of lignocaine into the sacrospinous ligament
5. Inject a further 2 mL just beyond the sacrospinous ligament
6. Withdraw the needle out of the ligament and inject about 5 mL just lateral and above the ischial spine
7. Repeat the procedure on the left side
8. Inject any remaining lignocaine along the track of a proposed episiotomy
9. Remember to withdraw the syringe plunger before every injection to prevent accidental intravascular injection

CAESAREAN SECTION

Surgical techniques vary according to the circumstances, and experience of the operator.

NOTES ON CAESAREAN SECTION

- Give sodium citrate 30 mL orally 30 minutes before the expected start of the operation, not necessarily at the time of booking
- Just before starting the operation, ensure that:
  - Sterilisation has been considered and with the necessary consent signed if that is her choice
  - The fetal heart can still be heard
  - The indication for operation is still valid, and known to the mother
  - The fetal presentation and position are known
- Always give broad spectrum antibiotic prophylaxis (e.g. co-amoxiclav (Augmentin) 1.25 g IV as a single dose) at the time of caesarean section, irrespective of whether it is an elective or emergency operation. Alternatives are cefoxitin 2 g or cefuroxime 1.5 g.
- Use a vertical skin incision where there is risk of intraoperative haemorrhage (ante partum haemorrhage, severe pre-eclampsia), difficult delivery (transverse lie, or prolonged second stage), or postoperative infection (prolonged labour or rupture of membranes, offensive liquor)
• Immediate postoperative IV fluids are usually Ringer-Lactate 1 L with 20 units oxytocin over 8 hours, followed by 1-2 litres of Maintelyte over 8 hours each
• Start postoperative mobilisation and feeding as soon as the patient feels strong enough and hungry
• Give postoperative analgesia: Omnopon 20 mg IM 4-6 hourly (if necessary) with prochlorperazine (Stemetil) 12.5 mg IM 4-6 hourly for 24 hours. Add indomethacin 100 mg suppository 12 hourly and paracetamol 1 g 6 hourly orally. Ibuprofen 400 mg 8 hourly orally may be used instead of indomethacin. Avoid indomethacin and ibuprofen in patients with renal dysfunction, severe pre-eclampsia, asthma, or a history of peptic ulceration
• Consider prophylaxis against thromboembolism for women who may be at risk (sodium heparin 5000 units SC 12 hourly while in hospital) – e.g. women who cannot get up, or who are obese (>100 kg)
• Discharge the woman from hospital on the third postoperative day if she is feeling well, is apyrexial, and has a heart rate of less than 100/min. Discharge on the second day is permissible if there is a shortage of postoperative beds and if the patient is very well and wants to go home

PRE-OPERATIVE TESTING BEFORE CAESAREAN SECTION

Recommendations from the Department of Anaesthesiology

• Healthy women with no medical problems: bedside Hb only
• Mild pre-eclamptics and gestational hypertensives: FBC, U&E
• Severe pre-eclamptics: FBC, U&E, LFT, INR/PTT if platelet count<100×10^9/L
• Abruptio placentae: U&E, FBC, INR/PTT
• Cardiac disease: ECG, cardiac echo, FBC, INR/PTT if on anticoagulants

Further points

• If haematocrit (Hct) <30%, anaemia is present
• Always interpret Hb in conjunction with Hct especially in high risk patients
• Spinal block is acceptable if platelet count is ≥75×10^9/L provided there is no coagulopathy
• For an operative procedure, platelet count should be ≥50×10^9/L
• It is inappropriate to wait for results in an emergency
• Encourage good communication between obstetrician and anaesthetist
• Request detailed pre-anaesthetic assessment for high risk patients

REQUESTS BY WOMEN FOR CAESAREAN SECTION

Caesarean section is associated with an increased risk of maternal infection, haemorrhage, thromboembolism, abdominal adhesions, uterine rupture in subsequent pregnancies and death. Women who ask for caesarean section and have a relative indication, e.g. poor obstetric history or previous caesarean
section, may be scheduled for elective caesarean section. It is policy in state hospitals not to perform caesarean section for the sole reason that a woman is HIV positive.

Women who have no clinical indication for caesarean section should be informed about the possible risks and benefits of the procedure. In public hospitals, the performance of caesarean section without a valid clinical indication is unacceptable practice.

WOMEN WHO REFUSE CAESAREAN SECTION

Some women refuse caesarean section and put the lives of themselves and their babies at risk. No person can be physically forced to undergo surgery. The following stepwise procedure may help such a patient to agree to the operation:

1. Listen carefully to the reasons for refusal and take these into account
2. Give a full explanation in the language best understood by the mother
3. Call the most senior doctor and nurse available to explain the situation
4. Call the closest relatives to explain the need for surgery
5. Call the hospital clinical director or ethics committee to ask for further advice
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 fetalis
- Cord prolapse
- Abruptio placenta
- 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. Provide warmth
2. Clear the airway only if there are secretions, wiping the mouth and nose with gauze, cotton wool or clean linen.
3. Dry the baby and remove the wet linen
4. Maintain warmth by putting the infant directly on the mother’s chest and covering with dry linen (kangaroo mother care - KMC)
5. Do not separated these babies from their mothers
6. Start feeds within an hour after birth, breastfeed unless contraindicated.
If the answer is NO to any of these questions, evaluated and resuscitate:

- Provide warmth
- Place the infant on a flat surface facing up with the head supported in a neutral position (not flexed, not hyperextended)
- Suction the mouth and nose only when necessary i.e. when there are secretions that may obstruct the airway
- Dry the baby and remove the wet linen
- Provide gentle tactile stimulation (slapping the feet or gentle rubbing the back) for 2-3 seconds if the infant is not crying.
- 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 narcotics 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

The Apgar score. Scores for each are added, to a total out of 10.

<table>
<thead>
<tr>
<th>Sign</th>
<th>Score</th>
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<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Colour</td>
<td>Blue or pale</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Absent</td>
</tr>
<tr>
<td>Respiratory Effort</td>
<td>Absent</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Limp or floppy</td>
</tr>
<tr>
<td>Response to stimulation</td>
<td>No response</td>
</tr>
</tbody>
</table>
- Provide warmth
- Position, suction as necessary
- Dry and remove wet linen
- Stimulate if not crying or breathing
- Give oxygen if breathing regularly but blue

Evaluate breathing, heart rate and colour

If breathing is irregular or heart rate <100/min, start bag mask ventilation (BMV) and continue for 30 seconds

Evaluate breathing, heart rate and colour

If heart rate <60/min after BMV, continue BMV and start chest compressions and continue for 30 seconds.

Evaluate breathing, heart rate and colour

If HR remains <60/min, continue BMV, chest compressions, then intubate and give adrenalin intravenously or through the endotracheal tube

Supportive care if colour pink, HR>100/min and breathing

Ongoing care and monitoring if colour pink, HR>100/min and breathing

Ongoing care and monitoring if colour pink, HR>100/min and breathing

NEONATAL RESUSCITATION
ABNORMALITIES OF THE THIRD AND FOURTH STAGES OF LABOUR

REPAIR OF A THIRD-DEGREE TEAR

The anal sphincter is disrupted, and there may be injury to the rectal mucosa

1. This should be performed by a doctor in theatre, or in labour ward if an epidural anaesthetic is functional
2. Use polyglactin (Vicryl) suture
3. Repair the rectal mucosa first with 3/0 suture, continuous or interrupted
4. Follow this by repairing the rectal muscularis layer with 3/0 suture, continuous or interrupted; include the internal anal sphincter in this suture
5. Identify the disrupted ends of the external anal sphincter on each side just above the anal verge and extract and hold them with Allis clamps
6. Repair the external sphincter with 4 simple 2/0 sutures
7. Complete the repair as for episiotomy (page 25)
8. Give antibiotic prophylaxis – ampicillin 1 g IV 6 hourly and metronidazole 1 g supps 12 hourly for one day followed by amoxicillin 500 mg orally 3 times daily and metronidazole 400 mg orally 3 times daily for 5 days
9. Give oral analgesia, e.g. paracetamol 1 g orally 6 hourly or ibuprofen 400 mg orally 8 hourly for 3-4 days
10. Prescribe stool softeners, e.g. ispaghula (Agiolox) or bran, or lactulose 10 g twice daily orally for 5 days. Advise on a high fibre diet
11. Advise on pelvic floor exercises and ask the woman to report any anal sphincter incontinence to her clinic or doctor

RETAINED PLACENTA

The placenta is retained when it is not delivered from the uterus within 30 minutes of delivery of the baby. At times, the placenta is not truly retained, and it may be removed by simply lifting it out of the vagina.

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. Give oxytocin 10 units in 20 mL normal saline into the umbilical vein as a single dose
4. Observe the mother constantly for vaginal bleeding or placental delivery
5. If there is excessive vaginal bleeding, or if the placenta has not been delivered after one hour of oxytocin infusion, arrange for manual removal in theatre under general anaesthæsia
6. Take blood for Hb and crossmatch, and order 2 units of packed cells on standby…
7. Just before anaesthesia is given, check that the placenta is not now in the cervical canal or in the vagina.
8. For manual removal, attempt to remove the whole placenta with the hands. Use the ulnar surface of the palm to create a plane of cleavage. Do not grab at the placenta with the fingers. If instruments are required, use the largest available forceps and curettes, to prevent uterine perforation.
9. Call for senior help if bleeding persists or if placenta accreta is suspected.
10. Give ampicillin 1 g IV followed by amoxicillin 500 mg 3 times daily orally and metronidazole 400 mg 3 times daily orally for 5 days.

**ACUTE INVERSION OF THE UTERUS**

This emergency requires immediate action to prevent haemorrhage, shock and maternal death. It may be caused by inappropriate cord traction on a fundal placenta in a flaccid uterus, without upward counter-pressure on the uterus. At times it occurs spontaneously.

1. Immediately treat shock with Ringer-Lactate given through 1 or 2 lines using large bore (16G) IV cannulas.
2. Explain the problem to the patient.
3. Order blood for transfusion if there is haemorrhage.
4. Give pethidine 50-100 mg IV if systolic BP>90 mmHg.
5. Do not remove the placenta if it is still attached to the uterus.
6. Give hexoprenaline 10 µg IV or salbutamol 0.1-0.2 mg IV to relax the uterus.
7. Place the flat hand against the inverted surface of the uterus and push the uterus (with placenta if attached) as high up into the vagina as possible and hold that position for several minutes. Reduction should occur with sustained upward pressure (Johnson method).
8. Give syntometrine 1 amp IV and oxytocin 20 units in 1 L Ringer-Lactate when reduction has been achieved. Do not remove the hand from the uterine cavity until a firm uterine contraction is felt.
9. Carefully deliver the placenta when signs of separation are observed.
10. If the placenta is not expelled spontaneously from the uterus, manual removal will need to be done, in theatre.
11. Observe the patient closely for haemorrhage or re-inversion.
12. Failed reduction will require laparotomy. Using Allis clamps, pull on the round ligaments where they enter the uterine constriction ring, with an assistant pushing the inverted uterus up from below (Huntingdon method).
13. A tight constriction ring may prevent reduction. The ring can be opened by a low vertical posterior incision in the uterus (Haultain method). Then proceed with the Huntingdon method.
**PRIMARY POSTPARTUM HAEMORRHAGE**

Primary postpartum haemorrhage (PPH) is defined as blood loss greater than 500 mL in the first 24 hours after vaginal delivery, or 1000 mL after a caesarean section. A more useful definition may be a clinically excessive blood loss after delivery. Atonic uterus is by far the most common cause.

**Causes**

- Atonic uterus
- Retained placenta or products
- Placenta praevia
- Cervical laceration
- Vaginal and perineal lacerations
- Ruptured uterus
- Inverted uterus

**Coagulation failure**

Clotting abnormalities contribute to uterine atony and increased bleeding from the placental site and lacerations. Causes of coagulation failure include:

- Abruptio placentae
- Pre-eclampsia
- Severe systemic or uterine sepsis
- Massive haemorrhage
- Long-standing intrauterine fetal death
- Amniotic fluid embolism
- Incompatible blood transfusion.

**Prevention**

Identify women at risk. Risk factors for atonic uterus include multiple pregnancy, antepartum haemorrhage, polyhydramnios, prolonged labour, history of previous postpartum haemorrhage, vaginal birth after caesarean section, and parity >4. For these women, give oxytocin 20 units in 1L 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 contraction
2. Call for assistance
3. Start a rapid infusion with oxytocin 20 units in 1 L Ringer-Lactate solution
4. Ensure that the whole placenta has been delivered
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 (if not contraindicated) 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 with bright red fresh bleeding indicates that haemorrhage is caused by lacerations. These need to be found and repaired following a thorough examination of the entire birth canal, in the lithotomy position, with adequate analgesia or anaesthesia
- 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 immediate reduction (page 45)

7. If haemorrhage cannot be controlled:

- Continuously massage the uterus
- Continue with oxytocin infusion
- Give misoprostol 200 µg orally and 200-400 µg sublingually or rectally
- Start a second intravenous infusion with Ringer-Lactate solution
- Order at least two units of packed cells urgently
- Give a second dose of ergometrine 0.5 mg IM for atonic uterus
- Inject prostaglandin F2-alpha 1 mg into the myometrium: dilute 5 mg in 20 mL water and inject 2 mL (0.5 mg) through the skin into each uterine cornu. Beware contraindications – asthma, cardiovascular disease
- Arrange for urgent examination in theatre with manual exploration of the uterus and evacuation, and possible hysterectomy or internal iliac artery ligation, or B-Lynch brace suture
- As a desperate measure, apply firm pressure to the aorta above the level of the umbilicus, and call for senior help

Inserting a B-Lynch brace suture

1. This may be done for PPH after normal delivery or at caesarean section
2. Put the patient in a modified Lloyd Davies position (thighs spread but not flexed much), to allow surgery while observing for vaginal bleeding
3. Do a laparotomy and exteriorise the uterus
4. Open the lower segment (if not already open) with a transverse incision
5. Explore the inside of the uterus for bleeding points, and place figure-of-eight sutures over any single large bleeding points
6. Compress the uterus with the hands. If this stops the bleeding, a B-Lynch brace suture is likely to be successful
7. Use a single length of thick absorbable suture material (at least chromic or polyglycolic 1)
8. Compress the uterus well before tightening and tying the suture
Anterior view: the stitch is inserted below the right angle of the uterine incision

Posterior view: the right and left braces pass over the fundus and are joined by the suture passing across the lower segment through the posterior uterine wall, at the level of the uterosacral ligaments

Suture completed and uterus compressed. The stitch emerges below the left angle of the uterine incision with the knot in the midline below and anterior to the incision

The B-Lynch brace suture

(From: www.gyncph.dk/procedur/obstet/blynch.htm)
**Postpartum haemorrhage**

- Rub up the uterus
- Call for assistance
- Give oxytocin 20 units in 1L Ringer-Lactate
- Ensure placenta is complete
- Insert a urinary catheter
- Restore and maintain blood pressure with IV fluids/blood

**Abdominal examination**

- Uterus large and soft
  - Atonic uterus
    - Give ergometrine 0.5 mg IM, repeat once if needed
    - Continuous massage
    - Evacuate clots
    - Misoprostol 200 µg p.o. and 200 -400 µg s.l. or p.r.
    - Laparotomy

- Uterus well contracted
  - Lacerations
    - Find source of bleeding: uterus, cervix, vagina, perineum
    - Repair lacerations

- Uterus not felt
  - Inverted uterus
    - Reduce immediately

**ALGORITHM FOR MANAGEMENT OF POSTPARTUM HAEMORRHAGE**
CARDIOPULMONARY RESUSCITATION IN PREGNANCY

- External cardiac compression, defibrillation and drug therapy are the same for pregnant and non-pregnant women
- Pregnant women requiring CPR are at risk for aspiration of stomach contents. Early intubation and cricoid pressure will help to prevent this complication
- The pregnant uterus interferes with venous return and needs to be displaced to the side by 15 to 30 degrees lateral tilt, or emptied by caesarean section, even if the baby is dead. Perimortem caesarean section is performed primarily to improve maternal outcome and not to save the baby

MANAGEMENT OF CARDIORESPIRATORY ARREST

1. Call for help, call for a defibrillator, call for intubation equipment, call for a caesarean section pack if the patient is in the third trimester of pregnancy
2. Displace the uterus to the side, preferably using 15°-30° left 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 300 J, then to 360 J if necessary
6. Give adrenaline 0.01 mg/kg (0.5-1 mg) every 3 minutes, intravenously or into the endotracheal tube
7. Re-assess for heartbeat and breathing every minute
8. If cardiac output has not been restored in 4 minutes, and if the uterus is ≥28 weeks size, perform a caesarean section. The operation should be done immediately at the site of resuscitation
9. Continue cardiopulmonary resuscitation during the operation. If CPR is successful, the caesarean can be completed in theatre
10. Treat the cause of the cardiorespiratory arrest
11. Arrange follow up care: consider transfer to an intensive care unit
THE UNCONSCIOUS OBSTETRIC PATIENT

CAUSES

- Eclampsia
- Cerebrovascular accident
- Subarachnoid haemorrhage
- Epilepsy
- Amniotic fluid embolism
- Metabolic problems, e.g. hyper/hypoglycaemia, electrolyte abnormalities
- Infections – malaria, or severe sepsis
- Hypoxia resulting from cardiorespiratory problems
- Head injury
- Drugs and poisons

Management of the unconscious obstetric patient

1. Call for help
2. Evaluate using the principles of ABC (airway, breathing, circulation) and correct these, by CPR if necessary. Consider intubation
3. Assess Glasgow coma scale, consider intubation if score \( \leq 8 \)
4. Measure blood pressure, heart rate, respiratory rate and temperature
5. Attach a pulse oximeter
6. Take history from persons accompanying the patient
7. Obtain the antenatal record and notes of previous hospital admissions if possible
8. Do a complete physical examination, including neurological assessment and vaginal examination
9. Insert an intravenous line with Ringer’s lactate
10. Insert an indwelling urinary catheter
11. Do fingerprick blood glucose, U&E, FBC and ABG, and other tests if needed, e.g. malaria smear, malaria antigen, toxicology screen, depending on possible cause
12. Evaluate fetal condition with ultrasound and/or NST
13. Transfer to a high care area
14. Attempt to make a diagnosis
15. Investigate and treat according to the differential diagnosis
16. Consult with appropriate colleagues, e.g. neurology, internal medicine
17. Decide on further obstetric management
THE Puerperium AND ITS PROBLEMS

Discharge from hospital is permissible 6 hours after vaginal 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
- The rhesus blood group and RPR results are known
- Plans for contraception have been discussed

All findings should be recorded and the mother advised to attend her nearest clinic 3 days after delivery for reassessment as described above, and for examination of the baby. Write a short discharge summary for the mother to take to the clinic.

Routine 6-week postnatal visits are not considered necessary or practical

SECONDARY POSTPARTUM HAEMORRHAGE

This is passage of fresh blood or clots from the vagina more than 24 hours after delivery and the common causes are endometritis, retained products of conception and wound breakdown

Management

- Resuscitate the mother if she is shocked or has bled excessively, as for primary postpartum haemorrhage
- Try to find out whether the placenta and membranes were complete after delivery
- Carefully examine the vulva and vagina to find the source of bleeding
- If the cervix is open, attempt to feel inside the uterus for retained products
- If the cervix is open in the first week after delivery, this is normal and not necessarily a sign of retained products
- Do a transabdominal ultrasound scan where there is uncertainty about retained products
- Specific treatment will 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 upper genital tract after delivery. It may involve the endometrium, myometrium, pelvic peritoneum or the entire peritoneal cavity.

Risk factors for puerperal infection

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

*Patients having caesarean section, retained placenta, prolonged rupture of membranes and extensive vulval warts should always receive antibiotic prophylaxis to prevent puerperal sepsis

Mild puerperal sepsis

Clinical features include mild uterine tenderness without signs of peritonitis, a pulse rate of <100/minute, temperature <37.5 degrees, and offensive lochia.

Management

- Give amoxycillin 500 mg 3 times daily orally and metronidazole 400 mg 3 times daily orally
- If allergic to penicillin, give erythromycin 500 mg 4 times daily orally
- Encourage adequate intake of oral fluids
- If there are retained products, admit for evacuation of the uterus
- Follow up for reassessment after 24-48 hours

Severe puerperal sepsis

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

- Admit to hospital
- With evidence of septic shock (tachycardia, systolic BP <90 mmHg), start a rapid intravenous infusion of Ringer-Lactate 1-2 L, and closely observe BP, heart rate and respiratory rate. Call for senior help if BP does not respond to these measures
- Take blood for full blood count, urea and creatinine, blood culture, HIV serology, and arterial blood gas
- Prescribe ampicillin 1 g IV 6 hourly with gentamicin 240 mg IV daily, and metronidazole 1 g suppository twice daily or 400 mg orally 3 times daily
- Insert an indwelling urinary catheter
- Perform uterine evacuation if there are retained products
- Perform colpopuncture if there is uncertainty about evidence of peritonitis
- Observe hourly fluid intake and output, pulse rate, respiratory rate and blood pressure for the first 24-48 hours
- Consider laparotomy and hysterectomy, and transfer to intensive care if:
  - There is generalised peritonitis
  - Pus is withdrawn on colpopuncture
  - There is evidence of septic shock
  - There is organ dysfunction (oliguria, abnormal biochemistry, persistent tachypnoea, acidosis and hypoxaemia, and coagulopathy)
  - There is no improvement after 24-48 hours of treatment
  - If ICU admission is required

Caesarean section wound sepsis

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

Management

- Admit to hospital
- Examine thoroughly and look for evidence of severe sepsis (above)
- Remove all sutures, and explore the wound. Look for tissue necrosis and disruption of the rectus sheath
- Irrigate the wound with saline and remove all pus and dead tissue
- Dress the wound in accordance with the dressing agent used
- With features of severe puerperal sepsis, manage as described above
- With no features of severe puerperal sepsis, give oral antimicrobials as for mild puerperal sepsis
- Perform secondary wound closure (if necessary) under local anaesthetic when the wound is clean, or discharge the patient for outpatient dressings
**LACTATION**

In general, breastfeeding should be encouraged for all mothers who are HIV negative

- Wherever possible, avoid separation of a mother from her newborn
- Encourage early suckling (within about 2 hours of birth)
- Ensure correct positioning of the infant during suckling
- Avoid formula, water or other oral supplementation of healthy newborns
- Encourage unrestricted ('demand') breastfeeding
- Avoid prescribing combined oral contraceptives to women who want to breastfeeding; give progestogen-only preparations

**Insufficient milk supply**

1. Ensure correct positioning of the infant during suckling
2. Encourage unrestricted breastfeeding
3. Avoid the temptation to supplement the infant
4. Provide emotional and practical support
5. If true milk insufficiency is suspected, prescribe domperidone (Motilium) 10 mg orally 3 times daily for a few days
6. Consider Sheehan’s syndrome (pituitary failure secondy to postpartum haemorrhage and hypovolaemic shock) if there appears to be no milk at all

**Breast engorgement**

1. Ensure correct positioning of the infant during suckling
2. Encourage unrestricted breastfeeding
3. Give analgesia, e.g. paracetamol 1 g orally 4 times daily
4. Express the breast(s) if engorgement is severe, and give cold compresses for symptomatic relief
5. If infective mastitis is suspected, prescribe broad spectrum antibiotics including cover for *Staphylococcus aureus* (cloxacillin)

**Painful cracked nipples**

1. Give analgesia, e.g. paracetamol 1 g orally 4 times daily
2. Continue breastfeeding with the unaffected breast
3. Suspend feeding with the affected breast, but express at regular intervals
4. Resume feeding when the cracks have started to heal
5. Ensure correct positioning of the infant during suckling
Lactation suppression

Many women need assistance to suppress milk production. This may be because of HIV seropositivity, perinatal death, or their own choice on infant feeding.

- Breast binding and fluid restriction are effective non-pharmacologic methods.
- Bromocriptine (Parlodel) 2.5 mg orally twice daily is effective.
- Bromocriptine may cause nausea, dizziness, drowsiness, rebound lactation, and occasionally myocardial infarction and stroke.
- Avoid bromocriptine in women with pre-eclampsia or cardiovascular disease.
- Cabergoline (Dostinex), 1 mg orally as a single dose, is effective and has less side effects, but may not be available in public hospitals.
Hypertensive disorders of pregnancy are a frequent cause of maternal mortality in South Africa. Early detection and timely intervention are essential to prevent maternal and perinatal complications.

**DEFINITIONS**

**Definition of hypertension**

A diastolic blood pressure (BP) of 90 mmHg or more, on 2 occasions at least 4 hours apart, or a single diastolic BP reading of 110 mmHg or more.

**Definition of proteinuria**

The presence of 1+ proteinuria or more on reagent strip (dipstick) testing on 2 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, or albumin:creatinine ratio $>30$.

**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

**Pre-eclampsia** (gestational proteinuric hypertension, pre-eclamptic toxaemia): hypertension, detected **after** 20 weeks of pregnancy with any of the following:

- Proteinuria
- Renal insufficiency - serum creatinine $\geq 100$ µmol/L
- Liver disease AST $>40$ U/L
- Neurological problems – severe headache, hyperreflexia, convulsion
- Thrombocytopenia $<100$/mm$^3$ or haemolysis
- Placental insufficiency – asymmetric fetal growth restriction
Gestational hypertension: hypertension without proteinuria or any features of pre-eclampsia, detected 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 present as pre-eclampsia or as apparent gestational hypertension

Superimposed pre-eclampsia: pre-eclampsia that develops in a woman with chronic hypertension

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 110 mmHg or more measured on 2 occasions at least 4 hours apart, or 120 mmHg or more on one occasion, or persistent 3+ proteinuria irrespective of the level of blood pressure, or organ dysfunction irrespective of the level of blood pressure, e.g. renal failure, raised liver enzymes or thrombocytopenia.

Imminent eclampsia: symptoms and signs that develop in a pre-eclamptic woman: 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, in the absence of other causes of convulsions

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

MEASUREMENT OF BLOOD PRESSURE IN PREGNANCY

- The right and left semi-lateral and sitting positions are acceptable
- The supine position (lying flat on the back) should not be used after 24 weeks
- The sphygmomanometer cuff must be at the level of the heart
- The diastolic blood pressure is taken at the point where the sounds disappear (Korotkoff phase 5). In patients where the sounds do not disappear, the point of muffling (Korotkoff phase 4) may be used.
PATHOPHYSIOLOGY OF PRE-ECLAMPSIA

Pre-eclampsia is a multiorgan disease affecting predominantly the circulatory system, renal system, central nervous system, coagulation and liver.

A placental immunological or chemical defect causes a prostaglandin imbalance, which affects the endothelium (lining) of blood vessels, resulting in vascular spasm, 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.

COMPLICATIONS OF PRE-ECLAMPSIA

Maternal

- Severe hypertension
- Cerebrovascular accident
- Eclampsia
- Renal failure
- Liver failure or rupture
- Disseminated intravascular coagulation
- Pulmonary oedema
- Abruptio placentae

Fetal

- Intrauterine death from placental insufficiency
- Intrauterine death from abruption placentae
- Prematurity
- Intrauterine growth restriction
- Respiratory distress syndrome
- Acute fetal distress related to antihypertensive drug use
MANAGEMENT OF HYPERTENSIVE DISORDERS OF PREGNANCY

ANTENATAL VISITS

Chronic and nonproteinuric hypertensives should attend 4 weekly up to 28 weeks, 2 weekly up to 36 weeks and weekly up to delivery. Those with pre-eclampsia must be treated as inpatients.

PREVENTION OF PRE-ECLAMPSIA

Give aspirin 75 mg orally daily from 12 weeks gestation to mothers who have a history of previous pre-eclampsia that resulted in delivery at less than 7 months of pregnancy (30 weeks). Add heparin if there is evidence of antiphospholipid syndrome.

HOSPITAL ADMISSION

Independent mandatory admission criteria for hypertensive patients

- Proteinuria + on a midstream specimen
- Symptoms of imminent eclampsia
- Organ dysfunction e.g. thrombocytopenia, liver dysfunction, eclampsia
- Diastolic BP ≥110 mmHg
- Systolic BP ≥170 mmHg
- Pregnancy at term

Admission procedure

1. Admit to hospital
2. Take blood for FBC and U&E
3. Take blood for uric acid (except in mothers in labour or for delivery)
4. Order 4 hourly BP and daily urinalysis for protein in the ward
5. Order NST to be done in the ward if fetus is viable
6. Order ultrasound with fetal weight estimation if there is doubt about growth or gestational age
7. Prescribe oral antihypertensive medication (page 61)
8. If BP ≥170/110 mmHg, treat as for severe pre-eclampsia (pages 61 and 63)
CONTROLLING THE BLOOD PRESSURE IN PRE-ECLAMPSIA

Emergency treatment (BP $\geq 170/110$)

- Admit to a high care area
- Preload with 300 mL Ringer-Lactate solution over 20 minutes
- Give nifedipine 10 mg orally as a single dose
- Measure the blood pressure every 30 minutes at first, then hourly
- Repeat nifedipine hourly if necessary (BP still $\geq 170/110$)
- Aim for a diastolic BP of 90 mmHg
- Add maintenance treatment (below)

For unconscious patients, infuse labetalol 200 mg in 200 mL normal saline at 20 mL/hour (i.e. 20 mg/hour, increasing by 20 mg/hour every 30 minutes if necessary, to a maximum of 300 mg in 24 hours). Give 300 mL preload just before starting the infusion.

Dihydralazine may be used if available (25 mg in 200 mL normal saline at 10-20 mL/hour) with titration against the blood pressure. Give 300 mL preload just before starting the infusion. Dihydralazine 3.125 mg IV or 6.25 mg IM as single doses may be given postpartum or to patients with intrauterine death.

Maintenance treatment (BP $\geq 150/100$)

The drugs are usually prescribed in a stepwise fashion, depending on response. Aim for a diastolic BP 90-99 mmHg

- 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 (alternative: hydralazine 10-50 mg orally 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

For chronic hypertensives, discontinue beta-blockers, diuretics, and ACE inhibitors. Some chronic hypertensives may need no medication at all during pregnancy.
INPATIENT MANAGEMENT

- Doctors' daily round - ask for symptoms of imminent eclampsia, fetal movements, check BP and urine chart
- Repeat U&E, FBC and uric acid twice weekly
- Send a 24-hour urine specimen for protein, or urine for albumin:creatinine ratio only if urinalysis findings are equivocal or if renal disease is suspected. In the latter case creatinine clearance should also be measured on a 24-hour specimen
- Do NST on alternate days (if gestation >27 weeks or fetal weight ≥1 kg)
- Treat imminent eclampsia and severe pre-eclampsia as set out below

INDICATIONS FOR DELIVERY OF HYPERTENSIVE MOTHERS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
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<tbody>
<tr>
<td>Pregnancy ≥40 weeks with gestational and essential hypertension</td>
<td>Delivery</td>
</tr>
<tr>
<td>Pregnancy ≥38 weeks with mild pre-eclampsia</td>
<td></td>
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<tr>
<td>Pregnancy ≥32 weeks in severe pre-eclampsia</td>
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</tr>
<tr>
<td>Estimated fetal weight ≥1.5 kg in severe pre-eclampsia</td>
<td>Delivery</td>
</tr>
<tr>
<td>Pregnancy &lt;26 weeks or fetus &lt;900 g in severe pre-eclampsia</td>
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<tr>
<td>Eclampsia</td>
<td></td>
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<tr>
<td>Imminent eclampsia persisting after treatment with magnesium sulphate</td>
<td>Delivery</td>
</tr>
<tr>
<td>Cerebral oedema</td>
<td></td>
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<tr>
<td>HELLP syndrome</td>
<td></td>
</tr>
<tr>
<td>Renal dysfunction (serum urea ≥8 mmol/L, creatinine ≥100 µmol/L, urine output &lt;500 mL/24 hours)</td>
<td>Delivery</td>
</tr>
<tr>
<td>Thrombocytopenia (platelet count persistently &lt;100×10⁹/L)</td>
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<tr>
<td>Fetal distress</td>
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<tr>
<td>Dead fetus</td>
<td></td>
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<tr>
<td>Suspected abruptio placentae</td>
<td></td>
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</tbody>
</table>

Discharging hypertensive pregnant patients from the antenatal ward

- The BP must be stable below 170/110 mmHg
- There must be no proteinuria
- Mother and fetus must be well
- There must be no indication for delivery
- A return date to antenatal clinic must be given by the doctor
- A very brief discharge summary must be written on the antenatal card
SEVERE PRE-ECLAMPSIA

Initial management is as follows:

1. Arrange for transfer to a high care area
2. Insert an indwelling Foley catheter and monitor urine output hourly
3. Take blood for FBC, U&E, uric acid and AST. Do INR/PTT if there is thrombocytopenia as caesarean section may need to be done (page 38)
4. Assess gestational age and fetal weight, by ultrasound if necessary
5. Do CTG if fetus is viable
6. Treat the blood pressure (page 61)
7. Arrange for delivery if indications exist and notify paediatricians if the baby is expected to weigh <1500 g.
8. If not for delivery, adjust oral antihypertensive medication
9. Always consider other causes of hypertension e.g. phaeochromocytoma

Exception: Asymptomatic severely hypertensive patients less than 20 weeks pregnant (i.e. chronic hypertension) can be managed in the antenatal wards without IV lines and catheters.

Conservative management of severe pre-eclampsia (26-32 weeks / 900-1500 g)

Following stabilisation of blood pressure:

- Oral antihypertensive medication to keep BP at about 150/90 mmHg
- Betamethasone 12 mg IMI stat, repeat after 12 hours
- Twice-weekly FBC, U&E, uric acid, more frequently if necessary
- 6 hourly NST if possible
- Weekly ultrasound fetal assessment for liquor volume and umbilical artery Doppler
- 4 hourly BP, daily urinalysis for protein

HELLP syndrome

- Manage as for severe pre-eclampsia
- Arrange for delivery
- If platelet count is <50×10^9/L and caesarean section is planned, give platelet transfusion 1 megaunit at operation
**ECLAMPSIA**

Principles of care are control of convulsions, reduction of blood pressure, clinical and laboratory assessment, and delivery

**Immediate management of eclampsia**

1. Call for help
2. Turn the woman onto her side (left lateral)
3. Clear the airway – ensure that it is open and remove secretions or vomitus
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 (page 66)
8. With persistent convulsions or restlessness, give additional magnesium sulphate 2 g IV or clonazepam 1 mg IV over 5 minutes
9. Phenytoin has no role in the prevention or management of eclamptic convulsions
10. Insert an indwelling urinary catheter
11. Admit to a high care area

**Management of eclampsia after fits have been controlled**

1. Take blood for FBC, U&E, and liver function tests
2. Control the blood pressure if ≥170/110 mmHg (page 61)
3. Continue intravenous fluids (Ringer-Lactate or normal saline) at 70 mL/hour
4. Monitor BP, urine output and level of consciousness hourly
5. Monitor level of consciousness 2 hourly using Glasgow Coma Scale
6. Intubate if Coma Scale ≤8
7. Assess fetal condition with CTG, and fetal size by ultrasound
8. Continue magnesium sulphate infusion at 1 g/hour (page 66) until 24 hours after delivery or 24 hours after the last convulsion, whichever is later, in a high care area
9. 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
   - Vaginally if the mother is in labour or if the cervix is favourable for induction
10. Vacuum extraction or forceps delivery may be necessary in the second stage
11. Do not use ergometrine in the third stage (use oxytocin 10 units IM)
12. Expect return to full consciousness within two hours of the last fit
13. Investigate women with persistent coma or localising signs – call a neurologist to assess and arrange for a CT scan of the brain
14. Take blood for FBC and U&E on the day after delivery
15. Keep in hospital for at least 3 days after delivery
The Glasgow Coma Scale

| Eyes       | 4 | Open spontaneously (already open with blinking) |
|           | 3 | Open to speech                                  |
|           | 2 | Open to pain                                    |
|           | 1 | No response                                     |

| Verbal (exclude if intubated) | 5 | Orientated to time and place                    |
|                              | 4 | Confused (still answers questions)              |
|                              | 3 | Inappropriate words (recognizable but random)   |
|                              | 2 | Incomprehensible sounds                        |
|                              | 1 | None                                            |

| Motor    | 6 | Obeys command (no pain required)                |
|          | 5 | Localises to pain                               |
|          | 4 | Withdraws (pulls away from a painful stimulus)  |
|          | 3 | Decorticate response (abnormal flexion)         |
|          | 2 | Decerebrate response (extensor response)        |
|          | 1 | No movement                                     |

**IMMINENT ECLAMPSIA**

1. Exclude other causes of pain - abruptio, simple headache, and send to a high care area
2. Insert an intravenous drip and give magnesium sulphate (below)
3. Insert indwelling Foley catheter and monitor urine output hourly
4. Take blood for U&E, FBC
5. Run intravenous fluids at 70 mL/hour
6. Do CTG
7. Reassess hourly. If imminent eclampsia persists, arrange for delivery
**ADMINISTRATION OF MAGNESIUM SULPHATE**

**Loading dose:** Add magnesium sulphate 4 g to 200 mL normal saline and run the infusion rapidly.

**Maintenance dosage:** Add magnesium sulphate 10 g to 200 mL normal saline and run the infusion at 20 mL/hour, equivalent to 1 g/hour.

**Alternative regimen:** Dilute magnesium sulphate 4 g (8 mL) in 12 mL normal saline and give slowly intravenously over 4 minutes, with 5 g IM in each buttock with 1 mL 1% lignocaine. A total of 14 g is given. Maintenance dosage is 5 g IM 4 hourly in alternate buttocks, mixed with 1 mL 1% lignocaine.

**Precautions during magnesium sulphate infusion**

Maintenance doses should only be continued if the following hourly observations are made and confirmed:

- Presence of patellar reflexes,
- The respiratory rate is ≥16 breaths/minute, and
- Urine output is ≥100 mL in the last 4 hours

**Treatment of suspected overdose**

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

**Blood magnesium levels:**

Normal range 0.7-1.0 mmol/L, therapeutic at 1.25-3.25, absent reflexes at 4-5, respiratory depression at 6-8, cardiac arrest at >15 mmol/L
LABOUR AND DELIVERY

INDUCTION OF LABOUR

The usual methods of induction may be used: great care must be taken during induction of labour in severe pre-eclampsia, especially preterm and with oligohydramnios. CTG monitoring is mandatory.

LABOUR

• Admit to a high care area
• Give total fluids 70 mL/hour
• Run continuous CTG
• If oxytocin is used, give it from a 200 mL bag of normal saline (page 31)
• Do assisted delivery if BP $\geq 170/110$ in the second stage or if the mother cannot push
• Ergometrine and Syntometrine are contraindicated in the third stage
• If caesarean section needs to be done, please note pre-anaesthetic tests (page 38)

POSTPARTUM CARE

• Keep the mother in hospital for at least 24 hours after delivery
• Continue oral antihypertensive medications (e.g. methyldopa) and modify or reduce the dosage as necessary (page 61)
• Diuretics, e.g. hydrochlorothiazide 25 mg daily, may be given
• Treat a BP $\geq 170/110$ with nifedipine 5-10 mg orally as single doses, and measure the BP hourly until stabilised
• Discharge the mother from hospital if the BP is $< 170/110$ for 24 hours
• Write a referral note to the local clinic for a woman discharged on antihypertensive medication to attend there after 2 weeks for BP measurement and adjustment (or discontinuation) of therapy
Chapter 4  Common obstetric problems

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 and umbilical artery Doppler velocimetry are usually normal.

- Asymmetric – the head grows, but the body shows growth failure. This may result from pre-eclampsia, vascular disease (as in diabetes or lupus), or from isolated placental insufficiency. Liquor volume may be reduced, showing low ultrasound amniotic fluid index (sum of depth of deepest pools in the four uterine quadrants is less than 5 cm). Umbilical Doppler studies may show reduced, absent, or reversed end-diastolic blood flow.

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

SCREENING

This is done at all antenatal visits using clinical methods. The following findings should raise suspicion of IUGR:

- **Measurement of symphysis-fundal height (SFH):** a measurement less than the 10th centile for gestational age (as noted on the antenatal SFH graph) should raise suspicion of IUGR

- **Palpation:** features that suggest IUGR include palpation of a large 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 is used to make a diagnosis.

**With findings on ultrasound suggestive of symmetric IUGR:**

1. Exclude syphilis with an RPR test
2. Exclude congenital abnormalities on ultrasound…
3. Repeat ultrasound for growth and umbilical artery Doppler every 2 weeks until normal growth is shown or growth failure becomes apparent
4. Consider induction of labour at term (37 weeks)

**With findings on ultrasound suggestive of asymmetric IUGR:**

1. Delivery is indicated at $\geq 34$ weeks
2. If dates or the diagnosis are uncertain but possibly $<34$ weeks, and delivery may be indicated, give betamethasone 12 mg daily for 2 days to accelerate fetal lung maturity
3. Do umbilical artery Doppler flow studies
4. If the umbilical artery Doppler pulsatility index (PI) is abnormal, follow up with weekly repeats and order middle cerebral artery (MCA) Doppler
5. If the MCA PI is also abnormal – showing redistribution or brain sparing – follow up with twice weekly MCA Doppler studies
6. If the ductus venosus flow becomes abnormal – high PI or reversed a-wave – admit to hospital and follow up daily with NST in the ward until delivery. When ductus venosus flow is abnormal, delivery within 24 hours is generally recommended
7. Fetal heart abnormalities – reduced baseline variability and late decelerations – necessitate immediate delivery

**DELIVERY**

During induction of labour for IUGR, use continuous CTG monitoring, because of a high risk of fetal distress. Caesarean section is recommended for delivery of small babies with asymmetric IUGR.

If the estimated fetal weight is $<1$kg, individualize management in consultation with the parents, the Fetal Medicine Unit and the neonatal unit.

**INTRAUTERINE DEATH**

Typical clinical findings include:

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

The diagnosis is confirmed by ultrasound scan. Take a good history to help establish the cause of fetal death. Offer induction of labour, although the mother may choose to go home first to make arrangements with her family. Some women may prefer expectant management, to await spontaneous labour.
EXPECTANT MANAGEMENT (if chosen by the mother)

- See the mother weekly at antenatal clinic
- Take blood for d-dimers, INR and platelet count weekly from 3 weeks after the presumed date of IUD, to detect coagulopathy
- Treat coagulopathy in consultation with a haematologist or experienced consultant before induction of labour
- Do not delay delivery if there is vaginal bleeding, abdominal pain, pyrexia or hypertension

INDUCTION, LABOUR AND DELIVERY

- Give misoprostol 100 µg intravaginally in the second trimester, or 50 µg in the third trimester. The dose may be repeated after 6 hours and again after 12 hours.
- Do not use misoprostol with previous caesarean section beyond 24 weeks of gestation, or for parity ≥5
- Do not give oxytocin infusion <6 hours after the last dose of intravaginal misoprostol
- Bulb induction using a Foley catheter is a safe alternative to misoprostol – inflate a 30 mL Foley catheter bulb above the internal os and strap the catheter to the thigh. When the bulb is expelled, start oxytocin infusion
- If the induction fails, always consider extrauterine pregnancy
- Give analgesia – morphine 15 mg IM with hydroxyzine (Aterax) 100 mg IM 4 hourly if necessary
- Delay amniotomy until late in the first stage (cervix ≥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

POSTPARTUM CARE

This differs from normal postpartum care in the following aspects:

- Encourage the mother to hold and look at her baby
- Be sympathetic and supportive at all times
- Take into account the normal grief responses
- Thoroughly examine the baby, placenta and cord for abnormalities
- Minimum investigations are RPR and rhesus blood group
- Request genetic investigation if an abnormality is suspected (page 97)
- Explain the cause (if known) of the stillbirth to the mother
- Treat breast discomfort with binding and fluid restriction, or with bromocriptine 2.5 mg orally twice daily for 14 days
- If possible, nurse the mother in a postnatal ward with other women who have had pregnancy losses, or in a gynaecology ward
Investigations following an unexplained IUD

Resources and infrastructure do not exist for routine extensive testing and autopsy. The following procedures are mandatory:

1. The paediatric medical officer on call must examine the baby and make appropriate notes
2. The midwife or obstetrician must examine the placenta and make appropriate notes
3. The mother must not be discharged without an RPR result
4. Maternal Rhesus blood group must be checked
5. If the baby has congenital abnormalities, send a skin biopsy (in saline) from the popliteal fossa, or heparinised blood from the heart of a recently deceased infant, for karyotyping, and arrange genetic counselling. A perinatal autopsy can also be arranged

PROCEDURE FOR PERINATAL AUTOPSY

1. Inform the mother and nursing staff as soon as possible about plans for autopsy
2. Put the placenta in formalin for histological examination and send it for histology. Indicate on the slip that the fetus is also being sent for autopsy
3. Very small fetuses (<750 g) should be sent to the laboratory in saline and not go to the mortuary
4. Complete a postmortem consent form with the mother (if she agrees)
5. Complete the hospital postmortem application form
6. Complete the laboratory postmortem request form
7. Contact the pathology registrar on call to arrange any further details
8. Take all completed forms to the mortuary
9. Arrange a follow-up date (± 1 month) for the mother

ANTEPARTUM HAEMORRHAGE

Antepartum haemorrhage (APH) is defined as bleeding from the genital tract from 28 weeks of pregnancy or fetal viability, 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.
EMERGENCY MANAGEMENT

1. Start an intravenous infusion of Ringer-Lactate solution with a large bore (16G) intravenous cannula
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 ruled out by a previous ultrasound scan
4. Do an ultrasound scan to look for placenta praevia, estimate fetal weight, identify a fetal heart beat and to demonstrate retroplacental clot (not always visible on ultrasound)
5. If no placenta praevia, examine the cervix by vaginal speculum examination and by digital examination for dilatation and presenting part
6. Further management depends on the cause (below)

Differences between abruptio placentae and placenta praevia

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

- Ringer-Lactate IV infusion
- Assess blood loss
- Check fetal heart

Abdominal examination
Ultrasound examination

Consider:
- Is there maternal compromise?
- Is there fetal distress?
- Is the fetus mature?
- Is the fetus normal?
- Is the mother in labour?

Placenta praevia
Abruptio placentae

No cause found
Speculum examination

APH of unknown origin
Cervical or vaginal lesion

ALGORITHM FOR MANAGEMENT AND DIAGNOSIS OF ANTEPARTUM HAEMORRHAGE
MANAGEMENT OF PLACENTA PRAEVIA

Placenta praevia may be of major degree, with placenta covering the internal os, or minor degree, with placenta in front of the presenting part but not covering the internal os. Major placenta praevia frequently requires caesarean section well before term, while the occasional patient with minor placenta praevia may do well with vaginal delivery. Principles of care are however similar for both.

At less than 37 weeks:
- Admit to hospital; do not discharge patients with major placenta praevia
- Check haemoglobin level
- Ensure that blood is available for transfusion
- If <34 weeks, give betamethasone 12 mg IM 12 hourly for 2 doses
- Plan elective caesarean section at 35-37 weeks
- Perform emergency caesarean section if blood transfusion becomes necessary, or if bleeding is considered to be severe
- Vaginal delivery (abortion) is preferred at <26 weeks

At 37 weeks or more, or in labour:
- If, on ultrasound scan, the placenta covers the cervix, perform caesarean section
- If the placenta does not cover the cervix, perform vaginal examination in theatre (with theatre staff and anaesthetist in attendance) and proceed immediately with caesarean section if the placenta can be felt through the cervix. If the placenta cannot be felt, rupture the membranes and induce labour
- Caesarean section for placenta praevia may result in massive haemorrhage. Be prepared to give an urgent blood transfusion, insert haemostatic sutures or perform hysterectomy

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 1 kg or more, perform emergency caesarean section, unless delivery is imminent (cervix ≥8 cm dilated) and there is no fetal distress
- For a baby weighing less than 1 kg, rupture the membranes and augment labour with oxytocin (page 31). Monitor blood loss carefully
If the fetus is dead:

Urgent delivery is essential. The abruption is likely to be severe and requires close observation and frequent reassessment.

1. Admit to a high care area
2. Take blood for cross-match, FBC, U&E, INR and d-dimers
3. Blood transfusion (2-4 units) is usually necessary, with fresh frozen plasma if there is a clotting disorder. If the platelet count is \( <50 \times 10^9 / \text{L} \), transfuse 1 megaunit of platelets
4. Consider insertion of a central venous pressure (CVP) line for patients who are haemodynamically unstable or who have severe pre-eclampsia
5. Insert an indwelling urinary catheter and monitor hourly urine output
6. Give fluids to maintain a systolic BP \( \geq 100 \text{ mmHg} \), or a CVP of 6 cm H\(_2\)O
7. Rupture the membranes and augment labour with oxytocin (page 31)
8. Give analgesia - morphine 15 mg IM with hydroxyzine (Aterax) 100 mg IM 4 hourly

9. Caesarean section is indicated if:
   - The cervix is closed and the membranes cannot be ruptured
   - The patient is not in the active phase of labour 6 hours after rupturing membranes
   - There is life-threatening haemorrhage at less than full cervical dilatation

10. After delivery of the fetus and placenta, run a drip with oxytocin 20 units in 1L Ringer-Lactate to prevent postpartum haemorrhage, and observe closely for bleeding
11. Check FBC and U&E on the day after delivery

ACUTE RENAL FAILURE

There is oliguria (<500 mL/24 hours) with rising serum urea and creatinine levels. Abruptio placentae is the most common obstetric cause, but this may also result from severe pre-eclampsia, massive haemorrhage, and overwhelming sepsis. The principles of management are as follows:

1. Correct fluid deficit with intravenous crystalloids, with a CVP line if necessary
2. Strict intake and output chart: total fluids given should be previous day’s output plus 500 mL for insensible loss
3. Take blood daily for U&E
4. Call Renal Unit for dialysis if there is no response. Indications for dialysis include rapidly rising urea and creatinine levels, pulmonary oedema, hyperkalaemia, severe acidosis, and symptomatic uraemia.
5. Avoid giving diuretics or dopamine unless instructed by Renal Unit.
ANTEPARTUM HAEMORRHAGE OF UNKNOWN ORIGIN

In this condition, there is no evidence of abruptio placentae, placenta praevia, or cervical/vaginal lesions

- Admit to hospital
- At \( \geq 37 \) weeks pregnant, induce labour
- If <37 weeks pregnant:
  - Do daily CTG
  - Observe for symptoms or signs of abruptio placentae
  - Discharge from hospital 24-48 hours after bleeding has stopped
  - Assess the cervix before discharge to exclude imminent preterm labour
  - Continue antenatal care at hospital, with attention to fetal growth and fetal movements
  - Consider induction of labour at 38-40 weeks

MULTIPLE PREGNANCY

Multiple pregnancy is diagnosed by ultrasound examination. Multiple pregnancy needs to be suspected on clinical examination. Pregnancies with the following signs are frequently referred for ultrasound assessment:

- Symphysis-fundal height >90\textsuperscript{th} centile for gestational age
- An unusually wide and round uterus
- Increased liquor volume
- More than 2 fetal poles palpable
- Head feels smaller than expected for the uterine size

ANTENATAL MANAGEMENT

- All antenatal visits must take place at a referral centre
- Refer to Fetal Medicine Unit for assessment of chorionicity, cervical length, fetal weight estimation, liquor volume and evidence of IUGR
- Warn the mother of possible complications: preterm labour, anaemia, hypertension and general discomfort
- Follow up patients every 4 weeks to 28 weeks, every 2 weeks to 36 weeks, and then weekly to delivery
- Give ferrous sulphate tablets 200 mg orally 3 times daily to prevent anaemia
- Ultrasound scan is done every 4 weeks from 28 weeks to follow fetal growth
DELIVERY

Indications for elective caesarean section

- Monochorionic twins at 35 weeks to avoid intrapartum twin-to-twin transfusion
- Triplets at 33 weeks
- Intrauterine growth restriction (estimated ultrasound fetal weight difference $\geq 25\%$ lower than the larger twin)
- First twin breech or transverse lie at 37 weeks
- Previous caesarean section
- Underlying hypertension, diabetes mellitus or renal disease

Principles of labour and delivery

- Treat preterm labour as for singleton pregnancies. Beware of pulmonary oedema if betasymathomimetics and betamethasone are used together
- Induction of labour is not contraindicated
- Use a partogram for observing labour progress
- Monitor both fetuses during labour, by CTG if possible
- Oxytocin may be used for labour augmentation
- A doctor should be present at delivery of both twins
- Ensure that the cord of twin I is firmly clamped until twin II has been born
- Vaginal delivery of twin II may be facilitated by:
  - External version from transverse to longitudinal lie (breech or cephalic), using hexoprenaline 10 $\mu$g IV or salbutamol 0.1-0.2 mg IV
  - Internal version and breech extraction of persistent transverse lie by an experienced registrar or consultant (best under epidural anaesthesia)
  - Oxytocin augmentation 5 units in 1L Ringer-Lactate at 240 mL/hour
  - Rupture of membranes after the presenting part has engaged
- Do an emergency caesarean section for the second twin if there is persistent transverse lie, not amenable to external or internal version
- 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

Local clinics may refer mothers with suspected breech presentation and transverse lie to hospital for confirmation and further management. Ultrasound scanning will confirm the presentation, and exclude multiple pregnancy, placenta praevia, uterine abnormality and fetal abnormality.

EXTERNAL CEPHALIC VERSION

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

1. Exclude contraindications – hypertension, scarred uterus, antepartum haemorrhage, ruptured membranes, HIV seropositivity
2. Give anti-D 100 µg IM to rhesus-negative mothers with no antibodies
3. Do not anaesthetise or sedate the mother
4. Use hexoprenaline 10 µg IV or salbutamol 0.1-0.2 mg IV to relax the uterus
5. Never use excessive force
6. Do a CTG tracing before and after ECV, whether successful or not
7. Observe the mother for a few hours for complications – labour, rupture of membranes, antepartum haemorrhage, fetal distress

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. Exclude fetal abnormality or multiple pregnancy, by ultrasound if necessary
2. Attempt external cephalic version if there are no contraindications
3. Estimate fetal weight and pelvic adequacy
4. Determine cervical dilatation and station of presenting part
5. 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 in advanced labour. Vaginal breech delivery can be planned for these women provided that all circumstances are favourable. Primigravidae should be strongly advised to have elective caesarean section. Vaginal breech delivery must be personally supervised by the most senior clinician available in the labour ward.
**Breech presentation suitable for vaginal delivery**

- Mother understands and accepts vaginal delivery
- Clinician experienced and confident with vaginal breech delivery
- No signs of pelvic contraction on clinical assessment
- Estimated fetal weight less than 3.0 kg
- X-ray or ultrasound excludes head extension (‘stargazing’)
- Frank or complete breech
- At 6 cm dilatation or more, the presenting part should be at or below the level of the ischial spines
- Labour progress \( \geq 1 \) cm per hour
- Epidural anaesthesia is strongly advised

Dead and grossly abnormal babies, and those with estimated weight <900 g should be delivered vaginally

**Technique of delivery**

1. Put the mother in lithotomy position
2. Have an assistant and a paediatric doctor in attendance
3. Cut an episiotomy after infiltration of the perineum with local anaesthetic
4. Allow the breech to deliver itself and only assist in keeping the fetal back facing upwards
5. If extended knees prevent easy delivery, assist by flexing at the knees and gently delivering each leg (Pinard maneuver)
6. After delivery of the trunk, allow the breech to hang, pull the cord down and cover the delivered parts with a cloth
7. As the scapulae appear, be ready to assist with delivery of the arms
8. 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
9. The neck will deliver up to the nape
10. Deliver the head by lying the fetus over the right forearm (if right-handed) and inserting the right middle finger into the baby’s mouth, with the index and ring fingers supporting the cheek (Mauriceau-Smellie-Veit maneuver)
11. The left hand exerts suprapubic pressure downwards to flex the head
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**

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 (alive or dead, expected weight \( \geq 1 \) kg) needs delivery by caesarean section. Consider classical or low vertical uterine incision, especially with dorso-anterior and dorso-inferior transverse lie.
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. It is usually necessary to do an ultrasound scan to assess fetal weight and normality.

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. Admit to labour ward
3. Manage labour as for term pregnancies.

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

1. Admit to a high care area
2. Give ampicillin 1 g IV 6 hourly and metronidazole 400 mg orally 3 times daily until delivery (for penicillin allergy, substitute erythromycin 500 mg orally 4 times daily)
3. Give betamethasone 12 mg IM 12 hourly for 2 doses
4. Run a CTG tracing
5. If there is evidence of abruptio placentae or chorioamnionitis, allow labour to proceed under close fetal monitoring with CTG, or consider caesarean section
6. If the cervix is $\geq 6$ cm dilated, allow labour to proceed
7. If the cervix is $< 6$ cm dilated, give hexoprenaline/salbutamol or nifedipine regimen (page 82). Pay attention to precautions with using these agents
8. Intravenous atosiban may be available for certain patients (e.g. cardiac disease, multiple pregnancy)
9. If hexoprenaline/salbutamol 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

Gestational age 24-26 weeks or estimated fetal weight 600-900 g:

1. Admit to labour ward
2. Allow labour to proceed
3. Give betamethasone 12 mg IM 12 hourly for 2 doses
4. If the baby is born alive, transfer to the nursery for resuscitation

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

1. Manage as an inevitable miscarriage
2. Counsel the mother appropriately
HEXOPRENALINE AND SALBUTAMOL REGIMENS

1. Give hexoprenaline 10µg IV over 5 minutes, then add 300µg to 1 L Normal Saline, to run at 60 mL/hour. Increase by 10 mL/hour every 30 minutes until contractions stop, or maternal heart rate reaches 120/minute, or infusion rate reaches 120 mL/hour.

   **OR:**

   Give salbutamol 0.1-0.2 mg IV over 5 minutes, then add 10 mg to 1 L Normal Saline, to run at 60 mL/hour. Increase by 10 mL/hour every 30 minutes until contractions stop, or maternal heart rate reaches 120/minute, or infusion rate reaches 120 mL/hour.

2. Stop infusion after 24 hours and allow labour to proceed, or discharge the mother if she is not in labour. Further oral dosing is not required.

NIFEDIPINE REGIMEN

1. Insert a drip with Ringer-Lactate, and run 500 mL fast followed by 125 mL/hour

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

**Precautions**

- These agents should be given only in a high care area under close supervision
- Do not give these agents to mothers with cardiac disease, hyperthyroidism, uncontrolled diabetes mellitus or pre-eclampsia
- Do not give these agents to women with a heart rate ≥120/minute
- Do not give beta-stimulants in combination with nifedipine
- Observe the pulse rate ½ hourly, or connect to a cardiac monitor
- Measure the blood pressure hourly
- Auscultate the mother’s lungs every 2 hours to exclude pulmonary oedema
- Do not allow the maternal heart rate to exceed 120/minute
- Do not allow the hexoprenaline or salbutamol infusion rate to exceed 120 mL/hour
ALGORITHM FOR MANAGEMENT OF 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, speculum examination, pH testing of vaginal fluid or, if necessary, by liquor volume assessment on ultrasound. Management depends on gestational age and/or estimated fetal weight (by palpation or ultrasound).

**Gestational age ≥34 weeks or estimated fetal weight ≥2 kg:**

1. Give ampicillin 1 g IV 6 hourly and metronidazole 400 mg orally 8 hourly
2. Allow labour to proceed
3. If the mother is not in labour within 12-24 hours, induce labour with oxytocin or oral misoprostol (pages 31 and 88-89)

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

1. Admit to hospital
2. Do not do digital vaginal examination as this may contribute to chorioamnionitis
3. Give erythromycin 250 mg orally 4 times daily and metronidazole 400 mg orally 3 times daily for 7 days
4. Give betamethasone 12 mg IM 12 hourly for 2 doses
5. Give hexoprenaline/salbutamol or nifedipine regimen if contractions start in the first 24 hours after admission (page 82)
6. Observe temperature, pulse rate, fetal heart rate, and pad checks 4 hourly
7. Palpate daily for evidence of chorioamnionitis (irritable or tender uterus)
8. Do CTG daily if possible
9. Induce labour at 34 weeks or 2 kg, or if there are signs of chorioamnionitis (pages 31, 88-89)
10. During labour, give ampicillin 1 g IV 6 hourly

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

1. Ensure that the membranes have definitely ruptured (reduced liquor volume on ultrasound). If in doubt, admit to hospital to observe for passage of liquor

2. If rupture of membranes has been confirmed, induce labour with oxytocin 10-20 units in 1L Ringer-lactate at 120 ml/hr, after full discussion of the problem with the mother
Prelabour rupture of the membranes

- Gestation ≥34 wk, Fetus ≥2000 g
  - Antibiotics
  - Induce labour after 12-24 hr

- Gestation 24-33 wk, Fetus 600 – 1999 g
  - Evidence of chorioamnionitis
    - Antibiotics
    - Betamethasone
    - Monitor fetus
    - Induce labour
  - No evidence of chorioamnionitis
    - Conservative management
      - Antibiotics
      - Betamethasone
      - Monitor for signs of infection
      - Induce labour at 34 weeks

- Gestation <24 wk, Fetus <600 g
  - Antibiotics
  - Induce labour after counselling
**CHORIOAMNIONITIS**

This is usually associated with prelabour rupture of membranes and preterm labour, or with antepartum haemorrhage, but may occur in the absence of any specific symptoms or signs. Both mother and baby are at significant risk of severe infection.

**Signs of chorioamnionitis include:**

- Pyrexia ≥37.5 degrees
- Maternal pulse rate ≥100/minute
- Uterine tenderness and/or irritability
- Fetal heart rate ≥160/minute
- Offensive liquor
- Meconium stained liquor

**Management**

1. If there is uncertainty about the diagnosis, exclude other causes of the presenting symptoms and signs, or admit to the antenatal ward for observation and fetal monitoring.
2. Give ampicillin 1 g IV 6 hourly, with metronidazole 400 mg orally 3 times daily
3. For gestation <34 weeks, give betamethasone 12 mg IM 12 hourly for 2 doses
4. Induce labour if the cervix is favourable, otherwise perform caesarean section
5. During labour, monitor the fetus with CTG
6. Continue ampicillin and metronidazole for 5 days after delivery

**SUSPECTED POSTTERM PREGNANCY**

This is pregnancy exceeding 41-42 weeks. The most serious associated problems are intrapartum related birth asphyxia and meconium aspiration. Many suspected postterm pregnancies are referred to hospital from their local clinics. The management is as follows:

1. Ensure that the gestational age has been correctly calculated
2. A report from an early ultrasound scan (≤24 weeks) provides convincing evidence of correct gestational age
3. If there is certainty about gestational age, induce labour (pages 31,87-89)
4. If there is uncertainty about gestational age:
   - Induce labour if there is reduced fetal movement, reduced liquor volume, or a favourable cervix
   - Do not induce labour if fetal movement and liquor volume are normal, and the cervix is unfavourable for induction
5. During labour, monitor the fetus with CTG if possible
INDUCTION OF LABOUR

The most frequent indications for induction of labour with a live baby are postterm pregnancy, hypertensive disorders of pregnancy and prelabour rupture of membranes. Contraindications are placenta praevia, transverse lie, fetal distress, previous caesarean section and maternal parity ≥5.

CERVICAL ASSESSMENT

Prior to induction of labour, the cervix needs to be assessed for favourability. Use the modified Bishop score – a total ≥8 suggests that induction with amniotomy and oxytocin is likely to be successful.

**Bishop score**

<table>
<thead>
<tr>
<th>Points:</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical dilatation (cm)</td>
<td>&lt;1</td>
<td>1-2</td>
<td>2-4</td>
<td>&gt;4</td>
</tr>
<tr>
<td>Cervical length (cm)</td>
<td>&gt;4</td>
<td>2-4</td>
<td>1-2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Station</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>≥0</td>
</tr>
<tr>
<td>Cervical consistency</td>
<td>Firm</td>
<td>Average</td>
<td>Soft</td>
<td></td>
</tr>
<tr>
<td>Cervical position</td>
<td>Posterior</td>
<td>Mid-position</td>
<td>Anterior</td>
<td></td>
</tr>
</tbody>
</table>

If the cervix is favourable for induction:

1. Admit the mother to labour ward
2. Ensure fetal well being by NST
3. Perform artificial rupture of membranes (not in HIV positive mothers)
4. Start oxytocin infusion (page 31)
5. Monitor the fetus with CTG

If the cervix is not favourable for induction:

1. Admit the mother to the antenatal ward
2. Ensure fetal well being by NST
3. Start oral misoprostol induction
4. If the cervix is not favourable or labour has not started after 24 hours of oral misoprostol, give up to two doses of prostaglandin E2 gel 0.5 mg into the cervix, 6-12 hours apart
5. Failed induction after 48 hours may necessitate caesarean section or further expectant management
An alternative to oral misoprostol or vaginal prostaglandin is ‘bulb induction’, where a Foley catheter is passed into the internal cervical os and blown up to 30 mL, and kept on traction by sticking the catheter to the thigh. When the bulb is expelled, the cervix is ripe for induction.

**Induction of labour with oral misoprostol**

1. Ensure that induction of labour is indicated
2. Presentation must be cephalic
3. Parity must be 4 or less
4. There must be no history of previous caesarean section or major uterine surgery
5. Assess the cervix – dilatation, length, position and consistency
6. Make the misoprostol solution. Dissolve 1 tablet of misoprostol 200 µg in 200 mL tap water in a clean plastic bottle (1 µg/mL). Shake well before each dose is given. Discard any unused solution after 12 hours
7. Give oral misoprostol 2-hourly as follows:
   a. For nulliparas: first 3 doses 20 mL (20 µg), then 40 mL (40 µg) 2 hourly for up to 24 hours
   b. For multiparas: first 3 doses 10 mL (10 µg), next 3 doses 20 mL (20 µg), then 40 mL (40 µg) 2 hourly for up to 24 hours
8. Before each oral dosage, check for uterine contractions. If there are 3 or more painful contractions in 10 minutes, assess the cervix and do a CTG
9. If the cervix is ≥4 cm dilated, transfer the mother to labour ward
10. If the cervix is <4 cm dilated, continue oral misoprostol 2-hourly and repeat the cervical assessment in 2-4 hours
11. Do not give oxytocin <4 hours after the last dose of oral misoprostol
12. If the mother is not in labour after 24 hours, stop misoprostol and consider alternative methods of induction or delivery, e.g. rupture of membranes and oxytocin infusion, or catheter bulb induction, or caesarean section
13. If tachysystole (≥6 contractions in 10 minutes for at least 20 minutes) or hypertonus (contraction lasting for ≥2 minutes) occurs:
   a. Place the mother in a left lateral position
   b. Perform a CTG tracing
   c. Do not rupture membranes
14. If hyperstimulation syndrome (hypersystole or hypertonus with fetal heart rate abnormality) occurs:
   a. Place the mother in a left lateral position
   b. Give 10 µg hexoprenaline IV or salbutamol 0.1-0.2 mg IV over 5 minutes, monitoring maternal pulse. Stop the injection if the pulse rate ≥120/minute
15. When the patient is in labour, monitor the fetus with continuous CTG if possible
Labour indicated
Parity 4 or less
Cephalic presentation
No previous caesarean

Nullipara

Add 200 µg misoprostol to 200 mL water: give 20 mL 2-hrly orally for 3 doses, then 40 mL 2-hrly for up to 24 hours, or until labour is established

Before each dose of oral misoprostol, check for uterine contractions

Less than 3 painful contractions in 10 minutes

Continue with oral misoprostol

3 or more painful contractions in 10 minutes

Assess the cervix, perform CTG

Cervix <4 cm dilated

Cervix ≥4 cm dilated

Insert a drip and transfer the mother to labour ward

Multipara

Add 200 µg misoprostol to 200 mL water: give 10 mL 2-hrly orally for 3 doses, then 20 mL 2-hrly for 3 doses, then 40 mL 2-hrly for up to 24 hours, or until labour is established
**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 woman is pregnant and rhesus-negative, send blood for atypical antibody testing at 26, 32 and 36 weeks:

- If antibodies are found at a titre of <1:16, repeat the antibody test 4 weeks after the first test.
- If antibodies are found at a titre of ≥1:16, refer the mother to the Fetal Medicine Unit for further investigation (fetal middle cerebral artery Doppler; cordocentesis if necessary, and planned delivery).
- If no antibodies are found, give prophylactic anti-D 100 µg IM as follows:
  - 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
  - After abortion, miscarriage or ectopic pregnancy (give only 50 µg)

**Previous Caesarean Section**

Women with previous lower segment caesarean sections should have antenatal care at their local clinics, but should be seen at least once by a doctor at a hospital antenatal clinic. Here a delivery plan can be discussed with the mother and the gestational age can be confirmed, if necessary, by an ultrasound scan. Women with a previous caesarean section are at increased risk of uterine rupture during labour. Labour and delivery must be conducted in hospital.

**Indications for elective repeat caesarean section**

- A previous vertical uterine incision (classical and De Lee operations)
- Previous uterine rupture
- Two or more previous caesarean sections
- High risk of disproportion, e.g. large fetus, maternal short stature
- Where the mother requests an elective caesarean section
- Other obstetric problem, e.g. multiple pregnancy, breech presentation
MANAGEMENT OF SPONTANEOUS LABOUR (‘TRIAL OF SCAR’)

This is similar to normal labour with the following precautions:

- Run an intravenous drip with Ringer-Lactate solution at 120 mL/hour
- Insert an indwelling urinary catheter
- Monitor labour with continuous CTG
- Do 2 hourly cervical assessments
- Do not augment labour with oxytocin
- Strict adherence to correct partogram use
- Observe carefully for signs of imminent uterine rupture:
  - Fetal tachycardia or decelerations
  - Vaginal bleeding
  - Haematuria
  - Abdominal pain between contractions
  - Sudden cessation of contractions

Emergency caesarean section is recommended if:

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

POSTPARTUM OBSERVATIONS

Observe the mother closely during the fourth stage of labour, as the uterus may have ruptured during delivery. Routine palpation of the old uterine scar is not necessary. Signs of possible rupture, which should immediately be reported to a registrar, include:

- Rising heart rate
- A drop in blood pressure
- Lower abdominal pain
- Severe lower abdominal tenderness
- Postpartum haemorrhage
- Haematuria

If uterine rupture is suspected, arrange laparotomy to repair the uterus. Warn the mother that hysterectomy may be necessary to save her life.
**POOR OBSTETRIC HISTORY**

Thorough history taking is essential. Ideally, a special clinic should provide expert management of patients with recurrent problems in previous pregnancies.

**PREVIOUS UNEXPLAINED STILLBIRTH IN THE THIRD TRIMESTER**

- Do an ultrasound scan at the first antenatal visit – this should include nuchal translucency screening if possible, at 11-14 weeks
- Ask the mother to count fetal movements from 28 weeks (page 13-14)
- Measure a random blood glucose level at 28 weeks and if $\geq 8$ mmol/L, do a full oral GTT
- Review the mother weekly from 36 weeks
- Consider induction of labour at 38 weeks

**TWO OR MORE PREVIOUS SECOND TRIMESTER MISCARRIAGES**

- Take a careful history of each of the miscarriages:
  - What was the gestation?
  - Cervical incompetence? – rapid painless delivery of a live fetus after membrane rupture or delivered with intact membranes
  - Was a fetus seen, and was it alive at delivery?
  - Was it necessary to induce delivery, e.g. by oxytocin drip?
- On vaginal examination, feel for dilatation and length of the cervix
- Do an ultrasound scan at the first antenatal visit, including estimation of the cervical length by transvaginal scan. This may be repeated at 23 weeks if there is doubt about cervical incompetence
- Decide on the need for cervical cerclage, and type of cerclage
- If the cervix is closed and there is no indication for cerclage, no further specific management is required and the mother can continue antenatal care and deliver at her local clinic

**INDICATIONS FOR CERVICAL CERCLAGE**

- A history suggestive of cervical incompetence
- The cervical internal os admits one finger
- Three consecutive second trimester miscarriages (but not 3 macerated abortions)
- Short cervix on transvaginal ultrasound scan ($< 2.5$ cm) in a patient with a history of midtrimester losses or recurrent preterm labour
- Significant cervical shortening over 4 weeks on serial ultrasound scans
- Uterine anomalies

Cervical cerclage is usually performed from 14 to 24 weeks, but ‘rescue’ cerclage may be done in selected cases at 25-26 weeks
TWO OR MORE PREVIOUS UNEXPLAINED FETAL DEATHS

- The main concern is antiphospholipid syndrome (APS) or thrombophilia
- Using a plain (red-topped) tube, take blood for APS:
  - Antinuclear antibodies
  - Anticardiolipin antibodies – IgG, IgM, IgA
  - Beta2-glycoprotein1
- APS is treated with heparin 5 000 units SC twice daily or enoxaparin 40 mg SC daily, with aspirin 75 mg daily given from 6 weeks gestation up to term, with close surveillance of blood pressure, fetal growth and well-being
- Consider thrombotic screen, including Factor V Leiden, Protein C and Protein S (specialist clinic only) for APS-negative patients

WHEN TO TEST FOR ANTIPHOSPHOLIPID SYNDROME

- Two or more unexplained fetal deaths
- Previous fetal death associated with early onset pre-eclampsia
- Recurrent fetal growth restriction with or without hypertension
- One unexplained fetal death and a history of thromboembolism

PREVIOUS PRETERM DELIVERY

This refers to the delivery of a preterm baby that died or required special care, in the previous pregnancy

- Do an ultrasound scan at the first antenatal visit, including estimation of the cervical length on transvaginal scan
- 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
- Look for evidence of bacterial vaginosis or trichomoniasis and treat appropriately (metronidazole 2 g orally as a single dose)
- Consider prophylactic corticosteroids (betamethasone 12 mg IMI and repeated after 24 hours) at 26-27 weeks
- After 33 weeks, no further specific management is required and the mother can continue antenatal care and give birth at her local clinic
GENETIC DISORDERS AND BIRTH DEFECTS

The Fetal Medicine Unit

The unit offers routine scanning, as a baseline investigation, to all obstetric patients seen in the antenatal clinic, and to patients referred for specific problems.

THE ULTRASOUND SCAN AT 11 TO 14 WEEKS

Ideally, all pregnant women should have a scan at this gestation:

1. **To diagnose major fetal anomalies**
   In about 1% of pregnancies the fetus has a major abnormality that may be visible at the 11-14 week scan. These abnormalities may be incompatible with life or may be corrected by surgery before or after birth.

2. **To calculate the risk for chromosomal abnormalities**
   All women, whatever their age, have a chance of delivering a baby with chromosomal abnormalities, e.g. Down’s syndrome. The risk of a chromosomal abnormality is calculated from the maternal age (MA), the gestational age, the nuchal translucency (NT), and presence or absence of the nasal bone (NB). Assessment of (MA + NT + NB) gives a detection rate of 92%. Addition of serum PPAP-A and beta-hCG may improve the detection rate. Women with increased nuchal translucency are counseled for possible chorion villus sampling or amniocentesis.

3. **To date the pregnancy accurately**
   This is particularly relevant for women who cannot recall the dates of their last menstrual periods or who have irregular cycles. By measuring the fetal crown-rump length (CRL), the gestational age can be accurately calculated.

4. **To diagnose multiple pregnancy**
   Approximately 2% of natural conceptions and 10% of assisted conceptions result in multiple pregnancies. Early ultrasound scanning can determine chorionicity, and help plan future antenatal care.

5. **To diagnose early pregnancy failure**
   In about 3% of women an early pregnancy failure (missed abortion) can be identified.
THE ULTRASOUND SCAN AT 18-23 WEEKS

Irrespective of the outcome of the 11-14 week scan, another scan at about 20 weeks is recommended to identify structural abnormalities. This is particularly important in fetuses with increased nuchal translucency at the 11-14 weeks scan, because of the higher risk of cardiac abnormalities and rare genetic syndromes.

Down’s syndrome detection and screening from 15 to 23 weeks

1. Biochemical screening
Maternal serum levels of intact hCG, unconjugated estriol, and alphafetoprotein (triple test) and inhibin-A (quadruple test) may be measured to compute a Down’s syndrome risk at 16-18 weeks. Women with a ‘positive’ triple test are counseled for possible amniocentesis. The triple test is currently not done in public hospitals.

2. Ultrasound detection of ‘soft markers’
The presence of one or more of the following on ultrasound scan may provide evidence of a possibility of Down’s syndrome in that fetus: echogenic intracardiac focus, renal pyelectasis, short femur, short humerus, sandal gap, hypoplasia of the middle phalanx of the fifth finger, nuchal fold thickening. Women with fetuses showing these features may be counseled for possible amniocentesis.

3. Structural abnormalities or ‘hard markers’
Ultrasound scanning may demonstrate serious structural abnormalities which are frequently associated with Down’s syndrome (and other chromosomal abnormalities). These include duodenal atresia, omphalocele, cystic hygroma, hydrothorax, atrial septal defect, ventricular septal defect, and cerebral ventriculomegaly. Fetal karyotyping using amniocentesis or cordocentesis is recommended.

Pregnancies requiring referral to the Fetal Medicine Unit

The table shows categories of patients who may be referred to the Fetal Medicine Unit for genetic counseling, detailed ultrasound scanning, and invasive tests if required.

Referrals should be made as early as possible in the pregnancy, to allow time for counseling and decisions, and for early diagnosis of any disorders.
## Risk factors for genetic disorders and birth defects

<table>
<thead>
<tr>
<th>Women at risk</th>
<th>Tests</th>
</tr>
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<tbody>
<tr>
<td>Advanced maternal age (≥40 years)</td>
<td>Ultrasound</td>
</tr>
<tr>
<td></td>
<td>CVS</td>
</tr>
<tr>
<td></td>
<td>Amniocentesis</td>
</tr>
<tr>
<td>Three or more first trimester miscarriages</td>
<td>Parental blood</td>
</tr>
<tr>
<td></td>
<td>Ultrasound</td>
</tr>
<tr>
<td></td>
<td>Amniocentesis</td>
</tr>
<tr>
<td>Previous child with a genetic disorder/birth defect, or family members affected by a specific genetic disorder.</td>
<td>Ultrasound</td>
</tr>
<tr>
<td></td>
<td>CVS</td>
</tr>
<tr>
<td></td>
<td>Amniocentesis</td>
</tr>
<tr>
<td>Exposure to teratogen drugs or toxins during pregnancy, e.g. warfarin, retinoids, alcohol, antiepileptic drugs, lithium</td>
<td>Ultrasound</td>
</tr>
<tr>
<td>Maternal infection during pregnancy</td>
<td>Maternal blood</td>
</tr>
<tr>
<td></td>
<td>Ultrasound</td>
</tr>
<tr>
<td></td>
<td>Cordocentesis</td>
</tr>
<tr>
<td>Maternal illness e.g. pregestational diabetes mellitus, congenital heart condition</td>
<td>Ultrasound</td>
</tr>
<tr>
<td>Couples in consanguineous relationships and women from ethnic groups at high risk for specific recessive disorders, e.g. Ashkenazy Jews (Tay-Sachs), Greeks and Cypriots (thalassaemia) and Central Africans (sickle cell disease)</td>
<td>Parental blood</td>
</tr>
<tr>
<td></td>
<td>CVS</td>
</tr>
<tr>
<td></td>
<td>Amniocentesis</td>
</tr>
</tbody>
</table>

Amniocentesis is best performed at 15-23 weeks gestation, and chorion villus sampling at 11-14 weeks. Referrals to the Fetal Medicine Unit must be made at the appropriate gestational age.
POSTNATAL INVESTIGATION

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

History and basic external examination

- 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

- Always check or repeat syphilis serology (RPR)
- Take photographs and a full body x-ray (babygram)
- If the baby is alive, send blood for karyotyping
- If the baby is dead, send heparinised blood from the heart, or skin (full thickness, in sterile saline, submitted within 48 hours) for karyotyping

If possible, 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 (page 72).
## LIST OF WELL KNOWN TERATOGENS

### Maternal infections
- Syphilis
- Toxoplasmosis
- Rubella
- Cytomegalovirus
- Herpes simplex type 2
- Human parvovirus B19

### Maternal medical conditions
- Insulin dependent diabetes mellitus
- Epilepsy
- Hypothyroidism
- Hyperthyroidism
- Systemic lupus erythematosus
- Phenylketonuria

### Drugs/chemicals/radiation
- Ethyl alcohol
- Cocaine
- Warfarin
- Anticonvulsants: phenytoin, carbamazepine, valproic acid
- Antineoplastic drugs: methotrexate, cyclophosphamide, aminopterin
- Tetracycline
- Diethylstilbestrol
- Lithium
- Retinoids
- X-Ray radiation in large doses
- Heavy metals: mercury, lead
Chapter 5  Medical disorders

ANAEMIA

SCREENING FOR ANAEMIA

All pregnant women have a haemoglobin (Hb) measurement at the first antenatal visit. Anaemia is defined as Hb < 11 mg/dL, but is managed actively if Hb < 10 g/dL.

The majority of anaemic pregnant women in Johannesburg have iron deficiency anaemia, but some have severe conditions such as malaria or genetic disorders, e.g. sickle cell disease. Ethnic background and travel history should be considered.

MANAGEMENT OF ANAEMIA

1. **If Hb ≥ 10 g/dL:** Give elemental iron 60 mg orally daily, and repeat Hb at 28 and 36 weeks. If Hb is borderline (10-12 g/dL), give 60 mg twice daily from 30 weeks. Folic acid 5 mg should be added if not contained in the preparation used.

2. **If Hb is < 7 g/dL:** Start haematinics at full dose – give elemental iron 60mg* orally with vitamin C 100 mg orally 3 times daily, and folic acid 5 mg orally daily – and refer to Haematology Clinic.

3. **If Hb is 7-9.9 g/dL:** Management depends on gestational age:
   a. **Pregnancy ≥ 36 weeks:** Take blood for FBC and refer to Haematology Clinic. Prescribe full doses of haematinics at time of transfer.
   b. **Pregnancy 30-35 weeks:** Prescribe full doses of haematinics. Recheck Hb in 2 weeks. Hb should have improved by 1 g/dL. If inadequate improvement, take blood for FBC and refer to Haematology Clinic.
   c. **Pregnancy < 30 weeks:** Prescribe full doses of haematinics. Repeat Hb after 3 weeks: if Hb has not improved by 2 g/dL in 3 weeks, take blood for FBC and refer to Haematology Clinic. If Hb is improving, reassess after another 3 weeks.

In addition to the above, treat any underlying infection

Patients < 26 weeks pregnant will often be intolerant of iron. If intolerant, omit vitamin C, change to a coated tablet, or reduce the dose of iron tablets, e.g. break tablet in ½, or use children’s iron syrup. Refer any anaemic woman who cannot tolerate iron to Haematology Clinic.
Choice and dosage of iron

- Ferrous sulphate 200 mg, and ferrous fumarate 200 mg (Pregamal) both contain about 65 mg elemental iron. Pregamal also contains 100 µg folic acid. Labels on iron preparations usually indicate the amount of elemental iron per tablet or mL.

- Treatment may need to be individualized, but often depends on what is currently available at the hospital or clinic.

- More than 60 mg elemental iron is rarely tolerated as a single dose during pregnancy. Rather give a smaller dose more often.

Advice to anaemic mothers

- Encourage honesty about compliance or intolerance of medication.
- Encourage consumption of meat, particularly liver (iron) and fresh fruit (vitamin C).
- Discourage consumption of ash soil or clay blocks.
- Discourage excessive consumption of tea or coffee.
- Anticipate gastrointestinal side-effects with iron: advise on taking iron tablets during meals.

OBSTETRIC HAEMATOLOGY CLINIC

Ideally, patients with haematological disorders in pregnancy should be managed in a special clinic run jointly by an obstetrician and a haematologist.

Problems that should be referred

- Anaemic patients as described above and any patient with an Hb <10 g/dL and an MCV >100.
- Thrombocytopenia other than that caused by pre-eclampsia.
- Current or previous leukaemia or lymphoma.
- Patients who have recently received cancer chemotherapy.
- Other preexisting haematological disease.
MANAGEMENT

Iron deficiency anaemia

- Diagnosis is made by finding a low mean red cell volume (MCV) and a positive response to iron. Treatment is elemental iron 60 mg orally 3 times daily with vitamin C 100 mg orally 3 times daily and folic acid 5 mg orally daily
- Treat any existing infection
- Review at intervals according to gestational age, severity of anaemia, and obstetric risk status
- Do urgent FBC at each visit to assess response (note changes in MCV and RDW, reticulocyte parameters, as well as Hb)
- If response to treatment is satisfactory, refer back to local clinic or hospital antenatal clinic, depending on obstetric risk status
- Failure to respond to iron therapy requires further investigation and may necessitate the use of intravenous iron
- Blood transfusion is only indicated for cardiac failure or obstetric reasons.

Megaloblastic anaemia

- This is more commonly seen in mothers from rural areas
- Diagnosis is made by finding a high MCV with megaloblastic changes on peripheral blood smear
- Measure red cell folate and serum vitamin B₁₂ levels to find the cause
- Treatment is folic acid 5 mg orally daily and/or vitamin B₁₂ 1000 mg daily for 5 days, then weekly for 4 weeks, then monthly
- Do urgent FBC and reticulocyte count (reticulocyte production index) weekly to assess response
- If response to treatment is satisfactory, refer back to local clinic or hospital antenatal clinic, depending on obstetric risk status
- Failure to respond requires investigation with bone marrow aspiration and/or trephine biopsy

LABOUR AND DELIVERY OF ANAEMIC PATIENTS

Measure Hb on admission, unless a very recent result (<1 week) is available

- If Hb ≥10 g/dL, no special measures need to be taken
- If Hb is 8.0-9.9 g/dL, keep 5 mL clotted blood in a tube for rapid cross-match if necessary.
- If Hb <8.0 g/dL, transfuse sufficient blood (1 unit per g/dL) to achieve an Hb of at least 8.5 g/dL, and ask the blood bank to cross-match and hold another 2 units of blood until after delivery
- The amount of blood transfused depends not only on the Hb level, but on the obstetric risk factors for haemorrhage
POSTPARTUM CARE

- Use oral iron wherever possible to manage postpartum anaemia. Should blood transfusion be considered, always start with only one unit of blood and reassess the response of the symptoms. On discharge, refer any anaemic patient and those who are transfused to a clinic for follow up of the anaemia.
- Discharge the patient on appropriate haematinics.
- Current patients of Haematology Clinic must be referred back on the first Thursday following delivery.
- All other patients on therapy should continue with appropriate treatment for about 6 months. Iron and folic acid can be prescribed on discharge and a note written to the patient’s local clinic.
- Transfusion is not indicated on the basis of an Hb result alone.

BLOOD TRANSFUSION

Packed cells are normally used. Transfusion volume should be just enough to reverse symptoms or reach a satisfactory level for delivery or operation. One unit may be sufficient. Reassess the clinical findings and blood requirements before giving multiple transfusions.

No patient with anaemia should be transfused without first doing an FBC and differential count to assess the red cell morphology. Uninvestigated anaemia requiring transfusion - and not as a result of an acute bleed, should in addition have blood taken for B12, red cell folate, and iron studies prior to transfusion.

If giving 2 or more units in normovolaemic patients, give 20 units furosemide IV with each unit of blood.

Indications for blood transfusion in obstetrics are:

- Anaemia with cardiac failure
- Severe symptoms of anaemia - these can be confused with vasovagal symptoms, or tiredness post partum
- Anaemic mothers before delivery or caesarean section (Hb <8 g/dL)
- Anaemic mothers at high risk of haemorrhage e.g. with placenta praevia
- Acute severe haemorrhage
- Anaemic patients who need to undergo an immediate general anaesthetic.
- Anaemic patients with severe sepsis
- Obtain specialist advice before transfusing patients with chronic haemolytic anaemias e.g. sickle cell anaemia – they may need exchange transfusion.

Transfuse a patient and not a haemoglobin result.
DIABETES MELLITUS

Obstetric diabetic clinic

Pregnant diabetic patients should ideally be managed by a combined clinic run by an obstetrician, physician, nurse and dietician

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. Pregestational optimization of blood glucose control is the ideal.

First assessment

- Initial admission is not always required if blood glucose control is good
- Take FBC, U&E; HbA1C (<7% = good, 7-10 = average, >10 = poor control)
- Take urine for microalbumin:creatinine ratio
- Take mid-stream urine for MC&S
- Order baseline ultrasound scan
- Do fundoscopy and refer patients with proliferative retinopathy to an ophthalmologist
- Convert all insulin dependent diabetics from Actraphane and other insulin combinations to equivalent dosages in one of the following regimens:
  - Twice daily combined intermediate and short acting insulin (Humulin N and R)
  - Three times daily short acting insulin and a night time dose of intermediate acting insulin
- Convert all non-insulin dependent diabetics from oral hypoglycaemic tablets to combined twice daily Humulin N and R.

Hospital admission

- Admit to hospital
- Give 1800 kcal diabetic diet
- Perform six-point profiles (fingerprick blood glucose half an hour before, and 1 hour after breakfast, lunch and supper)
- Using standard insulin regimen as described above, aim for postprandial blood glucose levels below 7 mmol/L.
- If on a twice daily regimen, add a midday dose if the total daily insulin requirement exceeds 120 units/day, or if control is difficult during the day
- Teach the patient to measure her own blood glucose and inject herself with insulin, and to understand recognition and treatment of hypoglycaemia.
- Discharge the mother once good control is achieved
Continuing antenatal care

- Regular attendance at Diabetic Clinic
- Outpatient blood glucose measurements are recorded by the patient on a daily 6-point basis (before and after breakfast, lunch and supper)
- Attendance is 2-weekly to 31 weeks, then weekly until admission at 37 weeks
- Follow up ultrasound scans for growth or macrosomia may be done at 28 and 34 weeks
- Do NST weekly from 31 weeks
- Admit to hospital at 37 weeks, with 6-point profiles and NSTs on alternate days

Labour and delivery

- Aim for induction from 37 weeks if there are no complications
- Preterm induction may require prophylactic betamethasone 12 mg IMI daily for two doses, with a supplemental insulin sliding scale
- Caesarean section should be done for obstetric indications only
- Elective caesarean section should be done as early as possible in the day
- Standard methods of induction are used (page 31, 87-89)
- Give only the Humulin N dose on the morning of planned delivery
- Transfer to a high care area
- Keep *nil per os*
- Measure hourly fingerprick blood glucose levels
- Run 5% dextrose-saline 1 L with 20 mmol of potassium chloride at 125 mL per hour with insulin according the fingerprick blood glucose level:
  - <4 mmol/L: no insulin
  - 4-8 mmol/L: 8 units insulin in 1 L
  - >8 mmol/L: 16 units insulin in 1 L
- Give oxytocin, if needed, through a separate 200 mL infusion bag (page 31)
- Monitor fetus with continuous CTG

Postpartum care

- After caesarean section, give 5% dextrose-saline with 20 mmol of potassium chloride – 3 litres in first 24 hours
- Measure 4 hourly fingerprick blood glucose
- Give a 4 hourly sliding scale of subcutaneous Humulin R based on blood glucose level...
Blood glucose level (mmol/L) | Humulin R dose (units) SC
--- | ---
0-4.4 | 0
4.5-6.7 | 2
6.8-8.9 | 4
9.0-11.0 | 6
11.1-16.7 | 8
16.7 | 10 and call doctor

- Re-introduce pre-pregnancy insulin or oral hypoglycaemic drugs cautiously as appetite may be poor and insulin requirements may be low in the first days after delivery
- Discharge the mother to be followed up at her normal diabetic care provider, with a discharge summary
- Breastfeeding mothers may need less insulin or a increased dietary intake
- For contraception, tubal ligation, progestogens, low-dose combined contraceptives and intrauterine devices are acceptable.

**Diabetic ketoacidosis in pregnancy**

**Diagnosis**

- Clinical features include polyuria, polydipsia, abdominal pain, weakness, vomiting, hyperventilation, dehydration, tachycardia, hypotension, disorientation, and coma
- Tests reveal blood glucose $\geq 17$ mmol/L, glycosuria and ketonuria, arterial blood pH $< 7.3$, serum bicarbonate $< 15$ mmol/L, base excess $<-7$, and raised serum urea

**General measures**

- Admit the mother to a high care area
- Nurse in left lateral position
- Monitor fetal heart rate by CTG
- Insert a large bore (16G) intravenous cannula
- Take blood for glucose, ketones, FBC, U&E, culture, and arterial blood gas. Repeat blood glucose and U&E hourly at first, and venous blood gas 2 hourly
- Insert an indwelling urinary catheter
- Send a catheter specimen of urine for MC&S
- Use CVP and peripheral arterial lines only for severe acidosis or hypotension
- Search for predisposing factors and sites of infection
- Record all findings on an ICU chart
- Do not hesitate to consult a physician or medical registrar for advice
Specific measures

1. Fluids

- Give normal saline 1 litre for the first hour. For hyperosmolar nonketotic coma use normal saline 1 litre followed by half-normal saline
- Rehydrate at 1 litre/hour (6-12 L in 12-24 hours) depending on clinical response. Add potassium as described below
- Decrease infusion rate to 150 mL/hour once response is satisfactory and blood glucose is <11 mmol/L, and change to 5% dextrose in water
- Patients in hypovolaemic shock after the first litre of fluid should receive colloid infusion

2. Insulin – use low dose Humulin R

- Start insulin only when serum potassium is known to be normal or elevated
- Give 10 units IV followed by a continuous infusion at 5-10 units/hour, or hourly boluses of 10 units IV
- If fall in blood glucose is <4 mmol/hour, double the insulin dose
- Change to subcutaneous sliding scale insulin when the base excess is greater than -7.
- Wherever possible, use IV insulin for no more than 12-24 hours
- Once the patient is fully alert and co-operative, commence twice daily insulin using combined Humulin N and R

3. Potassium

- Withhold potassium initially if ECG and/or U&E show hyperkalaemia
- Once rehydration has commenced and urine output is satisfactory, replace potassium according to serum levels:

<table>
<thead>
<tr>
<th>Potassium level (mmol/L)</th>
<th>Concentration (mmol/L IV fluid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤3.0</td>
<td>40</td>
</tr>
<tr>
<td>3.1-4.0</td>
<td>30</td>
</tr>
<tr>
<td>4.1-5.0</td>
<td>20</td>
</tr>
<tr>
<td>5.1-6.0</td>
<td>10</td>
</tr>
<tr>
<td>≥6.0</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Sodium bicarbonate

- Only give sodium bicarbonate if pH <7.0 and serum potassium >4.0 mmol/L
- Give 50-100 mL 8.5% slowly in the first hour
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

Screening is based on history taking at antenatal clinic and the presence of glycosuria at antenatal clinic visits. Random blood glucose testing may be done if there is strong suspicion of diabetes. A random blood glucose level $\geq 11 \text{ mmol/L}$ is diagnostic. Consider glucose tolerance testing (GTT) for women with the following:

- Glycosuria on two antenatal clinic visits
- Random blood glucose $\geq 8$, but $<11 \text{ mmol/L}$
- A previous unexplained third-trimester stillbirth
- A previous baby weighing more than 4 kg at birth
- A first degree relative with diabetes mellitus
- Previous gestational diabetes
- Polyhydramnios with or without congenital abnormalities
- Recurrent infections, e.g. urinary tract, vaginal thrush

Glucose tolerance testing

Blood glucose levels in gestational diabetics may only become abnormal in the third trimester, so a GTT may delayed to 28 weeks for some women, or repeated at 28 weeks if an earlier GTT was negative.

Perform a GTT using 100 g glucose given orally after an overnight fast. Blood is taken just before ingestion, and again at 1, 2 and 3 hours afterwards (total 4 specimens). The upper levels of normal are:

- **Fasting:** 5.8 mmol/L
- **1 hour:** 10.6 mmol/L
- **2 hours:** 9.2 mmol/L
- **3 hours:** 8.1 mmol/L

If any two of these specimens are above these levels, the patient is defined as having diabetes mellitus and should be admitted to hospital for observation and control of blood glucose.
Management of gestational diabetes mellitus

Management is the same as for pregestational diabetes mellitus except:

- Ophthalmologic examination is usually not required
- Some women can be successfully treated with diabetic diet alone
- Insulin is usually stopped after delivery
- A 75 mg oral glucose tolerance test is done 6 weeks after delivery

**THYROID DISEASE**

Most pregnant women with thyroid disease are already on treatment when they present for antenatal care. Women with recent onset of goitre, thyroid nodule, or with clinical evidence of thyroid dysfunction require investigation in consultation with endocrine physicians. Pregnant women with thyroid disease are best managed in a combined obstetric/endocrine clinic

**Hyperthyroidism**

- Most patients suffer from autoimmune Graves’ disease
- Antithyroid drugs (carbimazole) are effective in controlling hyperthyroidism
- Monitor thyroid functions regularly throughout the pregnancy
- Ensure that the maternal haemoglobin is ≥11 g/dL
- Follow the fetus with ultrasound scans to detect goiter or growth restriction
- Mode of delivery should be dictated by obstetric considerations
- Inform the anaesthetists of a planned caesarean section
- Inform the paediatricians that the mother is hyperthyroid
- Beware of postnatal exacerbations of hyperthyroidism
- The most serious maternal complications are thyroid storm and heart failure

**Hypothyroidism**

- Most patients have had thyroid gland destruction caused by autoimmune disease (Hashimoto’s thyroiditis), surgery or radiation
- Thyroid hormone replacement is effective and safe in pregnancy
- Expect normal pregnancy and delivery in well controlled patients
- Beware of postnatal exacerbations of hypothyroidism
- The most serious maternal complication is myxoedema coma
CARDIAC DISEASE

At the first antenatal visit, all women are asked about the presence of cardiac disease, and undergo a clinical examination of the cardiovascular system. Auscultation of the heart is routinely done where possible.

Symptoms and signs of cardiac disease include:

- Shortness of breath with mild effort
- Shortness of breath when lying flat
- Haemoptysis
- Palpitations
- Chest pain
- Dizziness
- Rapid (≥100/min) or irregular heart rate
- Heart murmurs

ANTENATAL CARE

All women with a history, or with symptoms and signs of heart disease, should ideally be referred to an obstetric cardiac clinic, run jointly by an obstetrician and a cardiologist.

Principles of antenatal care

- All pregnant cardiac patients should have an echocardiogram and ECG
- A New York Heart Association (NYHA) grading is assigned to each patient (I = no symptoms, II = symptoms with moderate exertion, III = symptoms with mild exertion, IV = symptoms at rest)
- Termination of pregnancy may be recommended for patients with severe cardiac disease early in pregnancy
- Women with congenital heart disease require detailed ultrasound scanning at Fetal Anomaly Clinic to identify fetal heart defects
- Infection, anaemia and arrhythmias must be prevented or identified
- Diuretics, digoxin, beta-blockers or antiarrhythmics are given if required
- Anticoagulation, if needed, is given as described below
- Induction of labour or elective caesarean section are usually recommended only for obstetric indications
LABOUR

First stage

- Admit to a high care area
- Nurse the mother in a semi-Fowler position
- Restrict intravenous fluids - Ringer-Lactate or Normal Saline 70 mL/hour
- Give adequate analgesia – pethidine 100 mg IM with hydroxyzine 100 mg IM. Epidural analgesia is useful for cardiac patients without fixed output states
- 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, heart rate, blood pressure and respiratory rate hourly
- Auscultate the lung bases 2 hourly
- If augmentation of labour is necessary, give oxytocin in a 200 mL infusion bag (page 31)

Second and third stages

- 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 or forceps delivery for NYHA grade III and IV unless delivery is very 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

- Observe closely for evidence of pulmonary oedema
- Do hourly observations of general condition, respiratory rate, heart rate and blood for 24 hours
- When stable, transfer to the postnatal ward
- Breast-feeding is encouraged if the mother can cope
- 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 a letter to her doctor or cardiac clinic
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 and pulse oximeter if available
- Seek advice from a medical registrar or anaesthetist if there is no rapid response to the above measures

ANTICOAGULATION

Indications for full anticoagulation

- Prosthetic heart valve (except porcine xenograft)
- Atrial fibrillation
- Tight mitral stenosis (<1 cm²)
- Dilated cardiomyopathy
- Primary pulmonary hypertension
- Known thrombophilies
- Thromboembolism during the pregnancy
- History of two or more previous episodes of thromboembolism

Full anticoagulation in pregnancy

- 4-13 weeks: heparin ±10 000 units 8 hourly SC
- 14-36 weeks: warfarin 2.5-10 mg daily orally
- 37-42 weeks: heparin ±10 000 units 8 hourly SC

Alternative full anticoagulation regimen

This is preferred for women with venous thromboembolism, and may, in consultation with cardiologists, be considered for women with cardiac problems or prosthetic valves.

- Enoxaparin 1 mg/kg 12 hourly SC
- Keep anti-factor Xa levels at 1.0 to 1.2 U/mL (3 hours after injection)

Management of anticoagulated mothers

- Order a second trimester ultrasound scan (22-24 weeks) to exclude fetal abnormality
- If on warfarin, admit to hospital at 36 weeks for changing of anticoagulation to heparin...
• For patients on warfarin, ensure INR of 2.0-2.5. For patients on heparin, monitor PTT daily at 12:00, and adjust to 2.0-2.5 times control. Blood for PTT must be taken at the same interval of time from the last dose of heparin, halfway between doses
• If on heparin or enoxaparin at term, discontinue these agents 24 hours before starting induction of labour or doing elective caesarean section
• Do not give heparin during labour, unless specifically requested by a consultant or cardiologist
• Epidural and spinal anaesthesia are contraindicated
• Avoid cuts and tears at delivery if possible
• Ensure adequate haemostasis during perineal suturing or at caesarean section
• Women fully anticoagulated on warfarin who present in labour may need caesarean section to protect the baby against intracranial bleeding. Give 2 units of fresh frozen plasma to prevent intraoperative bleeding
• Restart pre-pregnancy warfarin on the first postnatal day but continue SC heparin until INR is 2.0 to 2.5, then discharge with follow up arrangements

Antidotes to anticoagulants

• **Warfarin**: for immediate effect use fresh frozen plasma 1-2 units, then anticoagulate with heparin as soon as bleeding is controlled. Vitamin K 5 mg IV takes effect in 6-12 hours

• **Heparin**: protamine sulphate: give 1 mg for each 50 units of the hourly dose of continuously administered heparin or 1 mg for each 100 units of the last intermittent dose of heparin. Dilute in 20 mL saline and inject IV over 5 minutes

**THROMBOEMBOLIC DISEASE**

One previous deep vein thrombosis (DVT) or pulmonary embolism (PE)

• Give heparin 5000 units SC twice daily (or enoxaparin 40 mg SC daily) up to delivery, and warfarin postpartum for 4 weeks. Adjust warfarin to an INR of 2.0 to 2.5
• Prescribe graduated elastic compression stockings

Two previous episodes of DVT or PE

• Consult with a haematologist, for thrombophilia screening (antithrombin III, protein C, protein S, antiphospholipid screening)
• Prescribe full anticoagulation with enoxaparin or heparin and warfarin as shown above
• Prescribe graduated elastic compression stockings
DVT or PE in the current pregnancy

- Treat suspected PE with heparin 10,000 units IV stat followed by infusion of 1,000 units hourly for 5 days. Order a spiral CT scan or VQ/perfusion scan to confirm PE. After 5 days, continue full anticoagulation as above. Continue warfarin for 6 weeks postpartum. Acutely ill patients should be managed in a high care area, with support and advice from physicians.

- Confirm suspected DVT by iliofemoral/popliteal ultrasound and Doppler, then start full anticoagulation as above. Continue warfarin for 6 weeks postpartum.

- Prescribe graduated elastic compression stockings.

ASTHMA

ANTENATAL CARE

The management of asthma in pregnancy does not differ from that of nonpregnant women. Treatment must be optimised to prevent attacks, which may cause fetal hypoxia and intrauterine death. Use peak flow meters wherever possible to monitor response to drug therapy.

- Patients with infrequent attacks and who do not use inhaled steroids can be managed at their local clinics.
- Frequency of antenatal visits is the same as for uncomplicated pregnancies.
- Difficult patients may be referred to physicians for advice.

LABOUR AND POSTPARTUM CARE

- Give hydrocortisone 100 mg IV 6 hourly for 4 doses to all mothers who have used systemic steroids during pregnancy.
- Use prostaglandins, nonsteroidal anti-inflammatories, pethidine and ergometrine with caution. β-blockers are absolutely contraindicated.
- Asthma attacks in labour require admission, continuous oxygen, and aggressive management (below).

CHRONIC PERSISTENT ASTHMA

Step therapy is recommended, increasing according to severity. Prescribe inhaled steroids for mothers who need a bronchodilator inhaler at least once a day. Use peak flow meters to monitor response in patients who are wheezing.
Step therapy of chronic persistent asthma

<table>
<thead>
<tr>
<th>Step</th>
<th>Drug</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inhaled salbutamol as necessary</td>
<td>Ensure the recommended maximum dosage in the package insert is not exceeded</td>
</tr>
<tr>
<td>2</td>
<td>Add inhaled beclomethasone</td>
<td>One puff = 50 µg. Prescribe 2 puffs 2 to 4 times daily</td>
</tr>
<tr>
<td>3</td>
<td>Add oral slow-release theophylline</td>
<td>Usual dose is 10 mg/kg daily. This step may be omitted</td>
</tr>
<tr>
<td>4</td>
<td>Give oral prednisone in place of inhaled beclomethasone</td>
<td>Short course of up to 40 mg/day, tapering to 5 mg daily then on alternate days.</td>
</tr>
</tbody>
</table>

MANAGEMENT OF AN ACUTE ASTHMATIC ATTACK

- Admit to High Care Area
- Nurse in Fowler’s position
- Give mask oxygen to keep oxygen saturation >90%
- Use a peak flow meter to monitor response
- Adjust chronic medication as above to maintain control
- Consult with physicians if management is not successful

Drugs used in the management of an acute asthmatic attack

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salbutamol or fenoterol nebulisation (always)</td>
<td>1 mL in 4 mL saline every 20 minutes for 1 hour until response is satisfactory</td>
</tr>
<tr>
<td>Ipratropium nebulisation (recommended)</td>
<td>0.5 mg 4 hourly with salbutamol or fenoterol in the nebuliser solution</td>
</tr>
<tr>
<td>IV hydrocortisone (recommended)</td>
<td>200 mg 4-6 hourly until response is satisfactory, followed with oral prednisone as above</td>
</tr>
<tr>
<td>IV theophylline (not a first choice)</td>
<td>6 mg/kg over 30 minutes. Average maintenance dose is 0.6 mg/kg/hour. Beware arrhythmias or convulsions</td>
</tr>
</tbody>
</table>
JAUNDICE

CAUSES OF JAUNDICE IN PREGNANT WOMEN

Pregnancy related

- Severe pre-eclampsia or HELLP syndrome
- Acute fatty liver of pregnancy
- Severe hyperemesis gravidarum
- Intrahepatic cholestasis of pregnancy
- Severe sepsis

Unrelated to pregnancy

- Acute viral hepatitis
- Drug induced jaundice
- Haemolysis including malaria
- Other causes e.g. chronic liver disease or enzyme defects

MANAGEMENT

Making a diagnosis

- Ask about onset, duration, and associated symptoms e.g. pruritus, pain, vomiting, headache etc.
- Determine the colour of the stools and urine
- Ask about travel history if there is fever, anaemia or thrombocytopenia
- Find out what medications have recently been taken
- Look for fever, anaemia, hypertension, hepatosplenomegaly
- Test the urine for protein, ketones, urobilinogen and bilirubin
- Take blood for FBC (and malaria), U&E, INR, LFT, glucose and hepatitis studies

Treatment

1. Determine the cause of the jaundice and treat accordingly
2. Discuss management with a senior registrar or consultant
3. Call a medical registrar for assistance with causes of jaundice unrelated to pregnancy
4. Patients with acute fatty liver and pre-eclampsia/HELLP syndrome require delivery (page 63)
EPILEPSY

Epileptic management is best achieved in a dedicated obstetric epileptic clinic

KNOWN EPILEPTICS

These women are already on treatment. Those who have been off treatment and fit-free for over 2 years need not be on medication. Management is as follows:

• Do a second trimester ultrasound to exclude fetal abnormalities
• The drug of choice is carbamazepine, usually at 200 mg 3 times daily orally
• Monitor carbamazepine blood levels in poorly controlled epileptics. The therapeutic range is 8-12 µg/mL
• Use monotherapy wherever possible
• Do not change non-carbamazepine treatment (e.g. phenytoin) if it is effective
• Give folic acid 5 mg orally daily throughout the pregnancy
• Give vitamin K 20 mg orally daily from 36 weeks
• If convulsions occur in a compliant patient, increase the evening dose of carbamazepine to 400 mg and add phenobarbitone 30-60 mg or clonazepam 0.5 mg orally as evening doses if necessary.
• Obstetric care is the same as for non-epileptic women
• Do not omit doses of anti-epileptic drugs, even during labour
• At delivery, inform the paediatric doctors that the mother is epileptic
• Breastfeeding is safe with the anticonvulsants mentioned
• After delivery, readjust treatment to pre-pregnancy doses

Convulsions occurring for the first time in pregnancy

• Exclude eclampsia as a cause
• Admit to hospital
• Consult a physician or neurologist
• Do Skull x-ray, and take blood for FBC, U&E, calcium/magnesium/phosphate, antinuclear factor, anticardiolipin antibody, lupus anticoagulant, cysticercosis ELISA, syphilis serology and HIV before referral
• EEG and brain CT scan may be ordered by the neurologist

Stepwise management of status epilepticus

Step 1. Give diazepam 10 mg IV
Step 2. Except in the first trimester, give phenytoin 15 mg/kg (±1000 mg) IV infusion in 200 mL normal saline over 30 minutes
Step 3. Add diazepam infusion 20 mg in 200 mL normal saline to run over 3 hours
Step 4. Add clonazepam 2 mg IV stat then 1 mg 8 hourly IV
Step 5. Consider paralysis and ventilation
Chapter 6  Infectious conditions

SEXUALLY TRANSMITTED INFECTIONS

ABNORMAL VAGINAL DISCHARGE

Wherever possible, perform a vaginal speculum examination to observe the discharge and inspect the cervix. If no speculum is available, simple digital vaginal examination can be done.

- If vaginal candidiasis (thrush) is observed, give clotrimazole single-dose pessary 500 mg to be inserted in the vagina that evening. Advise the patient to avoid washing with soap or antiseptics.

- If a nonspecific yellow/green or offensive discharge is observed, 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.

- If a mucopurulent discharge from the cervical os is observed, add ceftriaxone 250 mg IM (or spectinomycin 2 g IM) as a single dose, with erythromycin 500 mg orally 4 times daily for 7 days. Do not use ciprofloxacin or doxycycline.

If no speculum is available, 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

- Give benzathine penicillin 2.4 million units IM as a single dose (for syphilis) and erythromycin 500 mg orally 3 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.

- Check or repeat RPR (if negative).

- Encourage the patient to send her partner for examination and treatment.

- Follow up in 1-2 weeks to assess response.

- Large extremely tender and persistent ulcers, particularly in the immune compromised, may be caused by genital herpes. Treat secondary infection, as above, and use local acyclovir.

- Further details on syphilis treatment are given on page 118.
GENITAL WARTS

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

- Do not attempt to treat the warts
- Podophyllin is contraindicated in pregnancy
- Metronidazole 400 mg orally 3 times daily may be useful for large foul-smelling and infected warts
- Reassure the mother that the warts may resolve after the pregnancy and can be treated then if necessary
- Consider elective caesarean section when warts are so large as to obstruct vaginal delivery

SYPHILIS AND POSITIVE RPR TESTS

- Treat all women with positive RPR, irrespective of titre values
- Do not do specific treponemal tests (FTA-ABS, TPHA) unless there is a strong suspicion of a false positive RPR and follow up is guaranteed
- Give benzathine penicillin 2.4 million units IM once weekly for 3 doses
- Repeat RPR 6-8 weeks after the last dose of penicillin to exclude reinfection. Retreatment is only necessary if the titre has increased. Give one injection only.
- Give erythromycin 500 mg 4 times daily for 14 days to women who are allergic to penicillin. Penicillin desensitisation is recommended if the RPR titre is ≥1:16. If erythromycin is used, the baby should be treated with penicillin after delivery
- Notify partner to go for examination and treatment

**Penicillin desensitization**

This is done for pregnant women who are allergic to penicillin and who have a high RPR titre (≥1:16). This is necessary because oral erythromycin may not transfer adequately to the fetus.

Penicillin desensitisation takes about 4 hours, and is followed by close observation until the following day. Oral penicillin V is used, with a starting dose of 100 units, doubling every 15 minutes. The benzathine penicillin injection is given 30 minutes after the last oral dose.

Second and third doses are given at weekly intervals one hour after a 400 000 unit dose of oral penicillin V, with similar precautions as described below.
Oral desensitization regimen

<table>
<thead>
<tr>
<th>Dose</th>
<th>Penicillin V (units/mL)</th>
<th>Amount (mL)</th>
<th>Units</th>
<th>Cumulative dose (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>0.1</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>5</td>
<td>1000</td>
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<td>1600</td>
<td>3100</td>
</tr>
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<td>6</td>
<td>1000</td>
<td>3.2</td>
<td>3200</td>
<td>6300</td>
</tr>
<tr>
<td>7</td>
<td>1000</td>
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Precautions with desensitization

- Admit to a high care area
- Informed consent
- Intravenous line
- Hourly BP
- Half-hourly heart and respiratory rate
- 4 hourly temperature
- Treat mild allergic reactions with promethazine 25 mg IV, and continue with the regimen

HIV AND AIDS

Infection with human immunodeficiency virus (HIV) is associated with an increased risk of opportunistic infections, and transmission from mother to newborn.

All women who book for antenatal care should be offered HIV testing, according to the principles of voluntary counseling and testing (VCT). Rapid tests are used. A positive test is repeated using another test kit.
Counselling a pregnant woman about being HIV positive

This should be done by trained counselors.

1. Establish what she knows about HIV
2. Give information on how the virus is transmitted
3. Discuss the symptoms, signs and progression of the disease
4. Explain the importance of CD4 count monitoring
5. Discuss the effect of pregnancy on HIV infection
6. Explain the risk of mother-to-child transmission of HIV and how this may be reduced: elective caesarean section, infant feeding choice and use of antiretroviral drugs
7. Discuss termination of pregnancy with a woman less than 20 weeks pregnant
8. Discuss who the woman may want to tell about the result
9. Discuss condom use to prevent transmission to and from her partner
10. Discuss future fertility plans and offer post-pregnancy sterilisation

Antenatal care

Antenatal care can be conducted at the woman’s local clinic. HIV seropositivity on its own is not a reason for referral for hospital antenatal care and delivery.

- Ask for symptoms of weight loss, cough, diarrhoea or other chronic illness
- Perform a general physical examination, looking for evidence of opportunistic infections: oral candidiasis, herpes zoster, tuberculosis and enlarged lymph nodes. Refer women with evidence of such infections to a doctor experienced in the management of these conditions
- Look for any evidence of sexually transmitted infections and treat appropriately
- Avoid procedures such as amniocentesis or external version
- Consider elective caesarean section for women who are likely to require an emergency caesarean section in labour, e.g. multiple pregnancy or a previous caesarean section
- Elective caesarean section for HIV seropositivity alone is not done in public hospitals

Obstetric antiretroviral (ARV) clinic.

Any patient who qualifies for obstetric care at the hospital antenatal clinic, must have HIV and CD4 results checked. Refer all patients with a CD4 count <200/mm$^3$, or with an AIDS-defining condition, to the ARV clinic. If appropriate, these patients will be started on highly active antiretroviral therapy (HAART).
Patients on HAART

The ARV clinic will supervise HAART. First-line drugs used are stavudine (d4T), lamivudine (3TC) and nevirapine. Second line drugs are zidovudine (AZT), didanosine (ddI), efavirenz and Kaletra (lopinovir/ritonavir). The clinic will monitor patients for serious side effects. These are liver dysfunction, rashes, pancreatitis and lactic acidosis.

- Patients who have started on HAART elsewhere do not need to attend at the hospital obstetric ARV clinic, unless they have obstetric problems that require ongoing hospital care, e.g. twin pregnancy, hypertension etc.
- Any patient who has had efavirenz during early pregnancy should be referred to the Fetal Medicine Unit for a detailed ultrasound scan.
- ARVs should not be discontinued during labour or after delivery
- Single-dose nevirapine need not be taken by the mother or given to the baby
- After delivery, ARVs are continued at the patient’s local ARV clinic

Labour and delivery

Labour is generally managed in the same way as for women who are HIV-negative. The main concern is to reduce the risk of mother-to-child transmission:

- Keep the membranes intact for as long as possible.
- Avoid using penetrating fetal scalp electrodes for heart rate monitoring
- Avoid episiotomy wherever possible
- For instrumental vaginal delivery, forceps is the preferred method
- At caesarean section, attempt to deliver the baby without it touching any of the mother’s blood. This can be done by delivering the baby inside the membranes as far as possible, using rinsed gloves and clean drapes and swabs
- Avoid routine suctioning of the baby’s mouth and airways
- Give nevirapine 200 mg orally to the mother at the onset of labour, and 2 mg/kg orally to the baby after delivery, for women not on HAART

Postpartum care

- Give normal postpartum care, irrespective of mode of delivery
- There is no special ward for postnatal care of HIV positive patients
- Inform the mother about handling and disposal of soiled pads and linen
- Treat infections promptly and aggressively
- Give appropriate contraceptive advice and discuss sterilisation
- Give information about advantages and disadvantages of breast and formula feeding
- Discourage mixed breast and formula feeding
- If breastfeeding is chosen, encourage early weaning (at 3 months)
Women with AIDS

The following problems may be expected:

- Complications of opportunistic infections, e.g. meningitis, pneumonia, diarrhoea
- Severe puerperal sepsis
- Spontaneous preterm labour with or without chorioamnionitis
- The need for preterm elective delivery in a terminally ill mother
- Rapid deterioration and death after delivery
- Possible need for disclosure of the illness to the relatives

Treatment is individualized according to each patient’s specific disease profile and family circumstances, in consultation with physicians and infectious disease or AIDS specialists.

**GROUP B STREPTOCOCCAL INFECTION**

Group B Streptococcus (GBS; *S. agalactiae*) colonises up to 30% of pregnant women, and causes early onset life-threatening infection in 0.2% of newborns. Maternal puerperal sepsis may also occur. Routine culture of the maternal rectum and vagina at 35-37 weeks is not practiced in public hospitals.

**Risk factors for neonatal early-onset Group B Streptococcal infection**

- Spontaneous preterm labour (<37 weeks)
- In labour, with membranes ruptured ≥18 hours
- Intrapartum pyrexia ≥38 degrees C
- A previously affected baby with neonatal early onset GBS infection
- Urine, vaginal or rectal cultures positive for GBS

Women with these risk factors must be treated during labour with ampicillin 2 g IV as a single dose, followed by 1 g IV 4 hourly up to delivery. Penicillin-allergic women may receive intravenous erythromycin or vancomycin.
URINARY TRACT INFECTION

CYSTITIS AND ASYMPTOMATIC BACTERIURIA

Cystitis presents with severe urinary discomfort and/or frequency. There may be some lower abdominal tenderness. The patient usually has no fever and does not appear ill, but may be very distressed. Urine dipstick testing may show leukocytes, nitrites and protein. Urine culture may identify the offending organism.

Asymptomatic bacteriuria is defined as a positive bacterial culture of a single organism with 100 000 colonies/mL in an asymptomatic woman. The prevalence is about 5-10% in pregnancy, and the condition is associated with a 40% probability of developing symptomatic urinary tract infection later in the pregnancy.

Management

• Send a midstream urine specimen for MC&S
• With severe symptoms, give cephalexin 500 mg orally 4 times daily or co-amoxiclav (Augmentin) 375 mg orally 3 times daily for 3 days while awaiting results. If symptoms are not severe or there are no symptoms, ampicillin 3 g orally, or cotrimoxazole 4 tablets orally, as single doses, may be given while awaiting results
• Encourage a high oral fluid intake
• A positive culture will indicate whether further treatment is needed and which antibiotics will be effective
• Consider follow-up urine culture after treatment, especially in women with asymptomatic bacteriuria

Taking a midstream urine specimen

Explain the procedure well to the patient, or ask a nurse to assist her with taking such a specimen

1. Separate the labia
2. Wipe the urethral opening from front to back with a sterile water swab
3. Pass urine
4. After a few seconds of urine passing out into the toilet, catch fresh urine from the stream in a sterile plastic container
5. Close the container tightly and submit it as soon as possible for culture
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
- Send a midstream urine specimen for MC&S
- Take blood for FBC, U&E and blood culture
- Assess the patient for evidence of preterm labour
- 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 culture results. Total duration of treatment should be 10 days
- Give Ringer-Lactate solution 3L/day, or more if the mother is vomiting
- Following recovery, take another urine specimen to confirm clearance of the infection
- Follow up for urine culture result at antenatal clinic

PULMONARY TUBERCULOSIS

Typical history of tuberculosis (TB) is cough for more than 3 weeks, chest pain, dyspnoea, tiredness, haemoptysis, weight loss, night sweats, or chest pain. Admit such patients to hospital for investigation.

Essential investigations

- Send 2 sputums, on different days, for microscopy for acid-fast bacilli
- Chest X-ray
- HIV test

Drug treatment

Start TB treatment only when the diagnosis is confirmed or after discussing with a consultant or a physician. Only streptomycin is contraindicated in pregnancy. The possible risks of rifampicin in the first trimester are generally outweighed by the benefits of treating the infection. All cases started on treatment must be notified and arrangements made for continuation of therapy at the patient’s local clinic. Usually, treatment must be continued for a minimum of six months.
Starting regimen:

Weight <50 kg: Rifafour 4 tablets with pyridoxine 50 mg daily

Weight ≥50 kg: Rifafour 5 tablets with pyridoxine 50 mg daily

1 tablet Rifafour e-200 = rifampicin 120 mg, isoniazid 60 mg, pyrazinamide 300 mg, ethambutol 200 mg

**PNEUMONIA**

Ill women with clinical evidence of pneumonia should be admitted to hospital. There is usually an acute onset of fever, chest pain, and productive cough with typical chest signs on examination.

**Investigations**

- Chest X-ray
- FBC and differential count, U&E, arterial blood gas, blood culture, HIV test
- CD4 count if HIV positive
- Sputum MC&S

**Treatment**

- Give co-amoxiclav (Augmentin) 1.2 g IV 8 hourly until the temperature has settled for 24 hours, followed by 375 mg orally 3 times daily with amoxycillin 250 mg orally 3 times daily.
- In ill patients, add erythromycin 500 mg orally 4 times daily
- Pneumocystis pneumonia is frequent in immune-compromised patients (below)
- If the oxygen saturation is less than 90%, give mask oxygen or consider ventilation in ICU
- Consider cefuroxime 750 mg IV 8 hourly with gentamicin 240 mg IV daily if:
  - there is evidence of multilobar pneumonia
  - temperature >38.3 degrees C
  - respiratory rate >30/minute
  - systolic BP <90 mmHg
  - there is renal dysfunction (caution with gentamicin)
  - the white cell count is <4 or >30×10^9/L
- Call a physician for advice if the patient is extremely ill or problematic
Pneumocystis pneumonia (PCP)

This presents with dry cough, tachypnoea, and respiratory failure, usually in HIV positive patients with CD4 count <200/mm³. Chest X-ray may show no abnormality, or a diffuse fine infiltrate, frequently sparing the lower zones.

Drug treatment is cotrimoxazole (Bactrim) 20/100 mg/kg/day in 4 divided doses for 3 weeks (4 tablets orally 4 times daily for a patient weighing 60 kg, or 5 tablets 4 times daily for one weighing 80 kg). Add prednisone 40 mg orally daily for 5 days and taper the dose after that.

MALARIA

Malaria in pregnancy is associated with cerebral complications, hypoglycaemia, pulmonary oedema and death. Consider malaria in any patient who presents with unexplained fever, and in anaemic patients coming from malaria endemic areas. A travel history is useful. Diagnosis is made on examination of a blood smear and/or the presence of malaria antigen in the blood. If severe malaria is suspected, also take blood for FBC, U&E, LFT and glucose.

Uncomplicated malaria

The mother has an Hb ≥ 6 g/dL, a parasitaemia count <5% and no organ dysfunction.

1. Admit to hospital
2. Give quinine 600 mg 3 times daily orally, or IV for as long as the patient is vomiting, for 7 days
3. Add clindamycin 300-450 mg orally 3 times daily for seven days, starting 48 hours after commencement of quinine
4. Do 4 hourly finger-prick blood glucose tests, at least for the first 24 hours
5. After 28 weeks, do daily NSTs
6. Follow up at the hospital antenatal clinic after discharge, as there is a risk of impaired fetal growth

Severe malaria

The mother has at least one of the following:

- Parasitaemia count ≥5%
- Haemoglobin level <6 g/dl
- Coma or depressed consciousness
- Renal dysfunction, creatinine >265 µmol/L
- Liver dysfunction, transaminase levels more than twice normal
- Spontaneous hypoglycaemia (not resulting from quinine treatment)
- Severe thrombocytopenia (<50×10⁹/L)
Management of severe malaria

1. Admit to a high care area, consult a physician and consider transfer to ICU
2. Loading dose: give quinine 20 mg/kg IV, in 1L 5% dextrose-saline (5-10 mL/kg body weight depending on the patient’s fluid balance) over 4 hours
3. Maintenance dose: 8 hours after starting the loading dose, give quinine 10 mg/kg in dextrose-saline diluted as above over 4 hours. Repeat this every 8 hours until the patient can take oral medication
4. During IV therapy, monitor blood glucose hourly, all intake and output hourly, and keep the patient on a continuous ECG monitor. Watch for signs of pulmonary oedema. Central venous pressure monitoring may be advisable
5. Do daily NSTs if appropriate (gestation >27 weeks)

Antimalarial prophylaxis for travelers

- Discourage pregnant women from traveling to malarious areas
- Suggest use of mosquito nets, protective clothing and insect repellants
- The drugs described below are usually not available in public hospitals
- Mefloquine:
  - This drug in prophylactic doses is probably safe in pregnancy
  - Avoid use in the first trimester if possible
  - Give mefloquine 250 mg orally weekly starting 1 week before departure, up to 4 weeks after returning from the malarious area
- Chloroquine and proguanil:
  - This combination is a less effective prophylactic than mefloquine
  - Both agents in prophylactic doses are considered safe in pregnancy
  - Give chloroquine 300 mg orally weekly starting 1 week before departure, up to 4 weeks after returning from the malarious area
  - Give proguanil 200 mg orally daily starting 1-2 days before departure, up to 4 weeks after returning from the malarious area
- The combination of atovaquone and proguanil has not been sufficiently evaluated for it to be recommended for pregnant women
Chapter 7  Audit and statistics

AUDIT

Audit in maternity care is more than just the gathering of data and statistics: it is the use of this information to identify problems and devise solutions to those problems. Audit involves collecting of essential data and holding audit meetings of all the staff involved in maternity care.

The following information is routinely collected:

- Number of deliveries
- Number of low birth weight babies (<2.5 kg)
- Number of stillbirths
- Number of early neonatal deaths (died in the first 7 days)
- Number of caesarean sections and assisted deliveries
- Number of multiple pregnancies
- Number of mothers <18 and ≥35 years of age
- Maternal deaths

The above data are summarised and presented at regular audit meetings (M&M meetings). All maternal deaths and selected cases of perinatal morbidity or mortality are also discussed. All doctors working in the maternity service should attend these meetings.

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 a given time period. This is expressed as a percentage (e.g. 15%).

Stillbirth rate = number of stillborn babies divided by all births in a given time period. 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 a given time period. This is expressed as a proportion of a thousand (e.g. 13/1000).
Perinatal mortality rate = number of stillborn babies plus the number of early neonatal deaths divided by all births in a given time period. This is expressed as a proportion of a thousand (e.g. 30/1000).

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 = death of a woman while pregnant or within 42 days after the end of a pregnancy

Direct cause of maternal death = death resulting from a condition specific to pregnancy, e.g. from pre-eclampsia, puerperal sepsis.

Indirect cause of maternal death = death resulting from a condition that is not specific to pregnancy, but where pregnancy may have aggravated the condition, e.g. cardiac disease, AIDS, diabetes mellitus.

Maternal mortality ratio = number of maternal deaths divided by all live births recorded in a given time period. This is expressed as a ratio of deaths against one hundred thousand live births (e.g. 150:100 000).

PERINATAL DEATHS

These include all stillbirths, and neonatal deaths in the first 7 days after birth, of babies weighing 500 g or more.

1. Details of all perinatal deaths should be collected daily and entered on the death forms. Stillbirths are identified in the labour ward register and neonatal deaths are found in the registers of the neonatal unit

2. Where possible, this data should be entered into the Perinatal Problems Identification Programme (PPIP) software, for analysis, reference and presentation
MATERNAL DEATHS

Maternal death is defined as death of a woman while pregnant or within 42 days of delivery. This is, by law, a notifiable event in South Africa.

Procedure for maternal death

1. The nursing staff usually arrange notification of the next of kin of the deceased.
2. All maternal deaths must be reported as soon as possible to the head of department by the doctor on duty at the time of the death.
3. The relatives should be counselled by the doctors and nurses involved and, if necessary, asked for permission to submit the body for autopsy.
4. The case should be discussed at the next M&M meeting.
5. The maternal death must be notified to the provincial authorities on the maternal death notification.

Procedure for autopsy after maternal death

1. Inform the departmental secretary as soon as possible about plans for autopsy.
2. Counsel the next of kin about the need for autopsy and ask their permission.
3. Complete the postmortem consent form with the next of kin.
4. Complete the hospital postmortem application form.
5. Complete the NHLS postmortem request form.
6. Contact the pathology registrar on duty to arrange any further details.
7. All completed forms are taken to the mortuary.
8. A doctor from the department should be in attendance at the autopsy.

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.
Procedure for maternal death notification

1. Complete the maternal death notification form
2. Attach photocopies of all the deceased’s clinical notes
3. Place the notification form and the photocopies of notes in an envelope, clearly labelled ‘confidential’
4. Send the envelope by courier to the Gauteng provincial maternal and child health directorate, within 7 days of the death
5. Keep the original clinical notes in a safe place
6. Keep a photocopy of the notification form in a safe 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.

AUDIT MEETINGS

Weekly or monthly audit meetings should be held in all institutions providing maternity care, and be attended by all doctors and midwives directly involved in the care of pregnant women. In some institutions, these meetings are known as morbidity and mortality (M&M) meetings.

Content of audit meetings

- Presentation and discussion of weekly (or monthly) statistics

- Presentation and discussion of maternal deaths and perinatal deaths: the emphasis is on identifying problems and finding solutions to these problems. 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 led to a death, what was done is much more important than who did it. Audit of deaths may follow the format used in the Confidential Enquiries into Maternal Deaths

- Discussion of any problems that relate to the care of pregnant women in the unit
ESSENTIAL AUDIT OF A PERINATAL OR MATERNAL DEATH

Identify:

1. The primary cause of death
2. The final and contributory causes of death
3. Avoidable factors related to the patient, her family or her community
4. Avoidable factors related to the health service administration or infrastructure
5. Avoidable factors related to the health care itself

Then propose solutions to any problems identified.