SECTION 2

SYMPTOMS

SHOCK

Shock is characterized by failure of the circulatory system to maintain adequate perfusion of the vital organs. Shock is a **life-threatening condition** that requires **immediate and intensive treatment**.

Suspect or anticipate shock if at least one of the following is present:

- bleeding in early pregnancy (e.g. abortion, ectopic or molar pregnancy);
- bleeding in late pregnancy or labour (e.g. placenta praevia, abruptio placentae, ruptured uterus);
- bleeding after childbirth (e.g. ruptured uterus, uterine atony, tears of genital tract, retained placenta or placental fragments);
- infection (e.g. unsafe or septic abortion, amnionitis, metritis, acute pyelonephritis);
- trauma (e.g. injury to uterus or bowel during abortion, ruptured uterus, tears of genital tract).

SYMPTOMS AND SIGNS

Diagnose shock if the following symptoms and signs are present:

- fast, weak pulse (110 per minute or more);
- low blood pressure (systolic less than 90 mm Hg).

Other symptoms and signs of shock include:

- pallor (especially of inner eyelid, palms or around mouth);
- sweatiness or cold clammy skin;
- rapid breathing (rate of 30 breaths per minute or more);
- anxiousness, confusion or unconsciousness;
- scanty urine output (less than 30 mL per hour).

MANAGEMENT

IMMEDIATE MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Monitor vital signs (pulse, blood pressure, respiration, temperature).

- If the **woman is unconscious**, turn her onto her side to minimize the risk of aspiration if she vomits, and to ensure that an airway is open.
- Keep the woman warm but do not overheat her, as this will increase peripheral circulation and reduce blood supply to the vital centres.
- Elevate the legs to increase return of blood to the heart (if possible, raise the foot end of the bed).

SPECIFIC MANAGEMENT

- Start an IV infusion (two if possible) using a large-bore (16-gauge or largest available) cannula or needle. Collect blood for estimation of haemoglobin, immediate cross-match and bedside clotting test (see below), just before infusion of fluids:
  - Rapidly infuse IV fluids (normal saline or Ringer's lactate) initially at the rate of 1 L in 15–20 minutes;

    Note: Avoid using plasma substitutes (e.g. dextran). There is no evidence that plasma substitutes are superior to normal saline in the resuscitation of a shocked woman, and dextran can be harmful in large doses.
  - Give at least 2 L of these fluids in the first hour. This is over and above fluid replacement for ongoing losses.

    Note: A more rapid rate of infusion is required in the management of shock resulting from bleeding. Aim to replace two to three times the estimated fluid loss.

Do not give fluids by mouth to a woman in shock.

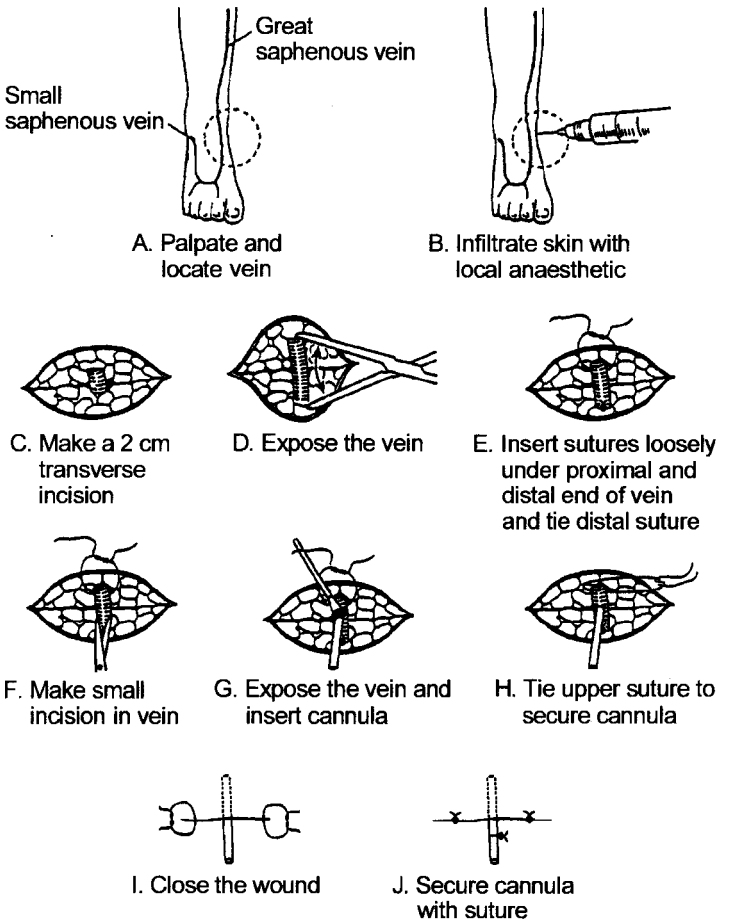
- If a **peripheral vein cannot be cannulated**, perform a venous cut-down (**Fig S-1**).
- Continue to monitor vital signs (every 15 minutes) and blood loss.
- Catheterize the bladder and monitor fluid intake and urine output.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.

BEDSIDE CLOTTING TEST

- Assess clotting status using this **bedside clotting test**:

- Take 2 mL of venous blood into a small, dry, clean, plain glass test tube (approximately 10 mm x 75 mm);
- Hold the tube in a closed fist to keep it warm (± 37°C);
- After four minutes, tip the tube slowly to see if a clot is forming. Then tip it again every minute until the blood clots and the tube can be turned upside down;
- Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

FIGURE S-1 Venous cut-down



DETERMINING AND MANAGING THE CAUSE OF SHOCK

Determine the cause of shock after the woman is stabilized.

- If **heavy bleeding is suspected** as the cause of shock:
  - Take steps simultaneously to stop bleeding (e.g. oxytocics, uterine massage, bimanual compression, aortic compression, preparations for surgical intervention);
  - Transfuse as soon as possible to replace blood loss (**page C-23**);
  - Determine the cause of bleeding and manage accordingly:
    - If **bleeding occurs during first 22 weeks of pregnancy**, suspect abortion, ectopic or molar pregnancy (**page S-7**);
    - If **bleeding occurs after 22 weeks or during labour but before delivery**, suspect placenta praevia, abruptio placentae or ruptured uterus (**page S-17**);
    - If **bleeding occurs after childbirth**, suspect ruptured uterus, uterine atony, tears of genital tract, retained placenta or placental fragments (**page S-25**).
  - Reassess the woman's condition for signs of improvement (**page S-5**).
- If **infection is suspected** as the cause of shock:
  - Collect appropriate samples (blood, urine, pus) for microbial culture before starting antibiotics, if facilities are available;
  - Give the woman a combination of antibiotics to cover aerobic and anaerobic infections and continue until she is fever-free for 48 hours (**page C-35**):
    - penicillin G 2 million units OR ampicillin 2 g IV every six hours;
    - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
    - PLUS metronidazole 500 mg IV every eight hours.

Do not give antibiotics by mouth to a woman in shock.

  - Reassess the woman's condition for signs of improvement (**page S-5**).

- If **trauma is suspected** as the cause of shock, prepare for surgical intervention.

REASSESSMENT

- Reassess the woman's response to fluids within 30 minutes to determine if her condition is improving. Signs of improvement include:
  - stabilizing pulse (rate of 90 per minute or less);
  - increasing blood pressure (systolic 100 mm Hg or more);
  - improving mental status (less confusion or anxiety);
  - increasing urine output (30 mL per hour or more).
- If the **woman's condition improves**:
  - Adjust the rate of infusion of IV fluids to 1 L in six hours;
  - Continue management for the underlying cause of shock (**page S-4**).
- If the **woman's condition fails to improve or stabilize**, provide further management (see below).

FURTHER MANAGEMENT

- Continue to infuse IV fluids, adjusting the rate of infusion to 1 L in six hours and maintain oxygen at 6–8 L per minute.
- Closely monitor the woman's condition.
- Perform laboratory tests including repeat haemoglobin determination, blood grouping and Rh typing. If facilities are available, check serum electrolytes, serum creatinine and blood pH.

VAGINAL BLEEDING IN EARLY PREGNANCY

PROBLEM

- Vaginal bleeding occurs during the first 22 weeks of pregnancy.

GENERAL MANAGEMENT

- Perform a **rapid evaluation** of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- If the **woman is in shock**, consider ruptured ectopic pregnancy (**Table S-4, page S-14**).
- Start an IV infusion and infuse IV fluids (**page C-21**).

DIAGNOSIS

- **Consider ectopic pregnancy** in any woman with anaemia, pelvic inflammatory disease (PID), threatened abortion or unusual complaints about abdominal pain.

  Note: If **ectopic pregnancy is suspected**, perform bimanual examination gently because an early ectopic pregnancy is easily ruptured.
- **Consider abortion** in any woman of reproductive age who has a missed period (delayed menstrual bleeding with more than one month having passed since her last menstrual period) and has one or more of the following: bleeding, cramping, partial expulsion of products of conception, dilated cervix or smaller uterus than expected.
- If **abortion is a possible diagnosis**, identify and treat any complications immediately (**Table S-2, page S-9**).

TABLE S-1 Diagnosis of vaginal bleeding in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Light[a] bleeding • Closed cervix • Uterus corresponds to dates	• Cramping/lower abdominal pain • Uterus softer than normal	**Threatened abortion, page S-10**
• Light bleeding • Abdominal pain • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal	• Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness	**Ectopic pregnancy (Table S-4, page S-14)**
• Light bleeding • Closed cervix • Uterus smaller than dates • Uterus softer than normal	• Light cramping/lower abdominal pain • History of expulsion of products of conception	**Complete abortion, page S-12**
• Heavy[b] bleeding • Dilated cervix • Uterus corresponds to dates	• Cramping/lower abdominal pain • Tender uterus • No expulsion of products of conception	**Inevitable abortion, page S-11**
• Heavy bleeding • Dilated cervix • Uterus smaller than dates	• Cramping/lower abdominal pain • Partial expulsion of products of conception	**Incomplete abortion, page S-11**
• Heavy bleeding • Dilated cervix • Uterus larger than dates • Uterus softer than normal • Partial expulsion of products of conception which resemble grapes	• Nausea/vomiting • Spontaneous abortion • Cramping/lower abdominal pain • Ovarian cysts (easily ruptured) • Early onset pre-eclampsia • No evidence of a fetus	**Molar pregnancy, page S-15**

[a] Light bleeding: takes five minutes or longer for a clean pad or cloth to be soaked.
[b] Heavy bleeding: takes less than five minutes for a clean pad or cloth to be soaked.

TABLE S-2 Diagnosis and management of complications of abortion

Symptoms and Signs	Complication	Management
• Lower abdominal pain • Rebound tenderness • Tender uterus • Prolonged bleeding • Malaise • Fever • Foul-smelling vaginal discharge • Purulent cervical discharge • Cervical motion tenderness	**Infection/sepsis**	Begin antibiotics[a] as soon as possible before attempting manual vacuum aspiration (**page P-65**).
• Cramping/abdominal pain • Rebound tenderness • Abdominal distension • Rigid (tense and hard) abdomen • Shoulder pain • Nausea/vomiting • Fever	**Uterine, vaginal or bowel injuries**	Perform a laparotomy to repair the injury and perform manual vacuum aspiration (**page P-65**) simultaneously. Seek further assistance if required.

[a] Give ampicillin 2 g IV every six hours PLUS gentamicin 5 mg/kg body weight IV every 24 hours PLUS metronidazole 500 mg IV every eight hours until the woman is fever-free for 48 hours (**page C-35**).

BOX S-1 Types of abortion

Spontaneous abortion is defined as the loss of a pregnancy before fetal viability (22 weeks gestation). The stages of spontaneous abortion may include:

- threatened abortion (pregnancy may continue);
- inevitable abortion (pregnancy will not continue and will proceed to incomplete/complete abortion);
- incomplete abortion (products of conception are partially expelled);
- complete abortion (products of conception are completely expelled).

Induced abortion is defined as a process by which pregnancy is terminated before fetal viability.

Unsafe abortion is defined as a procedure performed either by persons lacking necessary skills or in an environment lacking minimal medical standards, or both.

Septic abortion is defined as abortion complicated by infection. Sepsis may result from infection if organisms rise from the lower genital tract following either spontaneous or unsafe abortion. Sepsis is more likely to occur if there are retained products of conception and evacuation has been delayed. Sepsis is a frequent complication of unsafe abortion involving instrumentation.

MANAGEMENT

If unsafe abortion is suspected, examine for signs of infection or uterine, vaginal or bowel injury (Table S-2, page S-9), and thoroughly irrigate the vagina to remove any herbs, local medications or caustic substances.

THREATENED ABORTION

- Medical treatment is usually not necessary.
- Advise the woman to avoid strenuous activity and sexual intercourse, but bed rest is not necessary.

- If **bleeding stops**, follow up in antenatal clinic. Reassess if bleeding recurs.
- If **bleeding persists**, assess for fetal viability (pregnancy test/ultrasound) or ectopic pregnancy (ultrasound). Persistent bleeding, particularly in the presence of a uterus larger than expected, may indicate twins or molar pregnancy.

Do not give medications such as hormones (e.g. oestrogens or progestins) or tocolytic agents (e.g. salbutamol or indomethacin), as they will not prevent miscarriage.

INEVITABLE ABORTION

- If **pregnancy is less than 16 weeks**, plan for evacuation of uterine contents (**page P-65**). If **evacuation is not immediately possible**:
  - Give ergometrine 0.2 mg IM (repeated after 15 minutes if necessary) OR misoprostol 400 mcg by mouth (repeated once after four hours if necessary);
  - Arrange for evacuation of uterus as soon as possible.
- If **pregnancy is greater than 16 weeks**:
  - Await spontaneous expulsion of products of conception and then evacuate the uterus to remove any remaining products of conception (**page P-65**);
  - If necessary, infuse oxytocin 40 units in 1 L IV fluids (normal saline or Ringer's lactate) at 40 drops per minute to help achieve expulsion of products of conception.
- Ensure follow-up of the woman after treatment (**page S-12**).

INCOMPLETE ABORTION

- If **bleeding is light to moderate** and **pregnancy is less than 16 weeks**, use fingers or ring (or sponge) forceps to remove products of conception protruding from the cervix.
- If **bleeding is heavy** and **pregnancy is less than 16 weeks**, evacuate the uterus:
  - Manual vacuum aspiration is the preferred method of evacuation (**page P-65**). Evacuation by sharp curettage should

only be done if manual vacuum aspiration is not available (**page P-61**);

- If **evacuation is not immediately possible**, give ergometrine 0.2 mg IM (repeated after 15 minutes if necessary) OR misoprostol 400 mcg orally (repeated once after four hours if necessary).

- If **pregnancy is greater than 16 weeks**:
  - Infuse oxytocin 40 units in 1 L IV fluids (normal saline or Ringer's lactate) at 40 drops per minute until expulsion of products of conception occurs;
  - If necessary, give misoprostol 200 mcg vaginally every four hours until expulsion, but do not administer more than 800 mcg;
  - Evacuate any remaining products of conception from the uterus (**page P-65**).
- Ensure follow-up of the woman after treatment (see below).

COMPLETE ABORTION

- Evacuation of the uterus is usually not necessary.
- Observe for heavy bleeding.
- Ensure follow-up of the woman after treatment (see below).

FOLLOW-UP OF WOMEN WHO HAVE HAD AN ABORTION

Before discharge, tell a woman who has had a spontaneous abortion that spontaneous abortion is common and occurs in at least 15% (one in every seven) of clinically recognized pregnancies. Also reassure the woman that the chances for a subsequent successful pregnancy are good unless there has been sepsis or a cause of the abortion is identified that may have an adverse effect on future pregnancies (this is rare).

Some women may want to become pregnant soon after having an incomplete abortion. The woman should be encouraged to delay the next pregnancy until she is completely recovered.

It is important to counsel women who have had an unsafe abortion. If **pregnancy is not desired**, certain methods of family planning (**Table S-3, page S-13**) can be started immediately (within seven days) provided:

- There are no severe complications requiring further treatment;
- The woman receives adequate counselling and help in selecting the most appropriate family planning method.

TABLE S-3 Family planning methods

Type of Contraceptive	Advise to Start
Hormonal (pills, injections, implants)	• Immediately
Condoms	• Immediately
Intrauterine device (IUD)	• Immediately • If infection is present or suspected, delay insertion until it is cleared • If Hb is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)
Voluntary tubal ligation	• Immediately • If infection is present or suspected, delay surgery until it is cleared • If Hb is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)

Identify any other reproductive health services that a woman may need. For example some women may need:

- tetanus prophylaxis or tetanus booster;
- treatment for sexually transmitted infections (STIs);
- cervical cancer screening.

ECTOPIC PREGNANCY

An ectopic pregnancy is one in which implantation occurs outside the uterine cavity. The fallopian tube is the most common site of ectopic implantation (greater than 90%).

Symptoms and signs are extremely variable depending on whether or not the pregnancy has ruptured (**Table S-4, page S-14**). Culdocentesis (cul-de-sac puncture, **page P-69**) is an important tool for the diagnosis of ruptured ectopic pregnancy, but is less useful than a serum pregnancy test combined with ultrasonography. If **non-clotting blood is obtained**, begin immediate management.

TABLE S-4 Symptoms and signs of ruptured and unruptured ectopic pregnancy

Unruptured Ectopic Pregnancy	Ruptured Ectopic Pregnancy
• Symptoms of early pregnancy (irregular spotting or bleeding, nausea, swelling of breasts, bluish discoloration of vagina and cervix, softening of cervix, slight uterine enlargement, increased urinary frequency) • Abdominal and pelvic pain	• Collapse and weakness • Fast, weak pulse (110 per minute or more) • Hypotension • Hypovolaemia • Acute abdominal and pelvic pain • Abdominal distension[a] • Rebound tenderness • Pallor

[a] Distended abdomen with shifting dullness may indicate free blood.

DIFFERENTIAL DIAGNOSIS

The most common differential diagnosis for ectopic pregnancy is threatened abortion. Others are acute or chronic PID, ovarian cysts (torsion or rupture) and acute appendicitis.

If available, ultrasound may help distinguish a threatened abortion or twisted ovarian cyst from an ectopic pregnancy.

IMMEDIATE MANAGEMENT

- Cross-match blood and arrange for immediate laparotomy. **Do not wait for blood before performing surgery.**
- At surgery, inspect both ovaries and fallopian tubes:
  - If there is **extensive damage to the tubes**, perform salpingectomy (the bleeding tube and the products of conception are removed together). This is the treatment of choice in most cases (**page P-109**);
  - Rarely, if there is **little tubal damage**, perform salpingostomy (the products of conception can be removed and the tube conserved). This should be done only when the conservation of fertility is very important to the woman, as the risk of another ectopic pregnancy is high (**page P-111**).

AUTOTRANSFUSION

If **significant haemorrhage occurs**, autotransfusion can be used if the **blood is unquestionably fresh and free from infection** (in later stages of pregnancy, blood is contaminated [e.g. with amniotic fluid] and should not be used for autotransfusion). The blood can be collected prior to surgery or after the abdomen is opened:

- When the woman is on the operating table prior to surgery and the abdomen is distended with blood, it is sometimes possible to insert a needle through the abdominal wall and collect the blood in a donor set.
- Alternatively, open the abdomen:
  - Scoop the blood into a basin and strain through gauze to remove clots;
  - Clean the top portion of a blood donor bag with antiseptic solution and open it with a sterile blade;
  - Pour the woman's blood into the bag and reinfuse it through a filtered set in the usual way;
  - If a **donor bag with anticoagulant is not available**, add sodium citrate 10 mL to each 90 mL of blood.

SUBSEQUENT MANAGEMENT

- Prior to discharge, provide counselling and advice on prognosis for fertility. Given the increased risk of future ectopic pregnancy, family planning counselling and provision of a family planning method, if desired, is especially important (**Table S-3, page S-13**).
- Correct anaemia with ferrous sulfate or ferrous fumerate 60 mg by mouth daily for six months.
- Schedule a follow-up visit at four weeks.

MOLAR PREGNANCY

Molar pregnancy is characterized by an abnormal proliferation of chorionic villi.

IMMEDIATE MANAGEMENT

- If the **diagnosis of molar pregnancy is certain**, evacuate the uterus:
  - If **cervical dilatation is needed**, use a paracervical block (**page P-1**);
  - Use vacuum aspiration (**page P-65**). Manual vacuum aspiration is safer and associated with less blood loss. The risk of perforation using a metal curette is high;

- Have three syringes cocked and ready for use during the evacuation. The uterine contents are copious and it is important to evacuate them rapidly.

- Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute to prevent haemorrhage once evacuation is under way.

SUBSEQUENT MANAGEMENT

- Recommend a hormonal family planning method for at least one year to prevent pregnancy (**Table S-3, page S-13**). Voluntary tubal ligation may be offered if the woman has completed her family.

- Follow up every eight weeks for at least one year with urine pregnancy tests because of the risk of persistent trophoblastic disease or choriocarcinoma. If the **urine pregnancy test is not negative after eight weeks** or **becomes positive again** within the first year, urgently refer the woman to a tertiary care centre for further follow-up and management of choriocarcinoma.

VAGINAL BLEEDING IN LATER PREGNANCY AND LABOUR

PROBLEMS

- Vaginal bleeding after 22 weeks of pregnancy.
- Vaginal bleeding in labour before delivery.

TABLE S-5 Types of bleeding

Type of Bleeding	Probable Diagnosis	Action
Blood-stained mucus (show)	Onset of labour	Proceed with management of normal labour and childbirth, **page C-57**
Any other bleeding	Antepartum haemorrhage	Determine cause (**Table S-6, page S-18**)

GENERAL MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Perform a rapid evaluation of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).

Do not do a vaginal examination at this stage.

- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Start an IV infusion and infuse IV fluids (**page C-21**).

DIAGNOSIS

TABLE S-6 Diagnosis of antepartum haemorrhage

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Bleeding after 22 weeks gestation (may be retained in the uterus) • Intermittent or constant abdominal pain	• Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Bleeding after 22 weeks gestation	• Shock • Bleeding may be precipitated by intercourse • Relaxed uterus • Fetal presentation not in pelvis/lower uterine pole feels empty • Normal fetal condition	**Placenta praevia, page S-21**

MANAGEMENT

ABRUPTIO PLACENTAE

Abruptio placentae is the detachment of a normally located placenta from the uterus before the fetus is delivered.

- Assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- Transfuse as necessary, preferably with fresh blood (**page C-23**).

- If **bleeding is heavy** (evident or hidden), deliver as soon as possible:
  - If the **cervix is fully dilated**, deliver by vacuum extraction (**page P-27**);
  - If **vaginal delivery is not imminent**, deliver by caesarean section (**page P-43**).

    Note: In every case of abruptio placentae, be prepared for postpartum haemorrhage (**page S-25**).
- If **bleeding is light to moderate** (the mother is not in immediate danger), the course of action depends on the fetal heart rate:
  - If **fetal heart rate is normal or absent**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**):
    - If **contractions are poor**, augment labour with oxytocin (**page P-25**);
    - If the **cervix is unfavourable** (firm, thick, closed), perform caesarean section (**page P-43**).
  - If **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute):
    - Perform rapid vaginal delivery;
    - If **vaginal delivery is not possible**, deliver by immediate caesarean section (**page P-43**).

COAGULOPATHY (CLOTTING FAILURE)

Coagulopathy is both a cause and a result of massive obstetric haemorrhage. It can be triggered by abruptio placentae, fetal death in-utero, eclampsia, amniotic fluid embolism and many other causes. The clinical picture ranges from major haemorrhage, with or without thrombotic complications, to a clinically stable state that can be detected only by laboratory testing.

Note: In many cases of acute blood loss, the development of coagulopathy can be prevented if blood volume is restored promptly by infusion of IV fluids (normal saline or Ringer's lactate).

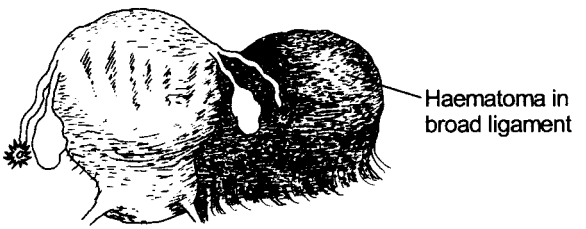
- Treat the possible cause of coagulation failure:
  - abruptio placentae (**page S-18**);
  - eclampsia (**page S-43**).

- Use blood products to help control haemorrhage (**page C-23**):
  - Give fresh whole blood, if available, to replace clotting factors and red cells;
  - If **fresh whole blood is not available**, choose one of the following based on availability:
    - fresh frozen plasma for replacement of clotting factors (15 mL/kg body weight);
    - packed (or sedimented) red cells for red cell replacement;
    - cryoprecipitate to replace fibrinogen;
    - platelet concentrates (if bleeding continues and the platelet count is less than 20 000).

RUPTURED UTERUS

Bleeding from a ruptured uterus may occur vaginally unless the fetal head blocks the pelvis. Bleeding may also occur intra-abdominally. Rupture of the lower uterine segment into the broad ligament, however, will not release blood into the abdominal cavity (**Fig S-2**).

FIGURE S-2 **Rupture of lower uterine segment into broad ligament will not release blood into the abdominal cavity**



- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate) before surgery.
- When stable, immediately perform caesarean section and deliver baby and placenta (**page P-43**).
- If the **uterus can be repaired with less operative risk** than hysterectomy would entail and the **edges of the tear are not necrotic**, repair the uterus (**page P-95**). This involves less time and blood loss than hysterectomy.

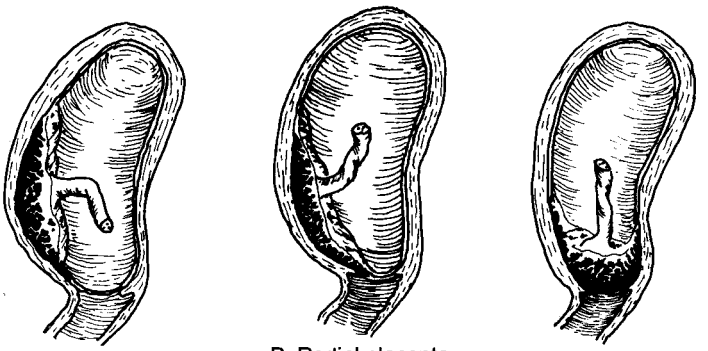
Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over.

- If the **uterus cannot be repaired**, perform subtotal hysterectomy (**page P-103**). If the **tear extends through the cervix and vagina**, total hysterectomy may be required.

PLACENTA PRAEVIA

Placenta praevia is implantation of the placenta at or near the cervix (**Fig S-3**).

FIGURE S-3 Implantation of the placenta at or near the cervix.



A. Low placental implantation

B. Partial placenta praevia

C. Complete placenta praevia

Warning: Do not perform a vaginal examination unless preparations have been made for immediate caesarean section. A careful speculum examination may be performed to rule out other causes of bleeding such as cervicitis, trauma, cervical polyps or cervical malignancy. The presence of these, however, does not rule out placenta praevia.

- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate).
- Assess the amount of bleeding:
  - If **bleeding is heavy and continuous**, arrange for caesarean delivery irrespective of fetal maturity (**page P-43**);

- If **bleeding is light or if it has stopped** and the **fetus is alive but premature**, consider expectant management until delivery or heavy bleeding occurs:
  - Keep the woman in the hospital until delivery;
  - Correct anaemia with ferrous sulfate or ferrous fumerate 60 mg by mouth daily for six months;
  - Ensure that blood is available for transfusion, if required;
  - If **bleeding recurs**, decide management after weighing benefits and risks for the woman and fetus of further expectant management versus delivery.

CONFIRMING THE DIAGNOSIS

- If a **reliable ultrasound examination** can be performed, localize the placenta. If **placenta praevia is confirmed and the fetus is mature**, plan delivery (**page S-23**).
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is less than 37 weeks**, manage as placenta praevia until 37 weeks.
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is 37 weeks or more**, examine the woman and be prepared for either vaginal or caesarean delivery, as follows:
  - have IV lines running and cross-matched blood available;
  - exam the woman in the operating theatre with the surgical team present;
  - use a high-level disinfected vaginal speculum to examine the cervix.
- If the **cervix is partly dilated and placental tissue is visible** (placenta praevia is confirmed), plan delivery (**page S-23**).
- If the **cervix is not dilated**, cautiously palpate the vaginal fornices:
  - If **spongy tissue is felt** (placenta praevia is confirmed), plan delivery (**page S-23**);
  - If a **firm fetal head is felt** (major placenta praevia is ruled out), proceed to deliver by induction (**page P-18**).
- If a **diagnosis of placenta praevia is still in doubt**, perform a cautious digital examination:

- If **soft tissue is felt within the cervix** (placenta praevia is confirmed), plan delivery (below);
- If **membranes and fetal parts are felt** both centrally and marginally (placenta praevia is ruled out), proceed to deliver by induction (**page P-17**).

DELIVERY

- Plan delivery if:
  - the fetus is mature;
  - the fetus is dead or has an anomaly not compatible with life (e.g. anencephaly);
  - the woman's life is at risk because of excessive blood loss.
- If there is **low placental implantation** (**Fig S-3 A**) and **bleeding is light**, vaginal delivery may be possible. Otherwise, deliver by caesarean section (**page P-43**).

  Note: Women with placenta praevia are at high risk for postpartum haemorrhage and placenta accreta/increta, a common finding at the site of a previous caesarean scar.
- If **delivered by caesarean section** and there is **bleeding from the placental site**:
  - Under-run the bleeding sites with sutures;
  - Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.
- If **bleeding occurs during the postpartum period**, initiate appropriate management (**page S-25**). This may include artery ligation (**page P-99**) or hysterectomy (**page P-103**).

VAGINAL BLEEDING AFTER CHILDBIRTH

Vaginal bleeding in excess of 500 mL after childbirth is defined as postpartum haemorrhage (PPH). There are, however, some problems with this definition:

- Estimates of blood loss are notoriously low, often half the actual loss. Blood is mixed with amniotic fluid and sometimes with urine. It is dispersed on sponges, towels and linens, in buckets and on the floor.
- The importance of a given volume of blood loss varies with the woman's haemoglobin level. A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anaemic woman.

Even healthy, non-anaemic women can have catastrophic blood loss.

- Bleeding may occur at a slow rate over several hours; the condition may not be recognized until the woman suddenly enters shock.

Risk assessment in the antenatal period does not effectively predict those women who will have PPH. **Active management of the third stage should be practised on all women in labour because it reduces the incidence of PPH due to uterine atony (page C-73).** All postpartum women must be closely monitored to determine those who have PPH.

PROBLEMS

- Increased vaginal bleeding within the first 24 hours after childbirth (immediate PPH).
- Increased vaginal bleeding following the first 24 hours after childbirth (delayed PPH).

Continuous slow bleeding or sudden bleeding is an emergency; intervene early and aggressively.

GENERAL MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Perform a rapid evaluation of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Massage the uterus to expel blood and blood clots. Blood clots trapped in the uterus will inhibit effective uterine contractions.
- Give oxytocin 10 units IM.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Catheterize the bladder.
- Check to see if the placenta has been expelled, and examine the placenta to be certain it is complete (**Table S-7, page S-27**).
- Examine the cervix, vagina and perineum for tears.
- Check for anaemia after bleeding has been stopped for 24 hours:
  - If **haemoglobin is less than 7 g/dL** or **haematocrit is less than 20%** (severe anaemia) arrange for a transfusion (**page C-23**) and give oral iron and folic acid:
    - Give ferrous sulfate or ferrous fumerate 120 mg by mouth PLUS folic acid 400 mcg by mouth once daily for three months;
    - After three months, continue supplementation with ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily for six months.
  - If **haemoglobin is 7–11 g/dL**, give ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily for six months;
  - Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:
    - albendazole 400 mg by mouth once;
    - OR mebendazole 500 mg by mouth once or 100 mg two times per day for three days;

- OR levamisole 2.5 mg/kg body weight by mouth once daily for three days;
- OR pyrantel 10 mg/kg body weight by mouth once daily for three days.

- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

DIAGNOSIS

TABLE S-7 Diagnosis of vaginal bleeding after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Immediate PPH[a] • Uterus soft and not contracted	• Shock	**Atonic uterus, page S-28**
• Immediate PPH[a]	• Complete placenta • Uterus contracted	**Tears of cervix, vagina or perineum, page S-31**
• Placenta not delivered within 30 minutes after delivery	• Immediate PPH[a] • Uterus contracted	**Retained placenta, page S-31**
• Portion of maternal surface of placenta missing or torn membranes with vessels	• Immediate PPH[a] • Uterus contracted	**Retained placental fragments, page S-32**
• Uterine fundus not felt on abdominal palpation • Slight or intense pain	• Inverted uterus apparent at vulva • Immediate PPH[b]	**Inverted uterus, page S-33**
• Bleeding occurs more than 24 hours after delivery • Uterus softer and larger than expected for elapsed time since delivery	• Bleeding is variable (light or heavy, continuous or irregular) and foul-smelling • Anaemia	**Delayed PPH, page S-33**
• Immediate PPH[a] (bleeding is intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Tender abdomen • Rapid maternal pulse	**Ruptured uterus, page S-20**

[a] Bleeding may be light if a clot blocks the cervix or if the woman is lying on her back.

[b] There may be no bleeding with complete inversion.

MANAGEMENT

ATONIC UTERUS

An atonic uterus fails to contract after delivery.

- Continue to massage the uterus.
- Use oxytocic drugs which can be given together or sequentially (**Table S-8**).

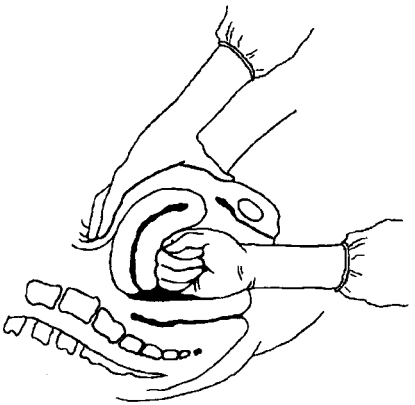
TABLE S-8 Use of oxytocic drugs

	Dose and Route	Continuing Dose	Maximum Dose	Precautions and Contra-Indications
Oxytocin	IV: Infuse 20 units in 1 L IV fluids at 60 drops per minute IM: 10 units	IV: Infuse 20 units in 1 L IV fluids at 40 drops per minute	Not more than 3 L of IV fluids containing oxytocin	Do not give as an IV bolus
Ergometrine/ Methyl-ergometrine	IM or IV (slowly): 0.2 mg	Repeat 0.2 mg IM after 15 minutes. If required, give 0.2 mg IM or IV (slowly) every four hours	Five doses (Total 1.0 mg)	High blood pressure, pre-eclampsia, heart disease
15-Methyl Prostaglandin $F_{2\alpha}$	IM: 0.25 mg	0.25 mg every 15 minutes	Eight doses (Total 2 mg)	Asthma

Prostaglandins should not be given intravenously. They may be fatal.

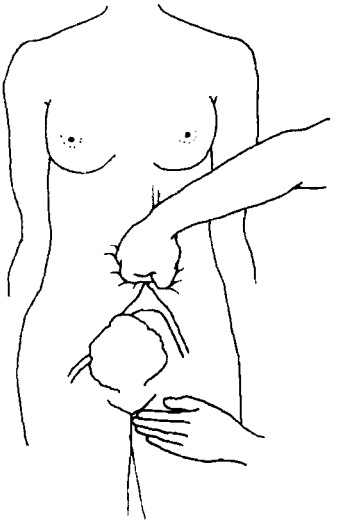
- Anticipate the need for blood early, and transfuse as necessary (**page C-23**).
- If **bleeding continues**:
  - Check placenta again for completeness;
  - If there are **signs of retained placental fragments** (absence of a portion of maternal surface or torn membranes with vessels), remove remaining placental tissue (**page S-32**);
  - Assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- If **bleeding continues** in spite of management above:
  - Perform bimanual compression of the uterus (**Fig S-4**):
    - Wearing high-level disinfected or sterile gloves, insert a hand into the vagina and remove any blood clots from the lower part of the uterus or cervix;
    - Form a fist;
    - Place the fist into the anterior fornix and apply pressure against the anterior wall of the uterus;
    - With the other hand, press deeply into the abdomen behind the uterus, applying pressure against the posterior wall of the uterus;
    - Maintain compression until bleeding is controlled and the uterus contracts.

FIGURE S-4 Bimanual compression of the uterus



- Alternatively, compress the aorta (**Fig S-5**):
  - Apply downward pressure with a closed fist over the abdominal aorta directly through the abdominal wall:
    - The point of compression is just above the umbilicus and slightly to the left;
    - Aortic pulsations can be felt easily through the anterior abdominal wall in the immediate postpartum period.
  - With the other hand, palpate the femoral pulse to check the adequacy of compression:
    - If the **pulse is palpable during compression**, the pressure exerted by the fist is inadequate;
    - If the **femoral pulse is not palpable**, the pressure exerted is adequate;
  - Maintain compression until bleeding is controlled.

FIGURE S-5 **Compression of abdominal aorta and palpation of femoral pulse**



Packing the uterus is ineffective and wastes precious time.

- If **bleeding continues** in spite of compression:
  - Perform uterine and utero-ovarian artery ligation (**page P-99**);
  - If **life-threatening bleeding continues** after ligation, perform subtotal hysterectomy (**page P-103**).

TEARS OF CERVIX, VAGINA OR PERINEUM

Tears of the birth canal are the second most frequent cause of PPH. Tears may coexist with atonic uterus. Postpartum bleeding with a contracted uterus is usually due to a cervical or vaginal tear.

- Examine the woman carefully and repair tears to the cervix (**page P-81**) or vagina and perineum (**page P-83**).
- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

RETAINED PLACENTA

There may be no bleeding with retained placenta.

- Apply controlled cord traction to remove the placenta.

  Note: Avoid forceful cord traction and fundal pressure, as they may cause uterine inversion.
- If the **placenta is not expelled**, give oxytocin 10 units IM if not already done for active management of the third stage.

Do not give ergometrine for retained placenta because it causes tonic uterine contraction, which may delay expulsion.

- Ensure that the bladder is empty. Catheterize the bladder, if necessary.
- If the **placenta is undelivered after 30 minutes of oxytocin** stimulation and controlled cord traction, attempt manual removal of the placenta (**page P-77**).

  Note: Very adherent tissue may be placenta accreta. Efforts to extract a placenta that does not separate easily may result in heavy

bleeding or uterine perforation, which usually requires hysterectomy.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

RETAINED PLACENTAL FRAGMENTS

There may be no bleeding with retained placental fragments.

When a portion of the placenta—one or more lobes—is retained, it prevents the uterus from contracting effectively.

- Feel inside the uterus for placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta (**page P-77**).
- Remove placental fragments by hand, ovum forceps or wide curette (page {).

  Note: Very adherent tissue may be placenta accreta. Efforts to extract fragments that do not separate easily may result in heavy bleeding or uterine perforation which usually requires hysterectomy.
- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

INVERTED UTERUS

The uterus is said to be inverted if it turns inside-out during delivery of the placenta. Repositioning the uterus should be performed immediately (**page P-91**). With the passage of time the constriction ring around the inverted uterus becomes more rigid and the uterus more engorged with blood.

- If the **woman is in severe pain**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.

  Note: Do not give oxytocic drugs until the inversion is corrected.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).
- Give a single dose of prophylactic antibiotics after correcting the inverted uterus (**page C-35**):
  - ampicillin 2 g IV PLUS metronidazole 500 mg IV;
  - OR cefazolin 1 g IV PLUS metronidazole 500 mg IV.
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).
- If **necrosis is suspected**, perform vaginal hysterectomy. This may require referral to a tertiary care centre.

DELAYED ("SECONDARY") POSTPARTUM HAEMORRHAGE

- If **anaemia is severe** (haemoglobin less than 7 g/dL or haematocrit less than 20%), arrange for a transfusion (**page C-23**) and provide oral iron and folic acid (**page S-26**).
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

Prolonged or delayed PPH may be a sign of metritis.

- Give oxytocic drugs (**Table S-8, page S-28**).
- If the **cervix is dilated**, explore by hand to remove large clots and placental fragments. Manual exploration of the uterus is similar to

the technique described for removal of the retained placenta (**page P-77**).

- If the **cervix is not dilated**, evacuate the uterus to remove placental fragments (**page P-65**).
- Rarely, if **bleeding continues**, consider uterine and utero-ovarian artery ligation (**page P-99**) or hysterectomy (**page P-103**).
- Perform histopathologic examination of curettings or hysterectomy specimen, if possible, to rule out trophoblastic tumour.

ELEVATED BLOOD PRESSURE, HEADACHE, BLURRED VISION, CONVULSIONS OR LOSS OF CONSCIOUSNESS

PROBLEMS

- A pregnant woman or a woman who recently delivered complains of severe headache or blurred vision.
- A pregnant woman or a woman who recently delivered is found unconscious or having convulsions (seizures).
- A pregnant woman has elevated blood pressure.

GENERAL MANAGEMENT

- If the **woman is unconscious or convulsing, SHOUT FOR HELP**. Urgently mobilize all available personnel.
- Perform a rapid evaluation of the general condition of the woman, including vital signs (pulse, blood pressure, respiration) while simultaneously finding out the history of her present and past illnesses either from her or from her relatives.
- If the **woman is not breathing** or **her breathing is shallow**:
  - Check airway and intubate if required;
  - If she is **not breathing**, assist ventilation using an Ambu bag and mask or give oxygen at 4–6 L per minute by endotracheal tube;
  - If she **is breathing**, give oxygen at 4–6 L per minute by mask or nasal cannulae.
- If the **woman is unconscious**:
  - Check airway and temperature;
  - Position her on her left side;
  - Check for neck rigidity.
- If the **woman is convulsing**:
  - Position her on her left side to reduce the risk of aspiration of secretions, vomit and blood;
  - Protect her from injuries (fall), but do not attempt to restrain her;

- Provide constant supervision;
- If **eclampsia is diagnosed** (**Table S-9, page S-38**), give magnesium sulfate (**Box S-3, page S-45**);
- If the **cause of convulsions has not been determined**, manage as eclampsia and continue to investigate other causes.

DIAGNOSIS OF HYPERTENSIVE DISORDERS

The hypertensive disorders of pregnancy include pregnancy-induced hypertension and chronic hypertension (elevation of the blood pressure before 20 weeks gestation). Headaches, blurred vision, convulsions and loss of consciousness are often associated with hypertension in pregnancy, but are not necessarily specific to it. Other conditions that may cause convulsions or coma include epilepsy, complicated malaria, head injury, meningitis, encephalitis, etc. See **Table S-9, page S-38** for more information on diagnosis.

- Diastolic blood pressure is a good indicator of prognosis for the management of hypertensive disorders in pregnancy:
  - Diastolic blood pressure is taken at the point at which the arterial sound disappears:
    - A falsely high reading is obtained if the cuff does not encircle at least three-fourths of the circumference of the arm;
    - A wider cuff should be used when the diameter of the upper arm is more than 30 cm;
  - Diastolic blood pressure measures peripheral resistance and does not vary with the woman's emotional state to the degree that systolic pressure does.
- If the **diastolic blood pressure is 90 mm Hg or more** on two consecutive readings taken four hours or more apart, diagnose hypertension. If **urgent delivery must take place** or if the **diastolic blood pressure is 110 mm Hg or more**, a time interval of less than four hours is acceptable:
  - If hypertension occurs **after 20 weeks of gestation, during labour and/or within 48 hours of delivery** it is classified as pregnancy-induced hypertension;
  - If hypertension occurs **before 20 weeks of gestation**, it is classified as chronic hypertension.

PROTEINURIA

The presence of proteinuria changes the diagnosis from pregnancy-induced hypertension to pre-eclampsia. Other conditions cause proteinuria and false positive results are possible. Urinary infection, severe anaemia, heart failure and difficult labour may all cause proteinuria. Blood in the urine due to catheter trauma or schistosomiasis and contamination from vaginal blood could give false positive results.

Random urine sampling, such as the dipstick test for protein, is a useful screening tool. A change from negative to positive during pregnancy is a warning sign. If **dipsticks are not available**, a sample of urine can be heated to boiling in a clean test tube. Add a drop of 2% acetic acid to check for persistent precipitates that can be quantified as a percentage of protein to the volume of the total sample. Vaginal secretions or amniotic fluid may contaminate urine specimens. Only clean-catch mid-stream specimens should be used. Catheterization for this purpose is not justified due to the risk of urinary tract infection.

Diastolic blood pressure alone is an accurate indicator of hypertension in pregnancy. Elevated blood pressure and proteinuria, however, define pre-eclampsia.

PREGNANCY-INDUCED HYPERTENSION

Women with pregnancy-induced hypertension disorders may progress from mild disease to a more serious condition. The classes of pregnancy-induced hypertension are:

- hypertension without proteinuria;
- mild pre-eclampsia;
- severe pre-eclampsia;
- eclampsia.

TABLE S-9 Diagnosis of elevated blood pressure, headache, blurred vision, convulsions or loss of consciousness

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Diastolic blood pressure 90 mm Hg or more before first 20 weeks of gestation		**Chronic hypertension, page S-49**
• Diastolic blood pressure 90–110 mm Hg before 20 weeks of gestation • Proteinuria up to 2+		**Chronic hypertension with superimposed mild pre-eclampsia, page S-42**
• Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 20 weeks gestation • No proteinuria		**Pregnancy-induced hypertension, page S-41**
• Two readings of diastolic blood pressure 90–110 mm Hg 4 hours apart after 20 weeks gestation • Proteinuria up to 2+		**Mild pre-eclampsia, page S-42**
• Diastolic blood pressure 110 mm Hg or more after 20 weeks gestation • Proteinuria 3+ or more	• Headache (increasing frequency, unrelieved by regular analgesics) • Blurred vision • Oliguria (passing less than 400 mL urine in 24 hours) • Upper abdominal pain (epigastric pain or pain in right upper quadrant) • Pulmonary oedema	**Severe pre-eclampsia[a], page S-43**
• Convulsions • Diastolic blood pressure 90 mm Hg or more after 20 weeks gestation • Proteinuria 2+ or more	• Coma (unconscious) • Other symptoms and signs of severe pre-eclampsia	**Eclampsia, page S-43**
• Trismus (difficulty opening mouth and chewing)	• Spasms of face, neck, trunk • Arched back • Board-like abdomen • Spontaneous violent spasms	**Tetanus, page S-50**

[a] If a woman has any one of the symptoms or signs listed under severe pre-eclampsia, diagnose severe pre-eclampsia.

TABLE S-9 Cont. Diagnosis of elevated blood pressure, headache, blurred vision, convulsions or loss of consciousness

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Convulsions • Past history of convulsions • Normal blood pressure		**Epilepsy[b], page S-51**
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**
• Headache • Stiff neck • Photophobia • Fever	• Convulsions • Confusion • Drowsiness • Coma	**Meningitis[b,c]** or **Encephalitis[b,c]**
• Headache • Blurred vision	• Vomiting	**Migraine[d]**

[b] If a diagnosis of eclampsia cannot be ruled out, continue treatment for eclampsia.
[c] Examine cerebrospinal fluid and give appropriate treatment for meningitis or encephalitis.
[d] Give analgesics (e.g. paracetamol 500 mg by mouth as needed).

A small proportion of women with eclampsia have normal blood pressure. Treat all women with convulsions as if they have eclampsia until another diagnosis is confirmed.

Remember:

- Mild pre-eclampsia often has no symptoms.
- Increasing proteinuria is a sign of worsening pre-eclampsia.
- Oedema of the feet and lower extremities is not considered a reliable sign of pre-eclampsia.

In pregnancy-induced hypertension, there may be no symptoms and the only sign may be hypertension.

- Mild pre-eclampsia may progress rapidly to severe pre-eclampsia. The risk of complications, including eclampsia, increases greatly in severe pre-eclampsia.
- Convulsions with signs of pre-eclampsia indicates eclampsia. These convulsions:
  - can occur regardless of the severity of hypertension;
  - are difficult to predict and typically occur in the absence of headache or visual changes;
  - occur after childbirth in about 25% of cases;
  - are tonic-clonic and resemble grand mal convulsions of epilepsy;
  - may recur in rapid sequence, as in status epilepticus, and may end in death;
  - will not be observed if the woman is alone;
  - may be followed by coma that lasts minutes or hours depending on the frequency of convulsions.

Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it increases the risk of convulsions and cerebrovascular accidents.

MANAGEMENT OF PREGNANCY-INDUCED HYPERTENSION

BOX S-2 Prevention of pregnancy-induced hypertension

- Restricting calories, fluids and salt intake does **NOT** prevent pregnancy-induced hypertension and may even be harmful to the fetus.
- The beneficial effects of aspirin, calcium and other agents in preventing pregnancy-induced hypertension have not yet been proven.
- **Early detection and management** in women with risk factors is critical to the management of pregnancy-induced hypertension and the prevention of convulsions. These women should be followed up regularly and given clear instructions on when to return to their health care provider. Education of immediate family members is equally important, not only so that they understand the significance of signs of pregnancy-induced hypertension progression but also to increase social support when hospitalization and changes in work activities are needed.

PREGNANCY-INDUCED HYPERTENSION

Manage on an outpatient basis:

- Monitor blood pressure, urine (for proteinuria) and fetal condition weekly.
- If **blood pressure worsens**, manage as mild pre-eclampsia (**page S-42**).
- If there are **signs of severe fetal growth restriction or fetal compromise**, admit the woman to the hospital for assessment and possible expedited delivery.
- Counsel the woman and her family about danger signals indicating pre-eclampsia or eclampsia.
- If all **observations remain stable**, allow to proceed with normal labour and childbirth (**page C-57**).

MILD PRE-ECLAMPSIA

GESTATION LESS THAN 37 WEEKS

If **signs remain unchanged or normalize**, follow up twice a week as an outpatient:

- Monitor blood pressure, urine (for proteinuria), reflexes and fetal condition.
- Counsel the woman and her family about danger signals of severe pre-eclampsia or eclampsia.
- Encourage additional periods of rest.
- Encourage the woman to eat a normal diet (salt restriction should be discouraged).
- Do not give anticonvulsants, antihypertensives, sedatives or tranquillizers.
- If **follow-up as an outpatient is not possible**, admit the woman to the hospital:
  - Provide a normal diet (salt restriction should be discouraged);
  - Monitor blood pressure (twice daily) and urine for proteinuria (daily);
  - Do not give anticonvulsants, antihypertensives, sedatives or tranquillizers unless blood pressure or urinary protein level increases;
  - Do not give diuretics. Diuretics are harmful and only indicated for use in pre-eclampsia with pulmonary oedema or congestive heart failure;
  - If the **diastolic blood pressure decreases to normal** levels or her **condition remains stable**, send the woman home:
    - Advise her to rest and to watch out for significant swelling or symptoms of severe pre-eclampsia;
    - See her twice weekly to monitor blood pressure, urine (for proteinuria) and fetal condition and to assess for symptoms and signs of severe pre-eclampsia;
    - If **diastolic blood pressure rises** again, readmit her;

- If the **signs remain unchanged**, keep the woman in the hospital. Continue the same management and monitor fetal growth by symphysis-fundal height;
- If there are **signs of growth restriction**, consider early delivery. If not, continue hospitalization until term.

- If **urinary protein level increases**, manage as severe pre-eclampsia (see below).

Note: Symptoms and signs of pre-eclampsia do not completely disappear until after pregnancy ends.

GESTATION MORE THAN 37 COMPLETE WEEKS

If there are **signs of fetal compromise** (e.g. decreased amniotic fluid, growth restriction), assess the cervix (**page P-18**) and expedite delivery:

- If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin (**page P-17**).
- If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**) or deliver by caesarean section (**page P-43**).

SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

Severe pre-eclampsia and eclampsia are managed similarly with the exception that delivery must occur within 12 hours of onset of convulsions in eclampsia. **ALL cases of severe pre-eclampsia should be managed actively.** Symptoms and signs of "impending eclampsia" (blurred vision, hyperreflexia) are unreliable and expectant management is not recommended.

MANAGEMENT DURING A CONVULSION

- Gather equipment (airway, suction, mask and bag, oxygen) and give oxygen at 4–6 L per minute.
- Protect the woman from injury but do not actively restrain her.
- Prepare anticonvulsive drugs (**page S-44**).

GENERAL MANAGEMENT

- Start an IV infusion and infuse IV fluids (**page C-21**).
- After the convulsion:
  - Give anticonvulsive drugs (**page P-44**);
  - Position the woman on her left side to reduce risk of aspiration of secretions, vomit and blood;
  - Aspirate the mouth and throat as necessary.
- Monitor vital signs (pulse, blood pressure, respiration), reflexes and fetal heart rate hourly.
- If **diastolic blood pressure remains above 110 mm Hg**, give antihypertensive drugs (**page S-46**). Reduce the diastolic blood pressure to less than 100 mm Hg but not below 90 mm Hg.
- Catheterize the bladder to monitor urine output and proteinuria.
- Maintain a strict fluid balance chart (monitor the amount of fluids administered and urine output) to prevent fluid overload.
- If **urine output is less than 30 mL per hour**:
  - Withhold magnesium sulfate and infuse IV fluids (normal saline or Ringer's lactate) at 1 L in eight hours;
  - Monitor for the development of pulmonary oedema.
- **Never leave the woman alone.** A convulsion followed by aspiration of vomit may cause death of the woman and fetus.
- Auscultate the lung bases hourly for rales indicating pulmonary oedema. If **rales are heard**, withhold fluids and give frusemide 40 mg IV once.
- Assess clotting status with a bedside clotting test (**page S-2**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-19**).

ANTICONVULSIVE DRUGS

A key factor in anticonvulsive therapy is adequate administration of anticonvulsive drugs. Convulsions in hospitalized women are most frequently caused by under-treatment. **Magnesium sulfate is the drug of choice for preventing and treating convulsions in severe pre-eclampsia and eclampsia**. Administration is outlined in **Box S-3** (**page S-45**).

If **magnesium sulfate is not available**, diazepam may be used. Although a single dose of diazepam seldom causes neonatal respiratory depression, long-term continuous IV administration increases the risk of respiratory depression in babies who may already be suffering from the effects of utero-placental ischaemia and preterm birth. The effect may last several days. Administration of diazepam is outlined in **Box S-4, page S-46**.

BOX S-3 Magnesium sulfate schedules for severe pre-eclampsia and eclampsia

Loading dose

- Give 4 g of 20% magnesium sulfate solution IV over five minutes.
- Follow promptly with 10 g of 50% magnesium sulfate solution: give 5 g in each buttock as a deep IM injection with 1 mL of 2% lignocaine in the same syringe. Ensure aseptic technique when giving magnesium sulfate deep IM injection. Warn the woman that a feeling of warmth will be felt when magnesium sulfate is given.
- If **convulsions recur after 15 minutes**, give 2 g of 50% magnesium sulfate solution IV over five minutes.

Maintenance dose

- Give 5 g of 50% magnesium sulfate solution with 1 mL of 2% lignocaine in the same syringe by deep IM injection into alternate buttocks every four hours. Continue treatment for 24 hours after delivery or the last convulsion, whichever occurs last.
- If 50% solution is not available, give 1 g of 20% magnesium sulfate solution IV every hour by continuous infusion.

CLOSELY MONITOR THE WOMAN FOR SIGNS OF TOXICITY.

Before repeat administration, ensure that:

- Respiratory rate is at least 16 per minute.
- Patellar reflexes are present.
- Urinary output is at least 30 mL per hour over four hours.

WITHHOLD OR DELAY DRUG IF:

- Respiratory rate falls below 16 per minute.
- Patellar reflexes are absent.
- Urinary output falls below 30 mL per hour over preceding four hours.

Keep antidote ready

- In case of respiratory arrest:
  - Assist ventilation (mask and bag, anaesthesia apparatus, intubation).
  - Give calcium gluconate 1 g (10 mL of 10% solution) IV slowly until calcium gluconate begins to antagonize the effects of magnesium sulfate and respiration begins.

BOX S-4 Diazepam schedules for severe pre-eclampsia and eclampsia

Note: Use diazepam only if magnesium sulfate is not available.

Intravenous administration

Loading dose

- Diazepam 10 mg IV slowly over two minutes.
- If **convulsions recur**, repeat loading dose.

Maintenance dose

- Diazepam 40 mg in 500 mL IV fluids (normal saline or Ringer's lactate) titrated to keep the woman sedated but rousable.
- Maternal respiratory depression may occur when dose exceeds 30 mg in one hour:
  - Assist ventilation (mask and bag, anaesthesia apparatus, intubation), if necessary.
  - Do not give more than 100 mg in 24 hours.

Rectal administration

- Give diazepam rectally when IV access is not possible. The loading dose is 20 mg in a 10 mL syringe. Remove the needle, lubricate the barrel and insert the syringe into the rectum to half its length. Discharge the contents and leave the syringe in place, holding the buttocks together for 10 minutes to prevent expulsion of the drug. Alternatively, the drug may be instilled in the rectum through a catheter.
- If **convulsions are not controlled within 10 minutes**, administer an additional 10 mg or more, depending on the size of the woman and her clinical response. Be prepared to assist ventilation.

ANTIHYPERTENSIVE DRUGS

If the **diastolic blood pressure is 110 mm Hg or more**, give antihypertensive drugs. The goal is to keep the diastolic pressure between 90 mm Hg and 100 mm Hg to prevent cerebral haemorrhage. Hydralazine is the drug of choice.

- Give hydralazine 5 mg IV slowly every five minutes until blood pressure is lowered. Repeat hourly as needed or give hydralazine 12.5 mg IM every two hours as needed.
- If **hydralazine is not available**, give labetolol or nifedipine:
  - labetolol 10 mg IV:
  - If **response to labetolol is inadequate** (diastolic blood pressure remains above 110 mm Hg) after 10 minutes, give labetolol 20 mg IV;

- Increase the dose to 40 mg and then 80 mg if satisfactory response is not obtained after 10 minutes of each dose;
- nifedipine 5 mg under the tongue:
- If **response to nifedipine is inadequate** (diastolic blood pressure remains above 110 mm Hg) after 10 minutes, give an additional 5 mg under the tongue.

Note: There is concern regarding a possibility for an interaction with magnesium sulfate that can lead to hypotension.

DELIVERY

Delivery should take place as soon as the woman's condition has stabilized. Delaying delivery to increase fetal maturity will risk the lives of both the woman and the fetus. Delivery should occur regardless of the gestational age.

In severe pre-eclampsia, delivery should occur within 24 hours of the onset of symptoms. In eclampsia, delivery should occur within 12 hours of the onset of convulsions.

- Assess the cervix (**page P-18**).
- If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin (**page P-17**).
- If **vaginal delivery is not anticipated** within 12 hours (for eclampsia) or 24 hours (for severe pre-eclampsia), deliver by caesarean section (**page P-43**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by caesarean section (**page P-43**).
- If the **cervix is unfavourable** (firm, thick, closed) and the **fetus is alive**, deliver by caesarean section (**page P-43**).
- If **safe anaesthesia is not available for caesarean section** or if the **fetus is dead or too premature for survival**:
  - Aim for vaginal delivery;
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using misoprostol, prostaglandins or a Foley catheter (**page P-24**).

Note: If **caesarean section is performed**, ensure that:

- Coagulopathy has been ruled out;
- Safe general anaesthesia is available. Spinal anaesthesia is associated with the risk of hypotension. This risk can be reduced if adequate IV fluids (500–1000 mL) are infused prior to administration of the anaesthetic (**page P-11**).

Do not use local anaesthesia or ketamine in women with pre-eclampsia or eclampsia.

POSTPARTUM CARE

- Anticonvulsive therapy should be maintained for 24 hours after delivery or the last convulsion, whichever occurs last.
- Continue antihypertensive therapy as long as the diastolic pressure is 110 mm Hg or more.
- Continue to monitor urine output.

REFERRAL FOR TERTIARY LEVEL CARE

Consider referral of women who have:

- oliguria that persists for 48 hours after delivery;
- coagulation failure (e.g. coagulopathy [**page S-19**] or haemolysis, elevated liver enzymes and low platelets [HELLP] syndrome);
- persistent coma lasting more than 24 hours after convulsion.

COMPLICATIONS OF PREGNANCY-INDUCED HYPERTENSION

Complications may cause adverse perinatal and maternal outcomes. Because complications are often difficult to treat, efforts should be made to prevent them by early diagnosis and proper management. Health care providers should be aware that management can also lead to complications. Manage complications as follows:

- If **fetal growth restriction is severe**, expedite delivery.
- If there is **increasing drowsiness or coma**, suspect cerebral haemorrhage:
  - Reduce blood pressure slowly to reduce the risk of cerebral haemorrhage;

- Provide supportive therapy and prepare to refer the woman for tertiary level care.

- If **heart, kidney or liver failure is suspected**, provide supportive therapy and prepare to refer the woman for tertiary level care.
- If a clotting test shows **failure of a clot to form after seven minutes or a soft clot that breaks down easily**, suspect coagulopathy (**page S-19**).
- If the **woman has IV lines and catheters**, she is prone to infection. Use proper infection prevention techniques (**page C-17**) and closely monitor for signs of infection.
- If the **woman is receiving IV fluids**, she is at risk of circulatory overload. Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output.

CHRONIC HYPERTENSION

- Encourage additional periods of rest.
- High levels of blood pressure maintain renal and placental perfusion in chronic hypertension; reducing blood pressure will result in diminished perfusion. Blood pressure should not be lowered below its pre-pregnancy level. There is no evidence that aggressive treatment to lower the blood pressure to normal levels improves either fetal or maternal outcome:
  - If the **woman was on anti-hypertensive medication before pregnancy** and the **disease is well-controlled**, continue the same medication if acceptable in pregnancy;
  - If **diastolic blood pressure is 110 mm Hg or more**, or systolic blood pressure is 160 mm Hg or more, treat with antihypertensive drugs (**page S-46**);
  - If **proteinuria or other signs and symptoms are present**, consider superimposed pre-eclampsia and manage as mild pre-eclampsia (**page S-42**).
- Monitor fetal growth and condition.
- If there are **no complications**, deliver at term.
- If **pre-eclampsia develops**, manage as mild pre-eclampsia (**page S-42**) or severe pre-eclampsia (**page S-43**).

- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
- If **fetal growth restriction is severe** and **pregnancy dating is accurate**, assess the cervix (**page P-18**) and consider delivery:

  Note: Assessment of gestation by ultrasound in late pregnancy is not accurate.

  - If the **cervix is favourable** (soft, thin, partly dilated), rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin (**page P-17**);
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**).
- Observe for complications including abruptio placentae (**page S-18**) and superimposed pre-eclampsia (see **Mild pre-eclampsia, page S-42**).

TETANUS

Clostridium tetani may enter the uterine cavity on unclean instruments or hands, particularly during non-professional abortions or non-institutional deliveries. The newborn is usually infected from unclean instruments used in cutting the cord or from contaminated substances applied as traditional cord dressings. Begin treatment as soon as possible.

- Control spasms with diazepam 10 mg IV slowly over two minutes. If **spasms are severe**, the woman may have to be paralyzed and put on a ventilator. This may be possible only at a tertiary care centre.
- Provide general care:
  - Nurse in a quiet room but monitor closely;
  - Avoid unnecessary stimuli;
  - Maintain hydration and nutrition;
  - Treat secondary infection.
- Give tetanus antitoxin 3000 units IM to neutralize absorbed toxin.
- Prevent further production of toxin:
  - Remove the cause of sepsis (e.g. remove infected tissue from uterine cavity in a septic abortion);

- Give benzyl penicillin 2 million units IV every four hours for 48 hours, then give ampicillin 500 mg by mouth three times per day for 10 days.

BOX S-5 Tetanus immunization

When the mother has active immunity, the antibodies pass through the placenta, protecting the newborn. A woman is considered protected when she has received two vaccine doses at least four weeks apart, with an interval of at least four weeks between the last vaccine dose and pregnancy termination. Women who last received a vaccination series (five injections) more than 10 years before the present pregnancy should be given a booster. In most women a booster is recommended in every pregnancy.

If an immunized woman has had an **unsafe abortion** or unhygienic delivery, give her a booster injection of tetanus toxoid 0.5 mL IM. If she **has not been immunized before**, give her anti-tetanus serum 1500 units IM and a booster injection of tetanus toxoid 0.5 mL IM after four weeks.

EPILEPSY

Women with epilepsy can present with convulsions in pregnancy. Like many chronic diseases, epilepsy worsens in some women during pregnancy but improves in others. In the majority of women, however, epilepsy is unaffected by pregnancy.

- Observe the woman closely. In general, pregnant women with epilepsy have an increased risk of:
  - pregnancy-induced hypertension;
  - preterm labour;
  - infants with low birth weights;
  - infants with congenital malformations;
  - perinatal mortality.
- Aim to control epilepsy with the smallest dose of a single drug. Avoid drugs in early pregnancy which are associated with congenital malformations (e.g. valproic acid).
- If the **woman is convulsing**, give diazepam 10 mg IV slowly over two minutes. Repeat if convulsions recur after 10 minutes.

- If **convulsions continue** (status epilepticus), infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50–100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

  Note: Only normal saline can be used to infuse phenytoin. All other IV fluids will cause crystallization of phenytoin.

  - Flush IV line with normal saline before and after infusing phenytoin;
  - Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risk of irregular heart beat, hypotension and respiratory depression;
  - Complete administration within one hour of preparation.

- If the **woman is known to be epileptic**, give her the same medication that she had been taking. Follow-up with her regularly and adjust the dose of medication according to the response.
- If the **woman is known to be epileptic but cannot recall details of her medication**, give her phenytoin 100 mg by mouth three times per day. Follow-up with her regularly and adjust the dose of medication according to her response.
- Folic acid deficiency may be caused by anticonvulsive drugs. Give folic acid 600 mcg by mouth once daily along with antiepileptic treatment in pregnancy.
- Phenytoin can cause neonatal deficiency of vitamin K-dependent clotting factors. This can be minimized by giving vitamin K 1 mg IM to the newborn.
- Evaluation for underlying causes of convulsions is indicated if convulsions are of recent onset. This may be possible only at the tertiary care level.

SEVERE/COMPLICATED MALARIA

Severe malaria in pregnancy may be misdiagnosed as eclampsia. **If a pregnant woman living in a malarial area has fever, headaches or convulsions and malaria cannot be excluded, it is essential to treat the woman for both malaria and eclampsia.**

Pregnant women with severe malaria are particularly prone to hypoglycaemia, pulmonary oedema, anaemia and coma.

ANTIMALARIAL DRUGS

Quinine remains the first line treatment in many countries and may be safely used throughout pregnancy. Where available, artesunate IV or artemether IM are the drugs of choice in the second and third trimesters. Their use in the first trimester must balance their advantages over quinine (better tolerability, less hypoglycaemia) against the limited documentation of pregnancy outcomes.

QUININE DIHYDROCHLORIDE

LOADING DOSE

- Infuse quinine dihydrochloride 20 mg/kg body weight in IV fluids (5% dextrose, normal saline or Ringer's lactate) over four hours:
  - **Never give an IV bolus injection of quinine**;
  - If it is **definitely known that the woman has taken an adequate dose of quinine** (1.2 g) within the preceding 12 hours, do **not** give the loading dose. Proceed with the maintenance dose (see below);
  - If the **history of treatment is not known or is unclear**, give the loading dose of quinine;
  - Use 100–500 mL IV fluids depending on the fluid balance state.
- Wait four hours before giving the maintenance dose.

MAINTENANCE DOSE

- Infuse quinine dihydrochloride 10 mg/kg body weight over four hours. Repeat every eight hours (i.e. quinine infusion for four hours, no quinine for four hours, quinine infusion for four hours, etc.).

  Note: Monitor blood glucose levels for hypoglycaemia every hour while the woman is receiving quinine IV (**page S-55**).
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give:
  - quinine dihydrochloride or quinine sulfate 10 mg/kg body weight by mouth every eight hours to complete seven days of treatment;
  - OR in areas where sulfadoxine/pyrimethamine is effective, give sulfadoxine/pyrimethamine three tablets as a single dose.

INTRAVENOUS ARTESUNATE

LOADING DOSE

- Give artesunate 2.4 mg/kg body weight IV as a single bolus on the first day of treatment.

MAINTENANCE DOSE

- Give artesunate 1.2 mg/kg body weight IV as a single bolus once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give artesunate 2 mg/kg body weight by mouth once daily to complete seven days of treatment.

INTRAMUSCULAR ARTEMETHER

LOADING DOSE

- Give artemether 3.2 mg/kg body weight IM as a single dose on the first day of treatment.

MAINTENANCE DOSE

- Give artemether 1.6 mg/kg body weight IM once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow and then give artesunate 2 mg/kg body weight by mouth once daily to complete seven days of treatment.

CONVULSIONS

- If **convulsions occur**, give diazepam 10 mg IV slowly over two minutes.
- If **eclampsia is diagnosed in addition to malaria**, prevent subsequent convulsions with magnesium sulfate (**Box S-3, page S-45**).
- If **eclampsia is excluded**, prevent subsequent convulsions with phenytoin (below).

PHENYTOIN

LOADING DOSE

- Infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50–100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

Note: Only normal saline can be used to infuse phenytoin. All other IV fluids will cause crystallization of phenytoin.

- Flush IV line with normal saline before and after infusing phenytoin;
- Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risk of irregular heart beat, hypotension and respiratory depression;
- Complete administration within one hour of preparation.

MAINTENANCE DOSE

- Give phenytoin 100 mg IV slowly over two minutes or by mouth every eight hours beginning at least 12 hours after the loading dose.

FLUID BALANCE

- Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output to ensure that there is no fluid overload. Assess clinical status regularly.

  Note: Women with severe malaria are prone to fluid overload.

- If **pulmonary oedema develops**:
  - Prop up the woman;
  - Give oxygen at 4 L per minute by mask or nasal cannulae;
  - Give frusemide 40 mg IV as a single dose.
- If **urine output is poor** (less than 30 mL per hour):
  - Measure serum creatinine;
  - Rehydrate with IV fluids (normal saline, Ringer's lactate).
- If **urine output does not improve**, give frusemide 40 mg IV as a single dose and continue to monitor urine output.
- If **urine output is still poor** (less than 30 mL per hour over four hours) and the **serum creatinine is more than 2.9 mg/dL**, refer the woman to a tertiary care centre, if possible, for management of renal failure.

HYPOGLYCAEMIA

Hypoglycaemia is common and occurs at any time during the illness, especially after initiation of quinine therapy. There may be no symptoms.

- Monitor blood glucose levels using a stix test every four hours.

  Note: If the **woman is receiving quinine IV**, monitor blood glucose levels every hour.

- If **hypoglycaemia is detected**, give 50% dextrose 50 mL IV followed by dextrose (5 or 10%) 500 mL infused over eight hours.

  Note: Monitor blood glucose levels and adjust infusion accordingly.

- Monitor fluid balance carefully (**page S-55**).

ANAEMIA

Complicated malaria is often accompanied by anaemia.

- Monitor haemoglobin levels daily.
- Transfuse as necessary (**page C-23**).
- Monitor fluid balance (**page S-55**).
- Give frusemide 20 mg IV or by mouth with each unit of blood.
- Give ferrous sulfate or ferrous fumerate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily upon discharge.

PROBLEMS

- Cervix not dilated beyond 4 cm after 8 hours of regular contractions.
- Cervical dilatation is to the right of the alert line on the partograph.
- The woman has been experiencing labour pains for 12 hours or more without delivery (prolonged labour).

GENERAL MANAGEMENT

- Perform a **rapid evaluation** of the condition of the woman and fetus and provide supportive care (**page C-57**).
- Test urine for ketones and treat with IV fluids if ketotic.
- Review partograph (**page C-65**).

DIAGNOSIS

TABLE S-10 Diagnosis of unsatisfactory progress of labour

Findings	Diagnosis
Cervix not dilated. No palpable contractions or infrequent contractions	**False labour, page S-64**
Cervix not dilated beyond 4 cm after eight hours of regular contractions	**Prolonged latent phase, page S-64**
Cervical dilatation to the right of the alert line on the partograph (**Fig S-6, page S-59**)	**Prolonged active phase, page S-65**
• Secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions	• **Cephalopelvic disproportion, page S-65**
• Secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band or maternal and fetal distress (**Fig S-7, page S-61**)	• **Obstruction, page S-66**
• Two contractions or less in 10 minutes, each lasting less than 40 seconds (**Fig S-8, page S-63**)	• **Inadequate uterine activity, page S-66**
• Presentation other than vertex with occiput anterior	• **Malpresentation or malposition, page S-69**
Cervix fully dilated and woman has urge to push, but no descent	**Prolonged expulsive phase, page S-67**

Figure S-6, page S-59 is a sample partograph for prolonged active phase of labour. **Note that the partograph was not adequately filled out and that this example demonstrates inappropriate management of prolonged labour.** The diagnosis of prolonged labour was evident at 2 PM and labour should have been augmented with oxytocin at that time.

- The woman was admitted in active labour at 10 AM:
  - fetal head 5/5 palpable;
  - cervix dilated 4 cm;
  - inadequate uterine contractions (two in 10 minutes, each lasting less than 20 seconds).
- At 2 PM:
  - fetal head still 5/5 palpable;
  - cervix dilated 4 cm and to the right of the alert line;
  - membranes have ruptured spontaneously and amniotic fluid is clear;
  - inadequate uterine contractions (one in 10 minutes, lasting less than 20 seconds).
- At 6 PM:
  - fetal head still 5/5 palpable;
  - cervix dilated 6 cm;
  - contractions still inadequate (two in 10 minutes, each lasting less than 20 seconds).
- At 9 PM:
  - fetal heart rate 80 per minute;
  - amniotic fluid stained with meconium;
  - no further progress in labour.
- Caesarean section performed at 9:20 PM due to fetal distress.

FIGURE S-6 Partograph showing prolonged active phase of labour

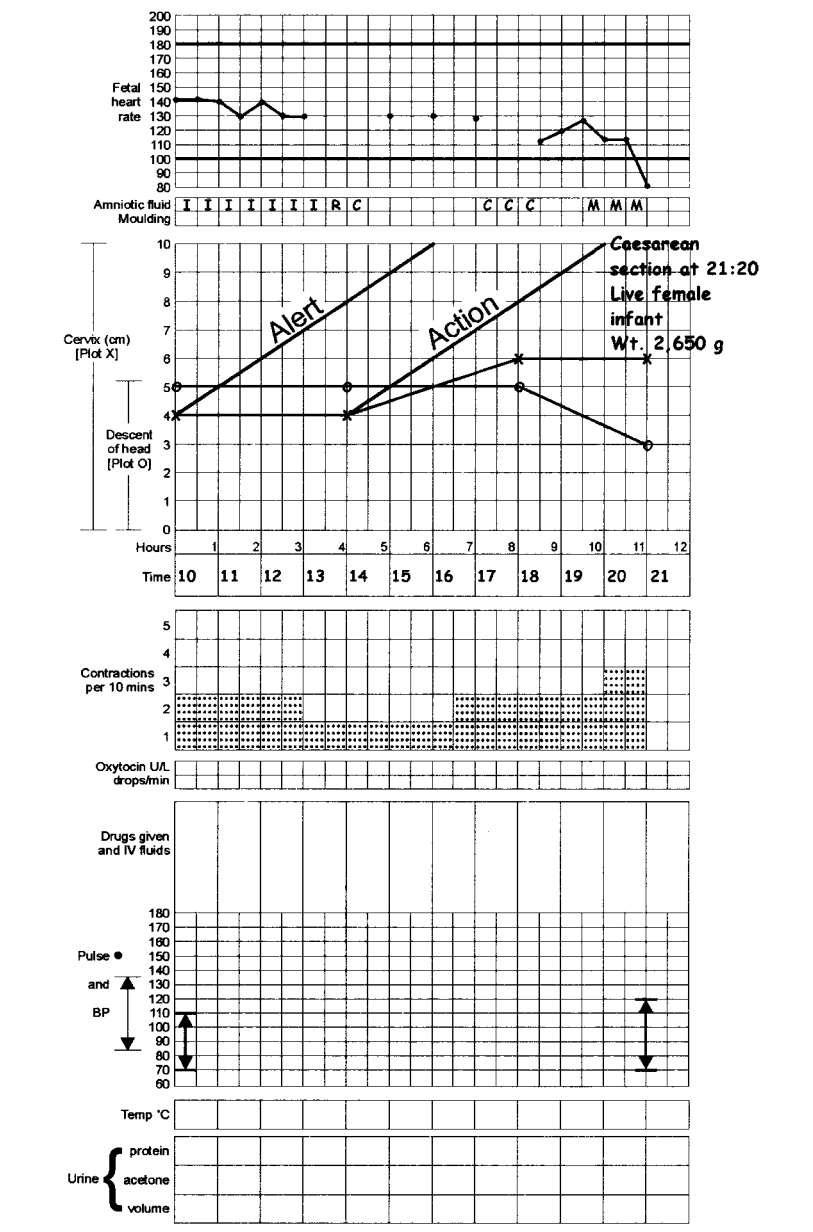


Figure S-7, page S-61 is a sample partograph showing arrest of dilatation and descent in the active phase of labour. Fetal distress and third degree moulding, together with arrest of dilatation and descent in the active phase of labour in the presence of adequate uterine contractions, indicates obstructed labour.

- The woman was admitted in active labour at 10 AM:
  - fetal head 3/5 palpable;
  - cervix dilated 4 cm;
  - three contractions in 10 minutes, each lasting 20–40 seconds;
  - clear amniotic fluid draining;
  - first degree moulding.
- At 2 PM:
  - fetal head still 3/5 palpable;
  - cervix dilated 6 cm and to the right of the alert line;
  - slight improvement in contractions (three in 10 minutes, each lasting 45 seconds);
  - second degree moulding.
- At 5 PM:
  - fetal head still 3/5 palpable;
  - cervix still dilated 6 cm;
  - third degree moulding;
  - fetal heart rate 92 per minute;
  - amniotic fluid stained with meconium.
- Caesarean section performed at 5:30 PM due to fetal distress.

FIGURE S-7 Partograph showing obstructed labour

Name Mrs. H Gravida 4 Para 3+0 Hospital number 6639

Date of admission 20.5.2000 Time of admission 10:00 A.M. Ruptured membranes 1 hours

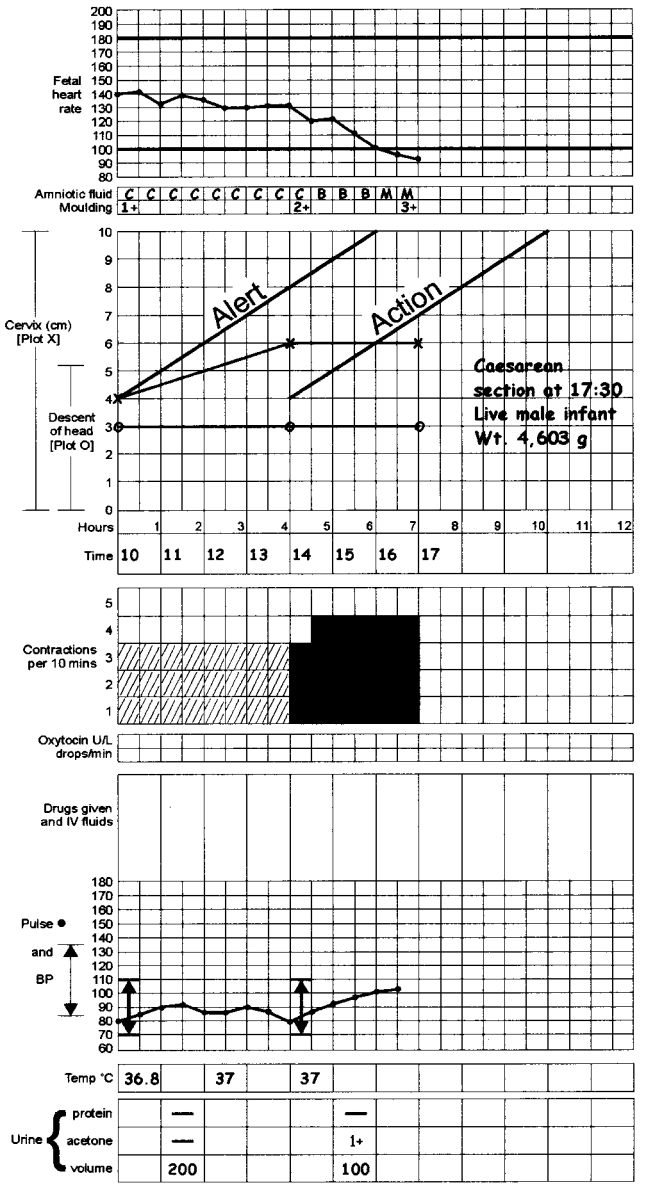
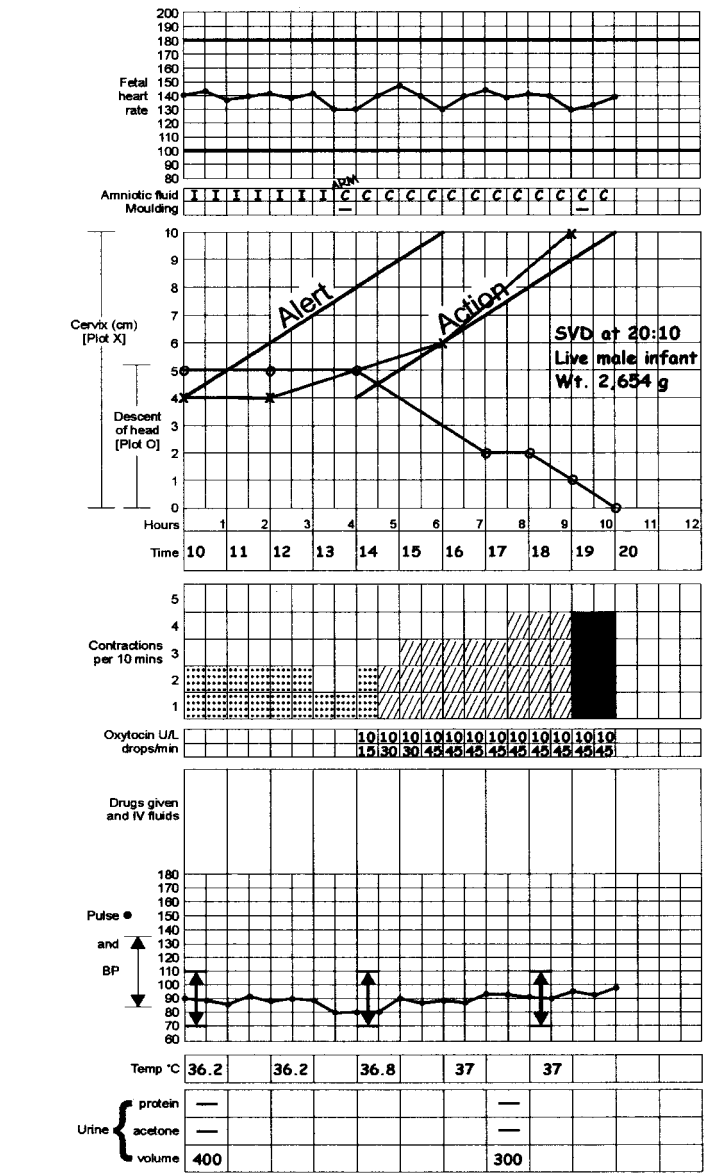


Figure S-8, page S-63 is a sample partograph for poor progress of labour due to inadequate uterine contractions corrected with oxytocin.

- The woman was admitted in active labour at 10 AM:
  - fetal head 5/5 palpable;
  - cervix dilated 4 cm;
  - two contractions in 10 minutes, each lasting less than 20 seconds.
- At 12 PM:
  - fetal head still 5/5 palpable;
  - cervix still dilated 4 cm and to the right of the alert line;
  - no improvement in contractions.
- At 2 PM:
  - poor progress of labour due to inefficient uterine contractions diagnosed;
  - augmented labour with oxytocin 10 units in 1 L IV fluids at 15 drops per minute;
  - escalated oxytocin until a good pattern of contractions was established.
- At 7 PM:
  - fetal head 1/5 palpable;
  - cervix dilated 10 cm;
  - four contractions in 10 minutes, each lasting 45 seconds.
- Spontaneous vaginal delivery occurred at 8:10 PM.

FIGURE S-8 Partograph showing inadequate uterine contractions corrected with oxytocin



MANAGEMENT

FALSE LABOUR

Examine for urinary tract or other infection (**Table S-13, page S-100**) or ruptured membranes (**page S-135**) and treat accordingly. If none of these are present, discharge the woman and encourage her to return if signs of labour recur.

PROLONGED LATENT PHASE

The diagnosis of prolonged latent phase is made retrospectively. When contractions cease, the woman is said to have had false labour. When contractions become regular and dilatation progresses beyond 4 cm, the woman is said to have been in the latent phase.

Misdiagnosing false labour or prolonged latent phase leads to unnecessary induction or augmentation, which may fail. This may lead to unnecessary caesarean section and amnionitis.

If a **woman has been in the latent phase for more than eight hours** and there is **little sign of progress**, reassess the situation by assessing the cervix:

- If there has been **no change in cervical effacement or dilatation** and there is no fetal distress, review the diagnosis. The woman may not be in labour.
- If there has been a **change in cervical effacement or dilatation**, rupture the membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin (**page P-17**):
  - Reassess every four hours;
  - If the **woman has not entered the active phase after eight hours of oxytocin** infusion, deliver by caesarean section (**page P-43**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge):
  - Augment labour immediately with oxytocin (**page P-25**);
  - Give a combination of antibiotics until delivery (**page C-35**):
    - ampicillin 2 g IV every six hours;

- PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
- If the **woman delivers vaginally**, discontinue antibiotics postpartum;
- If the **woman has a caesarean section**, continue antibiotics PLUS give metronidazole 500 mg IV every eight hours until the woman is fever-free for 48 hours.

PROLONGED ACTIVE PHASE

- If there are **no signs of cephalopelvic disproportion or obstruction** and the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- Assess uterine contractions:
  - If **contractions are inefficient** (less than three contractions in 10 minutes, each lasting less than 40 seconds), suspect inadequate uterine activity (**page S-66**);
  - If **contractions are efficient** (three or more contractions in 10 minutes, each lasting more than 40 seconds) suspect cephalopelvic disproportion, obstruction, malposition or malpresentation (see below).
- General methods of labour support may improve contractions and accelerate progress (**page C-57**).

CEPHALOPELVIC DISPROPORTION

Cephalopelvic disproportion occurs because the fetus is too large or the maternal pelvis is too small. If **labour persists with cephalopelvic disproportion**, it may become arrested or obstructed. The best test to determine if a pelvis is adequate is a trial of labour. Clinical pelvimetry is of limited value.

- If **cephalopelvic disproportion is confirmed** (**Table S-10, page S-57**), deliver by caesarean section (**page P-43**):
  - If the **fetus is dead**:
    - Deliver by craniotomy (**page P-57**);
    - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

OBSTRUCTION

Note: Rupture of an unscarred uterus is usually caused by obstructed labour.

- If the **fetus is alive, the cervix is fully dilated** and the **fetal head is at 0 station or below**, deliver by vacuum extraction (**page P-27**).
- If there is an **indication for vacuum extraction and symphysiotomy** for relative obstruction and the **fetal head is at –2 station**:
  - Deliver by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
  - If the **operator is not proficient in symphysiotomy**, deliver by caesarean section (**page P-43**).
- If the **fetus is alive but the cervix is not fully dilated** or if the **fetal head is too high for vacuum extraction**, deliver by caesarean section (**page P-43**).
- If the **fetus is dead**:
  - Deliver by craniotomy (**page P-57**);
  - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

INADEQUATE UTERINE ACTIVITY

If **contractions are inefficient** and **cephalopelvic disproportion and obstruction have been excluded**, the most probable cause of prolonged labour is inadequate uterine activity.

> **Inefficient contractions are less common in a multigravida than in a primigravida. Hence, every effort should be made to rule out disproportion in a multigravida before augmenting with oxytocin.**

- Rupture the membranes with an amniotic hook or a Kocher clamp and augment labour using oxytocin (**page P-17**).
- Reassess progress by vaginal examination two hours after a good contraction pattern with strong contractions has been established:
  - If there is **no progress between examinations**, deliver by caesarean section (**page P-43**);

- If **progress continues**, continue oxytocin infusion and re-examine after two hours. Continue to follow progress carefully.

PROLONGED EXPULSIVE PHASE

Maternal expulsive efforts increase fetal risk by reducing the delivery of oxygen to the placenta. Allow spontaneous maternal "pushing," but do not encourage prolonged effort and holding the breath.

- If **malpresentation and obvious obstruction have been excluded**, augment labour with oxytocin (**page P-25**).
- If there is **no descent after augmentation**:
  - If the **fetal head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the **fetal head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**);
  - If the **fetal head is between 1/5 and 3/5 above** the symphysis pubis or the leading bony edge of the **fetal head is between 0 station and –2 station**:
    - Deliver by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
    - If the **operator is not proficient in symphysiotomy**, deliver by caesarean section (**page P-43**).
  - If the **fetal head is more than 3/5 above** the symphysis pubis or the leading bony edge of the **fetal head is above –2 station, deliver by caesarean section (page P-43).**

MALPOSITIONS AND MALPRESENTATIONS

Malpositions are abnormal positions of the vertex of the fetal head (with the occiput as the reference point) relative to the maternal pelvis. Malpresentations are all presentations of the fetus other than vertex.

PROBLEM

- The fetus is in an abnormal position or presentation that may result in prolonged or obstructed labour.

GENERAL MANAGEMENT

- Perform a rapid evaluation of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- Assess fetal condition:
  - Listen to the **fetal heart rate** immediately after a contraction:
    - Count the fetal heart rate for a full minute at least once every 30 minutes during the active phase and every five minutes during the second stage;
    - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
  - If the **membranes have ruptured**, note the colour of the draining amniotic fluid:
    - Presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress (**page S-95**);
    - Absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.
- Provide encouragement and supportive care (**page C-57**).
- Review progress of labour using a partograph (**page C-65**).

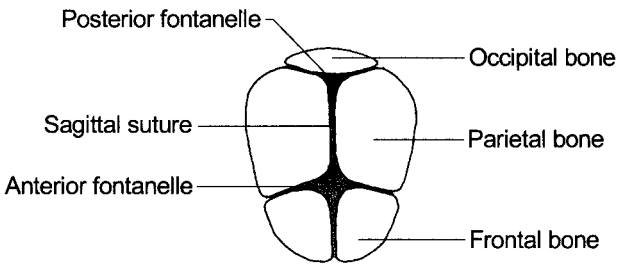
Note: Observe the woman closely. Malpresentations increase the risk for uterine rupture because of the potential for obstructed labour.

DIAGNOSIS

DETERMINE THE PRESENTING PART

- The most common presentation is the vertex of the fetal head. If the **vertex is not the presenting part**, see **Table S-12, page S-73**.
- If the **vertex is the presenting part**, use landmarks of the fetal skull to determine the position of the fetal head (**Fig S-9**).

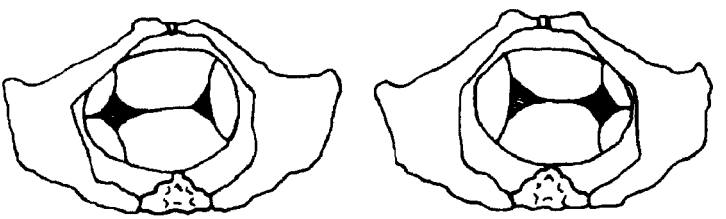
FIGURE S-9 Landmarks of the fetal skull



DETERMINE THE POSITION OF THE FETAL HEAD

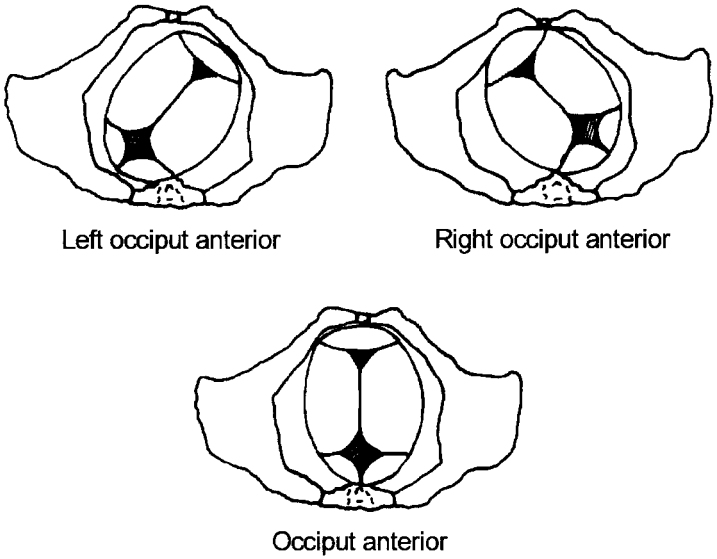
- The fetal head normally engages in the maternal pelvis in an occiput transverse position, with the fetal occiput transverse in the maternal pelvis (**Fig S-10**).

FIGURE S-10 Occiput transverse positions



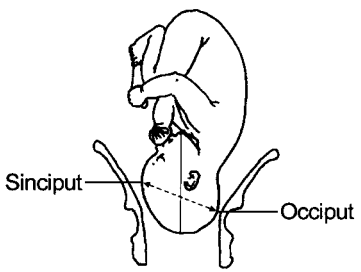
- With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (**Fig S-11**). Failure of an occiput transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position (**page S-75**).

FIGURE S-11 Occiput anterior positions



- An additional feature of a normal presentation is a well-flexed vertex (**Fig S-12**), with the fetal occiput lower in the vagina than the sinciput.

FIGURE S-12 Well-flexed vertex



- If the **fetal head is well-flexed** with **occiput anterior or occiput transverse** (in early labour), proceed with delivery (**page C-71**).
- If the **fetal head is not occiput anterior**, identify and manage the malposition (**Table S-11, page S-72**).
- If the **fetal head is not the presenting part** or the **fetal head is not well-flexed**, identify and manage the malpresentation (**Table S-12, page S-73**).

TABLE S-11 Diagnosis of malpositions

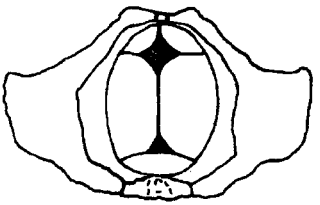
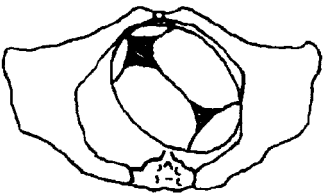
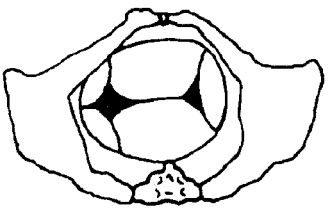
Symptoms and Signs	Figure
OCCIPUT POSTERIOR POSITION occurs when the fetal occiput is posterior in relation to the maternal pelvis (**Fig S-13** and **Fig S-14**). On **abdominal examination**, the lower part of the abdomen is flattened, fetal limbs are palpable anteriorly and the fetal heart may be heard in the flank. On **vaginal examination**, the posterior fontanelle is towards the sacrum and the anterior fontanelle may be easily felt if the head is deflexed. For management, see **page S-75**.	**FIGURE S-13**  Occiput posterior **FIGURE S-14**  Left occiput posterior
OCCIPUT TRANSVERSE POSITION occurs when the fetal occiput is transverse to the maternal pelvis (**Fig S-15**). If an occiput transverse position persists into the later part of the first stage of labour, it should be managed as an occiput posterior position (**page S-75**).	**FIGURE S-15**  Left occiput transverse

TABLE S-12 Diagnosis of malpresentations

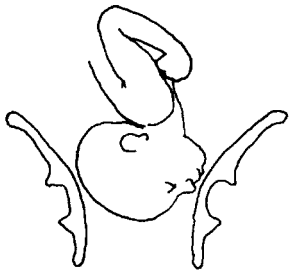
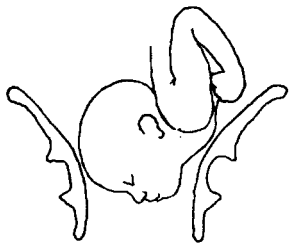
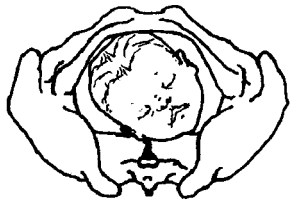
Symptoms and Signs	Figure
BROW PRESENTATION is caused by partial extension of the fetal head so that the occiput is higher than the sinciput (**Fig S-16**). On **abdominal examination**, more than half the fetal head is above the symphysis pubis and the occiput is palpable at a higher level than the sinciput. On **vaginal examination**, the anterior fontanelle and the orbits are felt. For management, see **page S-76**.	**FIGURE S-16** 
FACE PRESENTATION is caused by hyper-extension of the fetal head so that neither the occiput nor the sinciput are palpable on vaginal examination (**Fig S-17** and **Fig S-18**). On **abdominal examination**, a groove may be felt between the occiput and the back. On **vaginal examination**, the face is palpated, the examiner's finger enters the mouth easily and the bony jaws are felt. For management, see **page S-77**.	**FIGURE S-17**  **FIGURE S-18** 

TABLE S-12 Cont. Diagnosis of malpresentations

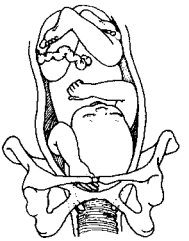
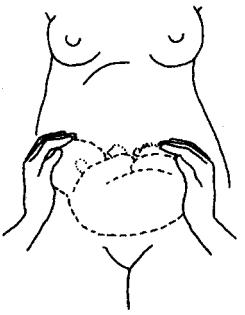
Symptoms and Signs	Figure
COMPOUND PRESENTATION occurs when an arm prolapses alongside the presenting part. Both the prolapsed arm and the fetal head present in the pelvis simultaneously (**Fig S-19**). For management, see **page S-78**.	**FIGURE S-19** 
BREECH PRESENTATION occurs when the buttocks and/or the feet are the presenting parts. On **abdominal examination**, the head is felt in the upper abdomen and the breech in the pelvic brim. Auscultation locates the fetal heart higher than expected with a vertex presentation. On **vaginal examination during labour**, the buttocks and/or feet are felt; thick, dark meconium is normal. For management, see **page S-79**. **COMPLETE (FLEXED) BREECH PRESENTATION** occurs when both legs are flexed at the hips and knees (**Fig S-20**). **FRANK (EXTENDED) BREECH PRESENTATION** occurs when both legs are flexed at the hips and extended at the knees (**Fig S-21**). **FOOTLING BREECH PRESENTATION** occurs when a leg is extended at the hip and the knee (**Fig S-22**).	**FIGURE S-20**  **FIGURE S-21**  **FIGURE S-22** 

TABLE S-12 Cont. Diagnosis of malpresentations

Symptoms and Signs	Figure
TRANSVERSE LIE AND SHOULDER PRESENTATION occur when the long axis of the fetus is transverse (**Fig S-23**). The shoulder is typically the presenting part. On **abdominal examination**, neither the head nor the buttocks can be felt at the symphysis pubis and the head is usually felt in the flank. On **vaginal examination**, a shoulder may be felt, but not always. An arm may prolapse and the elbow, arm or hand may be felt in the vagina. For management, see **page S-81**.	**FIGURE S-23** 

MANAGEMENT

OCCIPUT POSTERIOR POSITIONS

Spontaneous rotation to the anterior position occurs in 90% of cases. Arrested labour may occur when the head does not rotate and/or descend. Delivery may be complicated by perineal tears or extension of an episiotomy.

- If there are **signs of obstruction** but the **fetal heart rate is normal**, allow the woman to walk around or change position to encourage spontaneous rotation.
- If there are **signs of obstruction** and the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute) at any stage, deliver by caesarean section (**page P-43**).
- If the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- If the **cervix is not fully dilated** and there are **no signs of obstruction**, augment labour with oxytocin (**page P-25**).

- If the **cervix is fully dilated** but there is **no descent in the expulsive phase**, assess for signs of obstruction (**Table S-10, page S-57**):
  - If there are **no signs of obstruction**, augment labour with oxytocin (**page P-25**).
- If the **cervix is fully dilated and if**:
  - the **fetal head is more than 3/5 above** the symphysis pubis or the leading bony edge of the **fetal head is above –2 station**, perform caesarean section (**page P-43**);
  - the **fetal head is between 1/5 and 3/5 above** the symphysis pubis or the leading bony edge of the **fetal head is between 0 station and –2 station**:
    - Deliver by vacuum extraction (**page P-27**) and symphysiotomy (**page P-53**);
    - If the **operator is not proficient in symphysiotomy**, perform caesarean section (**page P-43**);
  - the **fetal head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the **fetal head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**).

BROW PRESENTATION

In brow presentation, engagement is usually impossible and arrested labour is common. Spontaneous conversion to either vertex presentation or face presentation can rarely occur, particularly when the fetus is small or when there is fetal death with maceration. It is unusual for spontaneous conversion to occur with an average-sized live fetus once the membranes have ruptured.

- If the **fetus is alive**, deliver by caesarean section (**page P-43**).
- If the **fetus is dead** and:
  - the **cervix is not fully dilated**, deliver by caesarean section (**page P-43**);
  - the **cervix is fully dilated**:
    - Deliver by craniotomy (**page P-57**);

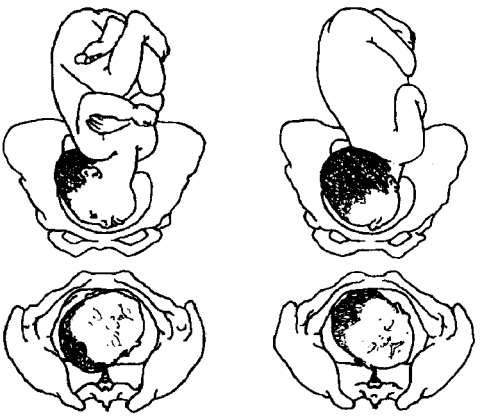
- If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

Do not deliver brow presentation by vacuum extraction, outlet forceps or symphysiotomy.

FACE PRESENTATION

The chin serves as the reference point in describing the position of the head. It is necessary to distinguish only chin-anterior positions, in which the chin is anterior in relation to the maternal pelvis (**Fig S-24 A**), from chin-posterior positions (**Fig S-24 B**).

FIGURE S-24 Face presentation



A. Chin anterior B. Chin posterior

Prolonged labour is common. Descent and delivery of the head by flexion may occur in the chin-anterior position. In the chin-posterior position, however, the fully extended head is blocked by the sacrum. This prevents descent and labour is arrested.

CHIN-ANTERIOR POSITION

- If the **cervix is fully dilated**:
  - Allow to proceed with normal childbirth (**page C-71**);
  - If there is **slow progress** and **no sign of obstruction** (**Table S-10, page S-57**), augment labour with oxytocin (**page P-25**);

- If **descent is unsatisfactory**, deliver by forceps (**page P-33**).

- If the **cervix is not fully dilated** and there are **no signs of obstruction**, augment labour using oxytocin (**page P-25**). Review progress as with vertex presentation.

CHIN-POSTERIOR POSITION

- If the **cervix is fully dilated**, deliver by caesarean section (**page P-43**).

- If the cervix is **not fully dilated**, monitor descent, rotation and progress. If there are **signs of obstruction**, deliver by caesarean section (**page P-43**).

- If the **fetus is dead**:

  - Deliver by craniotomy (**page P-57**);

  - If the **operator is not proficient in craniotomy**, deliver by caesarean section (**page P-43**).

Do not perform vacuum extraction for face presentation.

COMPOUND PRESENTATION

Spontaneous delivery can occur only when the fetus is very small or dead and macerated. Arrested labour occurs in the expulsive stage.

- Replacement of the prolapsed arm is sometimes possible:

  - Assist the woman to assume the knee-chest position (**Fig S-25**);

  - Push the arm above the pelvic brim and hold it there until a contraction pushes the head into the pelvis.

  - Proceed with management for normal childbirth (**page C-71**).

FIGURE S-25 Knee-chest position

- If the **procedure fails** or if the **cord prolapses**, deliver by caesarean section (**page P-43**).

BREECH PRESENTATION

Prolonged labour with breech presentation is an indication for urgent caesarean section. Failure of labour to progress must be considered a sign of possible cephalopelvic disproportion (**Table S-10, page S-57**).

The frequency of breech presentation is high in preterm labour.

EARLY LABOUR

Ideally, every breech delivery should take place in a hospital with surgical capability.

- Attempt external version (**page P-15**) if:
  - breech presentation is present at or after 37 weeks (before 37 weeks, a successful version is more likely to spontaneously revert back to breech presentation);
  - vaginal delivery is possible;
  - facilities for emergency caesarian section are available;
  - membranes are intact and amniotic fluid is adequate;
  - there are no complications (e.g. fetal growth restriction, uterine bleeding, previous caesarean delivery, fetal abnormalities, twin pregnancy, hypertension, fetal death).
- If **external version is successful**, proceed with normal childbirth (**page C-71**).
- If **external version fails**, proceed with vaginal breech delivery (see below) or caesarean section (**page P-43**).

VAGINAL BREECH DELIVERY

- A vaginal breech delivery (**page P-37**) by a skilled health care provider is safe and feasible under the following conditions:
  - complete (**Fig S-20, page S-74**) or frank breech (**Fig S-21, page S-74**);

- adequate clinical pelvimetry;
- fetus is not too large;
- no previous caesarean section for cephalopelvic disproportion;
- flexed head.

- Examine the woman regularly and record progress on a partograph (**page C-65**).
- If the **membranes rupture**, examine the woman immediately to exclude cord prolapse.

  Note: Do not rupture the membranes.
- If the **cord prolapses** and **delivery is not imminent**, deliver by caesarean section (**page P-43**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute) or **prolonged labour**, deliver by caesarean section (**page P-43**).

  Note: Meconium is common with breech labour and is not a sign of fetal distress if the fetal heart rate is normal.

The woman should not push until the cervix is fully dilated. Full dilatation should be confirmed by vaginal examination.

CAESAREAN SECTION FOR BREECH PRESENTATION

- A caesarean section (**page P-43**) is safer than vaginal breech delivery and recommended in cases of:
  - double footling breech;
  - small or malformed pelvis;
  - very large fetus;
  - previous caesarean section for cephalopelvic disproportion;
  - hyperextended or deflexed head.

  Note: Elective caesarean section does not improve the outcome in preterm breech delivery.

COMPLICATIONS

Fetal complications of breech presentation include:

- cord prolapse;
- birth trauma as a result of extended arm or head, incomplete dilatation of the cervix or cephalopelvic disproportion;
- asphyxia from cord prolapse, cord compression, placental detachment or entrapped head;
- damage to abdominal organs;
- broken neck.

TRANSVERSE LIE AND SHOULDER PRESENTATION

- If the **woman is in early labour** and the **membranes are intact**, attempt external version (**page P-15**):
  - If **external version is successful**, proceed with normal childbirth (**page C-71**);
  - If **external version fails** or is not advisable, deliver by caesarean section (**page P-43**).
- Monitor for signs of cord prolapse. If the **cord prolapses** and **delivery is not imminent**, deliver by caesarean section (**page P-43**).

Note: Ruptured uterus may occur if the woman is left unattended (**page S-20**).

In modern practise, persistent transverse lie in labour is delivered by caesarean section whether the fetus is alive or dead.

PROBLEM

- The fetal head has been delivered but the shoulders are stuck and cannot be delivered.

GENERAL MANAGEMENT

- Be prepared for shoulder dystocia at all deliveries, especially if a large baby is anticipated.
- Have several persons available to help.

Shoulder dystocia cannot be predicted.

DIAGNOSIS

- The fetal head is delivered but remains tightly applied to the vulva.
- The chin retracts and depresses the perineum.
- Traction on the head fails to deliver the shoulder, which is caught behind the symphysis pubis.

MANAGEMENT

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Make an adequate episiotomy (**page P-71**) to reduce soft tissue obstruction and to allow space for manipulation.
- With the woman on her back, ask her to flex both thighs, bringing her knees as far up as possible towards her chest (**Fig S-26, page S-84**). Ask two assistants to push her flexed knees firmly up onto her chest.

FIGURE S-26 Assistant pushing flexed knees firmly towards chest

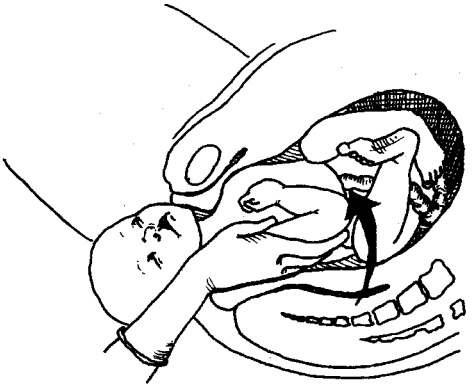
- Wearing high-level disinfected or sterile gloves:
  - Apply firm, continuous traction downwards on the fetal head to move the shoulder that is anterior under the symphysis pubis;

    Note: Avoid excessive traction on the fetal head as this may result in brachial plexus injury;
  - Have an assistant simultaneously apply suprapubic pressure downwards to assist delivery of the shoulder;

    Note: Do not apply fundal pressure. This will further impact the shoulder and can result in uterine rupture.
- If the **shoulder still is not delivered**:
  - Insert a hand into the vagina along the baby's back;
  - Apply pressure to the shoulder that is anterior in the direction of the baby's sternum to rotate the shoulder and decrease the diameter of the shoulders;
  - If needed, apply pressure to the shoulder that is posterior in the direction of the sternum.
- If the **shoulder still is not delivered despite the above measures**:
  - Insert a hand into the vagina;

- Grasp the humerus of the arm that is posterior and, keeping the arm flexed at the elbow, sweep the arm across the chest. This will provide room for the shoulder that is anterior to move under the symphysis pubis (**Fig S-27**).

FIGURE S-27 **Grasping the humerus of the arm that is posterior and sweeping the arm across the chest**



- If **all of the above measures fail to deliver the shoulder**, other options include:
  - Fracture the clavicle to decrease the width of the shoulders and free the shoulder that is anterior;
  - Apply traction with a hook in the axilla to extract the arm that is posterior.

LABOUR WITH AN OVERDISTENDED UTERUS

PROBLEM

- A woman in labour has an overdistended uterus or symphysis-fundal height more than expected for the period of gestation.

GENERAL MANAGEMENT

- Prop up the woman.
- Confirm accuracy of calculated gestational age, if possible.

DIAGNOSIS

- If **only one fetus is felt** on abdominal examination, consider wrong dates, a single large fetus (**page S-88**) or an excess of amniotic fluid (**page S-88**).
- If **multiple fetal poles and parts are felt** on abdominal examination, suspect multiple pregnancy. Other signs of multiple pregnancy include:
  - fetal head small in relation to the uterus;
  - uterus larger than expected for gestation;
  - more than one fetal heart heard with Doppler fetal stethoscope.

  Note: An acoustic fetal stethoscope cannot be used to confirm the diagnosis, as one heart may be heard in different areas.
- Use **ultrasound examination**, if available, to:
  - identify the number, presentations and sizes of fetuses;
  - assess the volume of amniotic fluid.
- If **ultrasound service is not available**, perform radiological examination (anterio-posterior view) for number of fetuses and presentations.

MANAGEMENT

SINGLE LARGE FETUS

- Manage as for normal labour (**page C-57**).
- Anticipate and prepare for prolonged and obstructed labour (**page S-57**), shoulder dystocia (**page S-83**) and postpartum haemorrhage (**page S-25**).

EXCESS AMNIOTIC FLUID

- Allow labour to progress and monitor progress using a partograph (**page C-65**).
- If the **woman is uncomfortable because of uterine distension**, aspirate excess amniotic fluid:
  - Palpate for location of fetus;
  - Prepare the skin with an antiseptic (**page C-22**);
  - Under aseptic conditions, insert a 20-gauge spinal needle through the abdominal and uterine walls and withdraw the stylet;
  - Aspirate the fluid using a large syringe. Alternatively, attach an infusion set to the needle and allow the fluid to slowly drain into a container;
  - When the woman is no longer uncomfortable because of overdistension, replace the stylet and remove the needle.
- If **rupture of membranes is indicated** for other reasons, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**).
- Check for cord prolapse when membranes rupture. If the **cord prolapses and delivery is not imminent,** deliver by caesarean section (**page P-43**).

MULTIPLE PREGNANCY

FIRST BABY

- Start an IV infusion and slowly infuse IV fluids (**page C-21**).
- Monitor fetuses by intermittent auscultation of the fetal heart rates. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-95**).
- Check presentation:
  - If a **vertex presentation**, allow labour to progress as for a single vertex presentation (**page C-57**) and monitor progress in labour using a partograph (**page C-65**);
  - If a **breech presentation,** apply the same guidelines as for a singleton breech presentation (**page S-79**) and monitor progress in labour using a partograph (**page C-65**);
  - If a **transverse lie**, deliver by caesarean section (**page P-43**).

Leave a clamp on the maternal end of the umbilical cord and do not attempt to deliver the placenta until the last baby is delivered.

SECOND OR ADDITIONAL BABY(S)

- Immediately after the first baby is delivered:
  - Palpate the abdomen to determine lie of additional baby;
  - Correct to longitudinal lie by external version (**page P-15**);
  - Check fetal heart rate(s).
- Perform a vaginal examination to determine if:
  - the cord has prolapsed (**page S-97**);
  - the membranes are intact or ruptured;
  - presentation of other baby(s).

VERTEX PRESENTATION

- If the **fetal head is not engaged**, manoeuvre the head into the pelvis manually (hands on abdomen), if possible.

- If the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp.
- Check fetal heart rate between contractions.
- If **contractions are inadequate after birth of first baby**, augment labour with oxytocin using rapid escalation (**Table P-8, page P-23**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds).
- If **spontaneous delivery does not occur within two hours** of good contractions or if there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by caesarean section (**page P-43**).

BREECH PRESENTATION

- If the **baby is estimated to be no larger than the first baby**, and if the **cervix has not contracted**, consider breech extraction (**page P-42**) or vaginal delivery (**page C-71**):
  - If there are **inadequate or no contractions after birth of first baby**, escalate oxytocin infusion at a rapid but controlled rate (**Table P-8, page P-23**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds);
  - If the **membranes are intact** and the **breech has descended**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-17**);
  - Check fetal heart rate between contractions. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), deliver by breech extraction (**page P-42**).
- If **vaginal delivery is not possible**, deliver by caesarean section (**page P-43**).

TRANSVERSE LIE

- If the **membranes are intact**, attempt external version (**page P-15**).
- If **external version fails** and the **cervix is fully dilated and membranes are still intact**, attempt internal podalic version:

  Note: **Do not attempt internal podalic version** if the provider is untrained, the membranes have ruptured and the amniotic fluid has drained, or if the uterus is scarred. Do not persist if the baby does not turn easily.

- Wearing high-level disinfected or sterile gloves, insert a hand into the uterus and grasp the baby's foot;
- Gently rotate the baby down;
- Proceed with breech extraction (**page P-42**).

- Check fetal heart rate between contractions.
- If **external version fails** and **internal podalic version is not advisable or fails**, deliver by caesarean section (**page P-43**).
- Give oxytocin 10 units IM or give ergometrine 0.2 mg IM within one minute after delivery of the last baby and continue active management of the third stage to reduce postpartum blood loss (**page C-73**).

COMPLICATIONS

- Maternal complications of multiple pregnancy include:
  - anaemia;
  - abortion;
  - pregnancy-induced hypertension and pre-eclampsia;
  - excess amniotic fluid;
  - poor contractions during labour;
  - retained placenta;
  - postpartum haemorrhage.
- Placental/fetal complications include:
  - placenta praevia;
  - abruptio placentae;
  - placental insufficiency;
  - preterm delivery;
  - low birth weight;
  - malpresentations;
  - cord prolapse;
  - congenital anomalies.

PROBLEM

- A woman in labour has a scarred uterus from a previous uterine surgery.

GENERAL MANAGEMENT

- Start an IV infusion and infuse IV fluids (**page C-21**).
- If possible, identify the reason for the uterine scar. Caesarean section and other uterine surgeries (e.g. repair of a previous uterine rupture, excision of an ectopic pregnancy implanted in the cornua) leave a scar in the uterine wall. This scar can weaken the uterus, leading to uterine rupture during labour (**Box S-6**).

BOX S-6 Rupture of uterine scars

- **Vertical scars** from a previous caesarean section may rupture before labour or during the latent phase.
- **Transverse scars** typically rupture during active labour or during the expulsive phase.
- The rupture may extend only a short distance into the myometrium with little pain or bleeding. The fetus and placenta may remain in the uterus and the fetus may survive for minutes or hours.

SPECIFIC MANAGEMENT

Studies have shown that more than 50% of cases with low transverse caesarean scars can deliver vaginally. The frequency of rupture of low transverse scars during a careful trial of labour is reported as less than 1%.

TRIAL OF LABOUR

- Ensure that conditions are favourable for trial of labour, namely:
  - The previous surgery was a low transverse caesarean incision;
  - The fetus is in a normal vertex presentation;

- Emergency caesarean section can be carried out immediately if required.

- If these **conditions are not met** or if the **woman has a history of two lower uterine segment caesarean sections or ruptured uterus**, deliver by caesarean section (**page P-43**).
- Monitor progress of labour using a partograph (**page C-65**).
- If **cervical dilatation crosses the alert line** of the partograph, diagnose the cause of slow progress and take appropriate action:
  - If there is slow progress in labour due to **inefficient uterine contractions** (**Table S-10, page S-57**), rupture the membranes with an amniotic hook or a Kocher clamp and augment labour using oxytocin (**page P-17**);
  - If there are **signs of cephalopelvic disproportion or obstruction** (**Table S-10**), deliver immediately by caesarean section (**page P-43**).
- If there are **signs of impending uterine rupture** (rapid maternal pulse, persistent abdominal pain and suprapubic tenderness, fetal distress), deliver immediately by caesarean section (**page P-43**).
- If **uterine rupture is suspected**, deliver immediately by caesarean section (**page P-43**) and repair the uterus (**page P-95**) or perform hysterectomy (**page P-103**).

PROBLEMS

- Abnormal fetal heart rate (less than 100 or more than 180 beats per minute).
- Thick meconium-stained amniotic fluid.

GENERAL MANAGEMENT

- Prop up the woman or place her on her left side.
- Stop oxytocin if it is being administered.
- Give oxygen 4–6 L by mask or nasal cannulae.

ABNORMAL FETAL HEART RATE

BOX S-7 Abnormal fetal heart rate

- A **normal fetal heart rate** may slow during a contraction but usually recovers to normal as soon as the uterus relaxes.
- A **very slow fetal heart rate** in the absence of contractions or persisting after contractions is suggestive of fetal distress.
- A **rapid fetal heart rate** may be a response to maternal fever, drugs causing rapid maternal heart rate (e.g. terbutaline or ritodrine), hypertension or amnionitis. In the absence of a rapid maternal heart rate, a rapid fetal heart rate should be considered a sign of fetal distress.

- If a **maternal cause is identified** (e.g. maternal fever, drugs), initiate appropriate management.
- If a **maternal cause is not identified** and the **fetal heart rate remains abnormal** throughout at least three contractions, perform a vaginal examination to check for explanatory signs of distress:
  - If there is **bleeding with intermittent or constant pain**, suspect abruptio placentae (**page S-18**);

- If there are **signs of infection** (fever, foul-smelling vaginal discharge) give antibiotics as for amnionitis (**page S-139**);
- If the **cord is below the presenting part or in the vagina**, manage as prolapsed cord (**page S-97**).

- If **fetal heart rate abnormalities persist** or there are **additional signs of distress** (thick meconium-stained fluid), plan delivery:
  - If the **cervix is fully dilated** and the **fetal head is not more than 1/5 above** the symphysis pubis or the leading bony edge of the **fetal head is at 0 station**, deliver by vacuum extraction (**page P-27**) or forceps (**page P-33**);
  - If the **cervix is not fully dilated** or the **fetal head is more than 1/5 above** the symphysis pubis or the leading bony edge of the **fetal head is above 0 station**, deliver by caesarean section (**page P-43**).

MECONIUM

- Meconium staining of amniotic fluid is seen frequently as the fetus matures and by itself is not an indicator of fetal distress. A slight degree of meconium without fetal heart rate abnormalities is a warning of the need for vigilance.
- **Thick meconium** suggests passage of meconium in reduced amniotic fluid and may indicate the need for expedited delivery and management of the neonatal upper airway at birth to prevent meconium aspiration (**page S-143**).
- In **breech presentation**, meconium is passed in labour because of compression of the fetal abdomen. This is not a sign of distress unless it occurs in early labour.

PROBLEMS

- The umbilical cord lies in the birth canal below the fetal presenting part.
- The umbilical cord is visible at the vagina following rupture of the membranes.

GENERAL MANAGEMENT

- Give oxygen at 4–6 L per minute by mask or nasal cannulae.

SPECIFIC MANAGEMENT

PULSATING CORD

If the **cord is pulsating**, the fetus is alive.

- Diagnose stage of labour by an immediate vaginal examination (**Table C-8, page C-60**).
- If the woman is in the **first stage of labour**, in all cases:
  - Wearing high-level disinfected or sterile gloves, insert a hand into the vagina and push the presenting part up to decrease pressure on the cord and dislodge the presenting part from the pelvis;
  - Place the other hand on the abdomen in the suprapubic region to keep the presenting part out of the pelvis;
  - Once the presenting part is firmly held above the pelvic brim, remove the other hand from the vagina. Keep the hand on the abdomen until caesarean section;
  - If available, give salbutamol 0.5 mg IV slowly over two minutes to reduce contractions;
  - Perform immediate caesarean section (**page P-43**).
- If the woman is in the **second stage of labour**:
  - Expedite delivery with episiotomy (**page P-71**) and vacuum extraction (**page P-27**) or forceps (**page P-33**);

- If **breech presentation**, perform breech extraction (**page P-42**) and apply Piper or long forceps to the after-coming head (**page P-41**);
- Prepare for resuscitation of the newborn (**page S-142**).

CORD NOT PULSATING

If the **cord is not pulsating**, the fetus is dead. Deliver in the manner that is safest for the woman.

FEVER DURING PREGNANCY AND LABOUR

PROBLEM

- A woman has a fever (temperature 38°C or more) during pregnancy or labour.

GENERAL MANAGEMENT

- Encourage bed rest.
- Encourage increased fluid intake by mouth.
- Use a fan or tepid sponge to help decrease temperature.

DIAGNOSIS

TABLE S-13 Diagnosis of fever during pregnancy and labour

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Abdominal pain	**Cystitis, page S-101**
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Foul-smelling vaginal discharge in first 22 weeks • Fever • Tender uterus	• Lower abdominal pain • Rebound tenderness • Prolonged bleeding • Purulent cervical discharge	**Septic abortion, Table S-2, page S-9**
• Fever/chills • Foul-smelling watery discharge after 22 weeks • Abdominal pain	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light vaginal bleeding	**Amnionitis, page S-139**
• Fever • Difficulty in breathing • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**
• Fever • Headache • Dry cough • Malaise • Anorexia • Enlarged spleen	• Confusion • Stupor	**Typhoid**[a]

[a] Give ampicillin 1 g by mouth four times per day OR give amoxicillin 1 g by mouth three times per day for 14 days. Alternative therapy will depend on local sensitivity patterns.

TABLE S-13 Cont. Diagnosis of fever during pregnancy and labour

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Fever • Malaise • Anorexia • Nausea • Dark urine and pale stool • Jaundice • Enlarged liver	• Muscle/joint pain • Urticaria • Enlarged spleen	**Hepatitis**[b]

[b] Provide supportive therapy and observe.

MANAGEMENT

URINARY TRACT INFECTIONS

Assume that a urinary tract infection involves all levels of the tract, from renal calyces to urethral meatus.

TESTS

Dipstick, microscopy and urine culture tests can be used to determine if a urinary tract infection is present, but will not differentiate between cystitis and acute pyelonephritis.

- A dipstick leukocyte esterase test can be used to detect white blood cells, and a nitrate reductase test can be used to detect nitrites.
- Microscopy of urine specimen may show white cells in clumps, bacteria and sometimes red cells.
- Urine culture and sensitivity tests should be done, if available, to identify the organism and its antibiotic sensitivity.

Note: Urine examination requires a clean-catch mid-stream specimen to minimize the possibility of contamination.

CYSTITIS

Cystitis is infection of the bladder.

- Treat with antibiotics (**page C-35**):

- amoxicillin 500 mg by mouth three times per day for three days;
- OR trimethoprim/sulfamethoxazole one tablet (160/800 mg) by mouth two times per day for three days.

- If **treatment fails**, check urine culture and sensitivity, if available, and treat with an antibiotic appropriate for the organism.
- If **infection recurs two or more times**:
  - Check urine culture and sensitivity, if available, and treat with an antibiotic appropriate for the organism;
  - For prophylaxis against further infections, give antibiotics by mouth once daily at bedtime for the remainder of pregnancy and two weeks postpartum. Give:
    - trimethoprim/sulfamethoxazole one tablet (160/800 mg);
    - OR amoxicillin 250 mg.

    Note: Prophylaxis is indicated after recurrent infections, not after a single episode.

ACUTE PYELONEPHRITIS

Acute pyelonephritis is an infection of the upper urinary tract, mainly of the renal pelvis, which may also involve the renal parenchyma.

- If **shock is present or suspected**, initiate immediate treatment (**page S-1**).
- Start an IV infusion and infuse IV fluids at 150 mL per hour (**page C-21**).
- Check urine culture and sensitivity, if possible, and treat with an antibiotic appropriate for the organism.
- If **urine culture is unavailable**, treat with antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Once the **woman is fever-free for 48 hours**, give amoxicillin 1 g by mouth three times per day to complete 14 days of treatment.

  Note: Clinical response is expected within 48 hours. If there is **no clinical response in 72 hours**, re-evaluate results and antibiotic coverage.

- For prophylaxis against further infections, give antibiotics by mouth once daily at bedtime for the remainder of pregnancy and for two weeks postpartum. Give:
  - trimethoprim/sulfamethoxazole one tablet (160/800 mg);
  - OR amoxicillin 250 mg.
- Ensure adequate hydration by mouth or IV.
- Give paracetamol 500 mg by mouth as needed for pain and to lower temperature.
- If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm labour (**page S-122**).

UNCOMPLICATED MALARIA

Two species of malaria parasites, *Plasmodium. falciparum* and *P. vivax*, account for the majority of cases. Symptomatic falciparum malaria in pregnant women may cause severe disease and death if not recognized and treated early. When malaria presents as an acute illness with fever, it cannot be reliably distinguished from many other causes of fever on clinical grounds. Malaria should be considered the most likely diagnosis in a pregnant woman with fever who has been exposed to malaria.

- Women without pre-existing immunity to malaria (living in non-malarial area) are susceptible to the more severe complications of malaria (**page S-52**).
- Women with acquired immunity to malaria are at high risk for developing severe anaemia and delivering low birth weight babies.

TESTS

- If **facilities for testing are not available**, begin therapy with antimalarial drugs based on clinical suspicion (e.g. headache, fever, joint pain).
- Where available, the following tests will confirm the diagnosis:
  - microscopy of a thick and thin blood film:
    - thick blood film is more sensitive at detecting parasites (absence of parasites does not rule out malaria);
    - thin blood film helps to identify the parasite species.
  - rapid antigen detection tests.

FALCIPARUM MALARIA

ACUTE, UNCOMPLICATED P. FALCIPARUM MALARIA

Chloroquine-resistant falciparum malaria is widespread. Resistance to other drugs (e.g. quinine, sulfadoxine/pyrimethamine, mefloquine) also occurs. It is, therefore, important to follow the recommended national treatment guidelines. Drugs contraindicated in pregnancy include primaquine, tetracycline, doxycycline and halofantrine. Insufficient data currently exists on the use of atovoquone/proguanil and artemether/lumefantrine in pregnancy to recommend their use at this time.

AREA OF CHLOROQUINE-SENSITIVE P. FALCIPARUM PARASITES

- Give chloroquine base 10 mg/kg body weight by mouth once daily for two days followed by 5 mg/kg body weight on day 3.

  Note: Chloroquine is considered safe in all three trimesters of pregnancy.

AREA OF CHLOROQUINE-RESISTANT P. FALCIPARUM PARASITES

Oral sulfadoxine/pyrimethamine or quinine salt (dihydrochloride or sulfate) can be used for treating chloroquine-resistant malaria throughout pregnancy. Treatment options include:

- sulfadoxine/pyrimethamine three tablets by mouth as a single dose;

  Note: Sulfadoxine/pyrimethamine should not be used if the woman is allergic to sulfonamides.

- OR quinine salt 10 mg/kg body weight by mouth three times per day for seven days.

  Note: If compliance with seven days of quinine is not possible or side effects are severe, give a minimum of three days of quinine PLUS sulfadoxine/pyrimethamine three tablets by mouth as a single dose on the first day of treatment (providing sulfadoxine/pyrimethamine is effective; consult the national guidelines).

Mefloquine may also be used for treating symptomatic *P. falciparum* in pregnancy if treatment with quinine or sulfadoxine/pyrimethamine is unsuitable because of drug resistance or individual contraindications.

Note: Clinicians should carefully consider the use of mefloquine in early pregnancy due to limited safety data in the first trimester of pregnancy:

- In areas of mefloquine-sensitive parasites, give mefloquine 15 mg/kg body weight by mouth as a single dose;
- In areas of emerging mefloquine resistance, give mefloquine 15 mg/kg body weight by mouth followed by 10 mg/kg body weight 24 hours later.

AREA OF MULTIDRUG-RESISTANT P. FALCIPARUM MALARIA

Multidrug-resistant *P. falciparum* malaria (resistant to chloroquine and sulfadoxine/pyrimethamine and quinine or mefloquine) is present in certain areas limiting treatment options. Consult the national treatment guidelines. Treatment options include:

- quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth three times daily for seven days;
- OR quinine salt 10 mg/kg body weight by mouth three times daily for even days PLUS clindamycin 300 mg four times daily for five days;

  Note: The quinine/clindamycin combination can be used in areas of quinine resistance.
- OR artesunate 4 mg/kg body weight by mouth in a divided loading dose on day 1, followed by 2 mg/kg body weight by mouth once daily for six days.

  Note: Artesunate can be used in the second and third trimester for treating uncomplicated malaria but there are insufficient data to recommend its use in the first trimester. Artesunate may be used, however, if no suitable alternative exists.

VIVAX MALARIA

AREA OF CHLOROQUINE-SENSITIVE P. VIVAX PARASITES

Chloroquine alone is the treatment of choice in areas with chloroquine-sensitive vivax malaria and areas with chloroquine-sensitive vivax and falciparum malaria. Where there is chloroquine-resistant *P. falciparum*, manage as a mixed infection (**page S-106**).

- Give chloroquine base 10 mg/kg body weight by mouth once daily for two days followed by 5 mg/kg body weight by mouth on day 3.

AREA OF CHLOROQUINE-RESISTANT P. VIVAX PARASITES

Chloroquine-resistant *P. vivax* has been reported in several countries and there are limited data available to determine the optimal treatment. Before considering second line drugs for treatment failure with chloroquine, clinicians should exclude poor patient compliance and a

new infection with *P. falciparum*. If **diagnostic testing is not available**, manage as a mixed infection (see below). Treatment options for confirmed chloroquine-resistant vivax malaria include:

- quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth twice daily for seven days;

  Note: The dose of quinine is less than that used for falciparum malaria; diagnosis of species is essential.

- OR mefloquine 15 mg/kg body weight by mouth as a single dose;
- OR sulfadoxine/pyrimethamine three tablets by mouth as a single dose;

  Note: Sulfadoxine/pyrimethamine is not generally recommended because it acts slowly to clear vivax parasites.

- OR artesunate 4 mg/kg body weight by mouth in a divided loading dose on day 1 followed by 2 mg/kg body weight by mouth daily for six days.

TREATMENT OF LIVER STAGES OF VIVAX MALARIA

Vivax malaria may remain dormant in the liver. From time to time, these dormant stages are released into the blood to cause a new, symptomatic vivax infection. Primaquine can be used to clear the liver stages but its use is not acceptable during pregnancy; primaquine should be used only after delivery. Dose regimens vary by geographic region; use the dose recommended in the national guidelines.

AREAS OF MIXED FALCIPARUM-VIVAX MALARIA

In areas of mixed transmission, the proportions of malaria species and their drug sensitivity patterns vary. Referral to the national treatment guidelines is essential. If **microscopic diagnosis is available**, specific treatment can be prescribed. Where unavailable, options include:

- assume the infection is due to *P. falciparum* and treat accordingly (follow national guidelines);
- in areas of chloroquine-resistant but sulfadoxine/pyrimethamine sensitive *P. falciparum* and chloroquine sensitive *P. vivax*, treat with standard dose chloroquine and standard dose sulfadoxine/pyrimethamine.

PROBLEM

- A woman has a fever (temperature 38°C or more) occurring more than 24 hours after delivery.

GENERAL MANAGEMENT

- Encourage bed rest.
- Ensure adequate hydration by mouth or IV.
- Use a fan or tepid sponge to help decrease temperature.
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

DIAGNOSIS

TABLE S-14 Diagnosis of fever after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Fever/chills • Lower abdominal pain • Purulent, foul-smelling lochia • Tender uterus	• Light[a] vaginal bleeding • Shock	**Metritis, page S-110**
• Lower abdominal pain and distension • Persistent spiking fever/chills • Tender uterus	• Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis	**Pelvic abscess, page S-110**
• Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**
• Breast pain and tenderness • 3–5 days after delivery	• Hard enlarged breasts • Both breasts affected	**Breast engorgement, page S-111**
• Breast pain and tenderness • Reddened, wedge-shaped area on breast • 3–4 weeks after delivery	• Inflammation preceded by engorgement • Usually only one breast affected	**Mastitis, page S-112**
• Firm, very tender breast • Overlying erythema	• Fluctuant swelling in breast • Draining pus	**Breast abscess, page S-113**
• Unusually tender wound with bloody or serous discharge	• Slight erythema extending beyond edge of incision	**Wound abscess, wound seroma or wound haematoma, page S-113**
• Painful and tender wound • Erythema and oedema beyond edge of incision	• Hardened wound • Purulent discharge • Reddened area around wound	**Wound cellulitis, page S-114**
• Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Abdominal pain	**Cystitis, page S-101**

[a] Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked.

TABLE S-14 Cont. Diagnosis of fever after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Spiking fever despite antibiotics	• Calf muscle tenderness	**Deep vein thrombosis**[a]
• Fever • Difficulty in breathing • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Fever • Decreased breath sounds	• Typically occurs postoperative	**Atelectasis**[b]
• Fever • Chills/rigors • Headache • Muscle/joint pain	• Enlarged spleen	**Uncomplicated malaria, page S-103**
• Symptoms and signs of uncomplicated malaria • Coma • Anaemia	• Convulsions • Jaundice	**Severe/complicated malaria, page S-52**
• Fever • Headache • Dry cough • Malaise • Anorexia • Enlarged spleen	• Confusion • Stupor	**Typhoid**[c]
• Fever • Malaise • Anorexia • Nausea • Dark urine and pale stool • Jaundice • Enlarged liver	• Muscle/joint pain • Urticaria • Enlarged spleen	**Hepatitis**[d]

[a] Give heparin infusion.

[b] Encourage the woman to move about freely and breathe deeply. Antibiotics are not necessary.

[c] Give ampicillin 1 g by mouth four times per day OR amoxicillin 1 g by mouth three times per day for 14 days. Alternative therapy will depend on local sensitivity patterns.

[d] Provide supportive therapy and observe.

MANAGEMENT

METRITIS

Metritis is infection of the uterus after delivery and is a major cause of maternal death. Delayed or inadequate treatment of metritis may result in pelvic abscess, peritonitis, septic shock, deep vein thrombosis, pulmonary embolism, chronic pelvic infection with recurrent pelvic pain and dyspareunia, tubal blockage and infertility.

- Transfuse as necessary. Use packed cells, if available (**page C-23**).
- Give a combination of antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every eight hours;
  - If **fever is still present 72 hours after starting antibiotics**, re-evaluate and revise diagnosis.

  Note: Oral antibiotics are not necessary after stopping IV antibiotics.
- If **retained placental fragments** are suspected, perform a digital exploration of the uterus to remove clots and large pieces. Use ovum forceps or a wide curette if required.
- If there is **no improvement** with conservative measures and there are **signs of general peritonitis** (fever, rebound tenderness, abdominal pain), perform a laparotomy to drain the pus.
- If the **uterus is necrotic and septic**, perform subtotal hysterectomy (**page P-103**).

PELVIC ABSCESS

- Give a combination of antibiotics before draining the abscess and continue until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every eight hours.

- If the abscess is **fluctuant in the cul-de-sac**, drain the pus through the cul-de-sac (**page P-69**). If the **spiking fever continues**, perform a laparotomy.

PERITONITIS

- Provide nasogastric suction.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Give a combination of antibiotics until the woman is fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every eight hours.
- If necessary, perform laparotomy for peritoneal lavage (wash-out).

BREAST ENGORGEMENT

Breast engorgement is an exaggeration of the lymphatic and venous engorgement that occurs before lactation. It is not the result of overdistension of the breast with milk.

BREASTFEEDING

- If the **woman is breastfeeding** and the **baby is not able to suckle**, encourage the woman to express milk by hand or with a pump.
- If the **woman is breastfeeding** and the **baby is able to suckle**:
  - Encourage the woman to breastfeed more frequently, using both breasts at each feeding;
  - Show the woman how to hold the baby and help it attach;
  - Relief measures before feeding may include:
    - Apply warm compresses to the breasts just before breastfeeding, or encourage the woman to take a warm shower;
    - Massage the woman's neck and back;
    - Have the woman express some milk manually before breastfeeding and wet the nipple area to help the baby latch on properly and easily;

- Relief measures after feeding may include:
  - Support breasts with a binder or brassiere;
  - Apply cold compress to the breasts between feedings to reduce swelling and pain;
  - Give paracetamol 500 mg by mouth as needed;
- Follow up in three days to ensure response.

NOT BREASTFEEDING

- If the **woman is not breastfeeding**:
  - Support breasts with a binder or brassiere;
  - Apply cold compresses to the breasts to reduce swelling and pain;
  - Avoid massaging or applying heat to the breasts;
  - Avoid stimulating the nipples;
  - Give paracetamol 500 mg by mouth as needed;
  - Follow up in three days to ensure response.

BREAST INFECTION

MASTITIS

- Treat with antibiotics (**page C-35**):
  - cloxacillin 500 mg by mouth four times per day for 10 days;
  - OR erythromycin 250 mg by mouth three times per day for 10 days.
- Encourage the woman to:
  - continue breastfeeding;
  - support breasts with a binder or brassiere;
  - apply cold compresses to the breasts between feedings to reduce swelling and pain.
- Give paracetamol 500 mg by mouth as needed.
- Follow up in three days to ensure response.

BREAST ABSCESS

- Treat with antibiotics (**page C-35**):
  - cloxacillin 500 mg by mouth four times per day for 10 days;
  - OR erythromycin 250 mg by mouth three times per day for 10 days.
- Drain the abscess:
  - General anaesthesia (e.g. ketamine, **page P-13**) is usually required;
  - Make the incision radially, extending from near the areolar margin towards the periphery of the breast to avoid injury to the milk ducts;
  - Wearing high-level disinfected gloves or sterile, use a finger or tissue forceps to break up the pockets of pus;
  - Loosely pack the cavity with gauze;
  - Remove the gauze pack after 24 hours and replace with a smaller gauze pack.
- If there is **still pus in the cavity**, place a small gauze pack in the cavity and bring the edge out through the wound as a wick to facilitate drainage of any remaining pus.
- Encourage the woman to:
  - continue breastfeeding even when there is collection of pus;
  - support breasts with a binder or brassiere;
  - apply cold compresses to the breasts between feedings to reduce swelling and pain.
- Give paracetamol 500 mg by mouth as needed.
- Follow up in three days to ensure response.

INFECTION OF PERINEAL AND ABDOMINAL WOUNDS

WOUND ABSCESS, WOUND SEROMA AND WOUND HAEMATOMA

- If there is **pus or fluid**, open and drain the wound.
- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.

- If there is an **abscess without cellulitis**, antibiotics are not required.
- Place a damp dressing in the wound and have the woman return to change the dressing every 24 hours.
- Advise the woman on the need for good hygiene and to wear clean pads or cloths that she changes often.

WOUND CELLULITIS AND NECROTIZING FASCIITIS

- If there is **fluid or pus**, open and drain the wound.
- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.
- If **infection is superficial and does not involve deep tissues**, monitor for development of an abscess and give a combination of antibiotics (**page C-35**):
  - ampicillin 500 mg by mouth four times per day for five days;
  - PLUS metronidazole 400 mg by mouth three times per day for five days.
- If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of antibiotics until necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-35**):
  - penicillin G 2 million units IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every eight hours;
  - Once the **woman is fever-free for 48 hours**, give:
    - ampicillin 500 mg by mouth four times per day for five days;
    - PLUS metronidazole 400 mg by mouth three times per day for five days.

  Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure two to four weeks later, depending on resolution of infection.
- If the **woman has a severe infection or necrotizing fasciitis**, admit her to the hospital for management and change wound dressing twice daily.

ABDOMINAL PAIN IN EARLY PREGNANCY

PROBLEM

- The woman is experiencing abdominal pain in the first 22 weeks of pregnancy. Abdominal pain may be the first presentation in serious complications such as abortion or ectopic pregnancy.

GENERAL MANAGEMENT

- Perform a **rapid evaluation** of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common problems in pregnancy which cause abdominal pain (e.g. ectopic pregnancy, abruptio placentae, twisted ovarian cysts, pyelonephritis).

DIAGNOSIS

TABLE S-15 Diagnosis of abdominal pain in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Abdominal pain • Adnexal mass on vaginal examination	• Palpable, tender discrete mass in lower abdomen • Light[b] vaginal bleeding	**Ovarian cyst[a], page S-117**
• Lower abdominal pain • Low-grade fever • Rebound tenderness	• Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected	**Appendicitis, page S-117**
• Dysuria • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain	**Cystitis, page S-101**
• Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**
• Abdominal pain • Light bleeding • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal	• Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness	**Ectopic pregnancy, page S-13**

[a] Ovarian cysts may be asymptomatic and are sometimes first detected on physical examination.

[b] Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked.

MANAGEMENT

OVARIAN CYSTS

Ovarian cysts in pregnancy may cause abdominal pain due to torsion or rupture. Ovarian cysts most commonly undergo torsion and rupture during the first trimester.

- If the **woman is in severe pain**, suspect torsion or rupture. Perform immediate laparotomy.

  Note: If **findings at laparotomy are suggestive of malignancy** (solid areas in the tumour, growth extending outside the cyst wall), the specimen should be sent for immediate histological examination and the woman should be referred to a tertiary care centre for evaluation and management.

- If the **cyst is more than 10 cm and is asymptomatic**:
  - If it is **detected during the first trimester**, observe for growth or complications;
  - If it is **detected during the second trimester**, remove by laparotomy to prevent complications.
- If the **cyst is between 5 and 10 cm**, follow up. Laparotomy may be required if the cyst increases in size or fails to regress.
- If the **cyst is less than 5 cm**, it will usually regress on its own and does not require treatment.

APPENDICITIS

- Give a combination of antibiotics before surgery and continue until the woman is postoperative and fever-free for 48 hours (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - PLUS metronidazole 500 mg IV every eight hours.
- Perform an immediate surgical exploration (regardless of stage of gestation) and perform appendectomy, if required.

  Note: Delaying diagnosis and treatment can result in rupture of the appendix, which may lead to generalized peritonitis.

- If there are **signs of peritonitis** (fever, rebound tenderness, abdominal pain), give antibiotics as for peritonitis (**page S-111**).

  Note: The presence of peritonitis increases the likelihood of abortion or preterm labour.

- If the **woman is in severe pain**, give pethidine 1 mg/kg body weight (but not more than 100 mg) IM or IV slowly or give morphine 0.1 mg/kg body weight IM.

- Tocolytic drugs may be needed to prevent preterm labour (**Table S-17, page S-123**).

ABDOMINAL PAIN IN LATER PREGNANCY AND AFTER CHILDBIRTH

PROBLEMS

- The woman is experiencing abdominal pain after 22 weeks of pregnancy.
- The woman is experiencing abdominal pain during the first six weeks after childbirth.

GENERAL MANAGEMENT

- Perform a **rapid evaluation** of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common problems in pregnancy which cause abdominal pain. If **appendicitis occurs in late pregnancy**, the infection may be walled off by the gravid uterus. The size of the uterus rapidly decreases after delivery, allowing the infection to spill into the peritoneal cavity. In these cases, appendicitis presents as generalized peritonitis.

DIAGNOSIS

TABLE S-16 Diagnosis of abdominal pain in later pregnancy and after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Palpable contractions • Blood-stained mucus discharge (show) or watery discharge before 37 weeks	• Cervical dilatation and effacement • Light[a] vaginal bleeding	**Possible preterm labour, page S-122**
• Palpable contractions • Blood-stained mucus discharge (show) or watery discharge at or after 37 weeks	• Cervical dilatation and effacement • Light vaginal bleeding	**Possible term labour, page C-57**
• Intermittent or constant abdominal pain • Bleeding after 22 weeks gestation (may be retained in the uterus)	• Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Severe abdominal pain (may decrease after rupture) • Bleeding (intra-abdominal and/or vaginal)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Abdominal pain • Foul-smelling watery vaginal discharge after 22 weeks gestation • Fever/chills	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light vaginal bleeding	**Amnionitis, page S-139**
• Abdominal pain • Dysuria • Increased frequency and urgency of urination	• Retropubic/suprapubic pain	**Cystitis, page S-101**

[a] Light bleeding: takes five minutes or longer for a clean pad or cloth to be soaked.

TABLE S-16 Cont. Diagnosis of abdominal pain in later pregnancy and after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Dysuria • Abdominal pain • Spiking fever/chills • Increased frequency and urgency of urination	• Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting	**Acute pyelonephritis, page S-102**
• Lower abdominal pain • Low-grade fever • Rebound tenderness	• Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected	**Appendicitis, page S-117**
• Lower abdominal pain • Fever/chills • Purulent, foul-smelling lochia • Tender uterus	• Light vaginal bleeding • Shock	**Metritis, page S-110**
• Lower abdominal pain and distension • Persistent spiking fever/chills • Tender uterus	• Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis	**Pelvic abscess, page S-110**
• Lower abdominal pain • Low-grade fever/chills • Absent bowel sounds	• Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock	**Peritonitis, page S-111**
• Abdominal pain • Adnexal mass on vaginal examination	• Palpable, tender discrete mass in lower abdomen • Light vaginal bleeding	**Ovarian cyst[b], page S-117**

[b] Ovarian cysts may be asymptomatic and are sometimes first detected on physical examination.

PRETERM LABOUR

Preterm delivery is associated with higher perinatal morbidity and mortality. Management of preterm labour consists of tocolysis (trying to stop uterine contractions) or allowing labour to progress. Maternal problems are chiefly related to interventions carried out to stop contractions (see below).

Make every effort to confirm the gestational age of the fetus.

TOCOLYSIS

This intervention aims to delay delivery until the effect of corticosteroids has been achieved (see below).

- Attempt tocolysis if:
  - gestation is less than 37 weeks;
  - the cervix is less than 3 cm dilated;
  - there is no amnionitis, pre-eclampsia or active bleeding;
  - there is no fetal distress.
- Confirm the diagnosis of preterm labour by documenting cervical effacement or dilatation over two hours.
- If **less than 34 weeks gestation**, give corticosteroids to the mother to improve fetal lung maturity and chances of neonatal survival:
  - betamethasone 12 mg IM, two doses 24 hours apart;
  - OR dexamethasone 6 mg IM, four doses 12 hours apart.

  Note: Corticosteroids should not be used in the presence of frank infection.
- Give a tocolytic drug (**Table S-17**) and monitor maternal and fetal condition (pulse, blood pressure, signs of respiratory distress, uterine contractions, loss of amniotic fluid or blood, fetal heart rate, fluid balance, blood glucose, etc.).

  Note: Do not give tocolytic drugs for more than 48 hours.

If preterm labour continues despite use of tocolytic drugs, arrange for the baby to receive care at the most appropriate service with neonatal facilities. If possible, refer the woman before she gives birth.

TABLE S-17 Tocolytic drugs[a] to stop uterine contractions

Drug	Initial Dose	Subsequent Dose	Side Effects and Precautions
Salbutamol	10 mg in 1 L IV fluids. Start IV infusion at 10 drops per minute.	If **contractions persist**, increase infusion rate by 10 drops per minute every 30 minutes until contractions stop or maternal pulse exceeds 120 per minute. If **contractions stop**, maintain the same infusion rate for at least eight hours after the last contraction.	If **maternal pulse increases** (more than 120 per minute), reduce infusion rate; If the **woman is anaemic**, use with caution. If steroids and salbutamol are used, **maternal pulmonary oedema may occur**. Restrict fluids, maintain fluid balance and stop drug.
Indomethacin	100 mg loading dose by mouth or rectum	Give 25 mg every six hours for 48 hours	If **gestation is more than 32 weeks**, avoid use to prevent premature closure of fetal ductus arteriosus. Do not use for more than 48 hours.

[a] Alternative drugs include terbutaline, nifedipine and ritodrine.

ALLOWING LABOUR TO PROGRESS

- Allow labour to progress if:
  - gestation is more than 37 weeks;
  - the cervix is more than 3 cm dilated;
  - there is active bleeding;
  - the fetus is distressed, dead or has an anomaly incompatible with survival;

- there is amnionitis or pre-eclampsia.

- Monitor progress of labour using the partograph (**page C-65**).
- If **labour continues and gestation is less than 37 weeks**, give prophylactic antibiotics (**page C-35**) in order to help reduce Group B streptococcus infection in the neonate:
  - penicillin G 2 million units IV every six hours until delivery;
  - OR ampicillin 2 g IV every six hours.

  Note: Avoid delivery by vacuum extraction, as the risks of intracranial bleeding in the preterm baby are high.
- Prepare for management of preterm or low birth weight baby and anticipate the need for resuscitation (**page S-141**).

DIFFICULTY IN BREATHING

PROBLEM

- A woman is short of breath during pregnancy, labour or after delivery.

GENERAL MANAGEMENT

- Perform a **rapid evaluation** of the general condition of the woman, including vital signs (pulse, blood pressure, respiration, temperature).
- Prop up the woman on her left side.
- Start an IV infusion and infuse IV fluids (**page C-21**).
- Give oxygen at 4–6 L per minute by mask or nasal cannulae.
- Obtain haemoglobin estimates using haemoglobinometer or other simple method.

DIAGNOSIS

TABLE S-18 Diagnosis of difficulty in breathing

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Difficulty in breathing • Pallor of conjunctiva, tongue, nail beds and/or palms • Haemoglobin 7g per dL or less • Haematocrit 20% or less	• Lethargy and fatigue • Flat or concave nails	**Severe anaemia, page S-127**
• Symptoms and signs of severe anaemia	• Oedema • Cough • Rales • Swelling of legs • Enlarged liver • Prominent neck veins	**Heart failure due to anaemia, page S-127**
• Difficulty in breathing • Diastolic murmur and/or • Harsh systolic murmur with palpable thrill	• Irregular heart beat • Enlarged heart • Rales • Cyanosis (blueness) • Cough • Swelling of legs • Enlarged liver • Prominent neck veins	**Heart failure due to heart disease, page S-128**
• Difficulty in breathing • Fever • Cough with expectoration • Chest pain	• Consolidation • Congested throat • Rapid breathing • Rhonchi/rales	**Pneumonia, page S-129**
• Difficulty in breathing • Wheezing	• Cough with expectoration • Rhonchi/rales	**Bronchial asthma, page S-129**
• Difficulty in breathing • Hypertension • Proteinuria	• Rales • Frothy cough	**Pulmonary oedema associated with pre-eclampsia**[a]

[a] Withhold fluids and give frusemide 40 mg IV once (**page S-44**).

MANAGEMENT

SEVERE ANAEMIA

- Transfuse as necessary (**page C-23**):
  - Use packed cells;
  - If **blood cannot be centrifuged**, let the bag of blood hang until the cells have settled. Infuse the cells slowly and dispose of the remaining serum;
  - Give frusemide 40 mg IV with each unit of packed cells.
- If ***Plasmodium falciparum*** **malaria is suspected**, manage as severe malaria (**page S-52**).
- Give ferrous sulfate or ferrous fumerate 120 mg by mouth PLUS folic acid 400 mcg by mouth once daily for six months during pregnancy. Continue for three months postpartum.
- Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:
  - albendazole 400 mg by mouth once;
  - OR mebendazole 500 mg by mouth once or 100 mg two times per day for three days;
  - OR levamisole 2.5 mg/kg body weight by mouth once daily for three days;
  - OR pyrantel 10 mg/kg body weight by mouth once daily for three days.
- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

HEART FAILURE

HEART FAILURE DUE TO ANAEMIA

- Transfusion is almost always necessary in heart failure due to anaemia (**page C-23**):
  - Use packed or sedimented cells as described for severe anaemia (above);
  - Give frusemide 40 mg IV with each unit of packed cells.

HEART FAILURE DUE TO HEART DISEASE

- Treat acute heart failure. Drugs used may include:
  - morphine 10 mg IM as a single dose;
  - OR frusemide 40 mg IV, repeated as necessary;
  - OR digoxin 0.5 mg IM as a single dose;
  - OR nitroglycerine 0.3 mg under the tongue, repeated in 15 minutes, if necessary.
- Refer to a higher level if needed.

MANAGEMENT OF HEART FAILURE DURING LABOUR

- Prop up the woman on her left side.
- Limit infusion of IV fluids to decrease the risk of circulatory overload, and maintain a strict fluid balance chart.
- Ensure adequate analgesia (**page C-37**).
- If **oxytocin infusion is required**, use a higher concentration at a slower rate while maintaining a fluid balance chart (e.g. the concentration may be doubled if the drops per minute is decreased by half, **Table P-7, page P-22**).

  Note: Do not give ergometrine.
- Have the woman avoid sustained bearing down efforts during the expulsive stage, if possible.
- If **necessary to decrease the woman's workload during delivery**, perform an episiotomy (**page P-71**) and assist delivery by vacuum extraction (**page P-27**) or forceps (**page P-33**).
- Ensure active management of third stage (**page C-73**).

Heart failure is not an indication for caesarean section.

MANAGEMENT OF HEART FAILURE DURING CAESAREAN SECTION

- Use local anaesthesia with conscious sedation (**page P-7**). Avoid spinal anaesthesia.
- Deliver baby and placenta (**page P-43**).

PNEUMONIA

Inflammation in pneumonia affects the lung parenchyma and involves respiratory bronchioles and alveoli. There is loss of lung capacity that is less tolerated by pregnant women.

- A radiograph of the chest may be required to confirm the diagnosis of pneumonia.
- Give erythromycin 500 mg by mouth four times per day for seven days.
- Give steam inhalation.

Consider the possibility of tuberculosis in areas where it is prevalent.

BRONCHIAL ASTHMA

Bronchial asthma complicates 3–4% of pregnancies. Pregnancy is associated with worsening of the symptoms in one-third of affected women.

- If **bronchospasm occurs**, give bronchodilators (e.g. salbutamol 4 mg by mouth every four hours OR 250 mcg aerosol every 15 minutes for three doses).
- If there is **no response to bronchodilators**, give corticosteroids such as hydrocortisone IV 2 mg/kg body weight every four hours as needed.
- If there are **signs of infection** (bronchitis), give ampicillin 2 g IV every six hours.
- Avoid the use of prostaglandins. For prevention and treatment of postpartum haemorrhage, give oxytocin 10 units IM or give ergometrine 0.2 mg IM.
- After acute exacerbation has been managed, continue treatment with inhaled bronchodilators and inhaled corticosteroids to prevent recurrent acute episodes.

LOSS OF FETAL MOVEMENTS

PROBLEM

- Fetal movements are not felt after 22 weeks of gestation or during labour.

GENERAL MANAGEMENT

- Reassure the woman and provide emotional support (**page C-7**).
- Check the fetal heart rate:
  - If the **fetal heart rate is heard but is depressed** and the **mother has had sedatives**, wait for the effect of the drugs to wear off and then recheck;
  - If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.

DIAGNOSIS

TABLE S-19 Diagnosis of loss of fetal movements

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Decreased/absent fetal movements • Intermittent or constant abdominal pain • Bleeding after 22 weeks gestation (may be retained in the uterus)	• Shock • Tense/tender uterus • Fetal distress or absent fetal heart sounds	**Abruptio placentae, page S-18**
• Absent fetal movements and fetal heart sounds • Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture)	• Shock • Abdominal distension/ free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Rapid maternal pulse	**Ruptured uterus, page S-20**
• Decreased/absent fetal movements • Abnormal fetal heart rate (less than 100 or more than 180 beats per minute)	• Thick meconium-stained fluid	**Fetal distress, page S-95**
• Absent fetal movements and fetal heart sounds	• Symptoms of pregnancy cease • Symphysis-fundal height decreases • Uterine size decreases	**Fetal death, page S-132**

FETAL DEATH

Intrauterine death may be the result of fetal growth restriction, fetal infection, cord accident or congenital anomalies. Where syphilis is prevalent, a large proportion of fetal deaths are due to this disease.

- If **X-ray is available**, confirm fetal death after five days. Signs include overlapping skull bones, hyper-flexed spinal column, gas bubbles in heart and great vessels and oedema of the scalp.
- Alternatively, if **ultrasound is available**, confirm fetal death. Signs include absent fetal heart activity, abnormal fetal head shape, reduced or absent amniotic fluid and doubled-up fetus.

- Explain the problem to the woman and her family (**page C-7**). Discuss with them the options of expectant or active management.
- If **expectant management is planned**:
  - Await spontaneous onset of labour during the next four weeks;
  - Reassure the woman that in 90% of cases the fetus is spontaneously expelled during the waiting period with no complications.
- If **platelets are decreasing, four weeks have passed without spontaneous labour, fibrinogen levels are low or the woman requests it**, consider active management (induction of labour).
- If **induction of labour is planned**, assess the cervix (**page P-18**):
  - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (**page P-18**);
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins or a Foley catheter (**page P-24**);

    Note: Do not rupture the membranes due to risk of infection.
  - Deliver by caesarean section only as a last resort.
- If **spontaneous labour does not occur within four weeks, platelets are decreasing** and the **cervix is unfavourable** (firm, thick, closed), or if the **woman requests** it, ripen the cervix using misoprostol:
  - Place misoprostol 25 mcg in the upper vagina. Repeat after six hours if required;
  - If there is **no response after two doses of 25 mcg**, increase to 50 mcg every six hours;

    Note: Do not use more than 50 mcg at a time and do not exceed four doses (200 mcg).

Do not use oxytocin within eight hours of using misoprostol. Monitor uterine contractions and fetal heart rate of all women undergoing induction of labour with prostaglandins.

- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for metritis (**page S-110**).

- If a **clotting test shows failure of a clot to form after seven minutes or a soft clot that breaks down easily**, suspect coagulopathy (**page S-19**).

PROBLEM

- Watery vaginal discharge after 22 weeks gestation.

GENERAL MANAGEMENT

- Confirm accuracy of calculated gestational age, if possible.
- Use a high-level disinfected speculum to assess vaginal discharge (amount, colour, odour) and exclude urinary incontinence.

If the woman complains of bleeding in later pregnancy (after 22 weeks), do not do a digital vaginal examination.

DIAGNOSIS

TABLE S-20 Diagnosis of vaginal discharge

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
• Watery vaginal discharge	• Sudden gush or intermittent leaking of fluid • Fluid seen at introitus • No contractions within 1 hour	**Prelabour rupture of membranes, page S-136**
• Foul-smelling watery vaginal discharge after 22 weeks • Fever/chills • Abdominal pain	• History of loss of fluid • Tender uterus • Rapid fetal heart rate • Light[a] vaginal bleeding	**Amnionitis, page S-139**
• Foul-smelling vaginal discharge • No history of loss of fluid	• Itching • Frothy/curdish discharge • Abdominal pain • Dysuria	**Vaginitis/cervicitis[b]**
• Bloody vaginal discharge	• Abdominal pain • Loss of fetal movements • Heavy, prolonged vaginal bleeding	**Antepartum haemorrhage, page S-17**
• Blood-stained mucus or watery vaginal discharge (show)	• Cervical dilatation and effacement • Contractions	**Possible term labour, page C-57** or **Possible preterm labour, page S-122**

[a] Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked.
[b] Determine cause and treat accordingly.

MANAGEMENT

PRELABOUR RUPTURE OF MEMBRANES

Prelabour rupture of membranes (PROM) is rupture of the membranes before labour has begun. PROM can occur either when the fetus is immature (preterm or before 37 weeks) or when it is mature (term).

CONFIRMING THE DIAGNOSIS

The typical odour of amniotic fluid confirms the diagnosis.

If **membrane rupture is not recent** or when **leakage is gradual**, confirming the diagnosis may be difficult:

- Place a vaginal pad over the vulva and examine it (visually and by odour) one hour later.
- Use a high-level disinfected speculum for vaginal examination:
  - Fluid may be seen coming from the cervix or forming a pool in the posterior fornix;
  - Ask the woman to cough; this may cause a gush of fluid.

Do not perform a digital vaginal examination as it does not help establish the diagnosis and can introduce infection.

- If available, perform tests:
  - The **nitrazine test** depends upon the fact that vaginal secretions and urine are acidic while amniotic fluid is alkaline. Hold a piece of nitrazine paper in a haemostat and touch it against the fluid pooled on the speculum blade. A change from yellow to blue indicates alkalinity (presence of amniotic fluid). Blood and some vaginal infections give false positive results;
  - For the **ferning test**, spread some fluid on a slide and let it dry. Examine it with a microscope. Amniotic fluid crystallizes and may leave a fern-leaf pattern. False negatives are frequent.

MANAGEMENT

- If there is **vaginal bleeding with intermittent or constant abdominal pain**, suspect abruptio placentae (**page S-18**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for amnionitis (**page S-139**).
- If there are **no signs of infection** and the **pregnancy is less than 37 weeks** (when fetal lungs are more likely to be immature):
  - Give antibiotics to reduce maternal and neonatal infective morbidity and to delay delivery (**page C-35**):

  - erythromycin 250 mg by mouth three times per day for seven days;
  - PLUS amoxicillin 500 mg by mouth three times per day for seven days;
- Consider transfer to the most appropriate service for care of the newborn, if possible;
- Give corticosteroids to the mother to improve fetal lung maturity:
  - betamethasone 12 mg IM, two doses 24 hours apart;
  - OR dexamethasone 6 mg IM, four doses 12 hours apart.

  Note: Corticosteroids should not be used in the presence of frank infection.
- Induce labour using oxytocin (**page P-17**) at 37 weeks and give prophylactic antibiotics to help reduce Group B streptococcus infection in the neonate, even if the woman received antibiotics previously:
  - penicillin G 2 million units IV every six hours until delivery;
  - OR ampicillin 2 g IV every six hours until delivery;
- If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm labour (**page S-122**).

• If there are **no signs of infection** and the **pregnancy is 37 weeks or more**:

- If the **membranes have been ruptured for more than 18 hours**, give prophylactic penicillin or ampicillin (**page C-35**) to help reduce Group B streptococcus infection in the neonate (see dosages above). If there are **no signs of infection after delivery**, discontinue antibiotics.
- Assess the cervix (**page P-18**):
  - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (**page P-17**);
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins and infuse oxytocin (**page P-24**) or deliver by caesarean section (**page P-43**).

AMNIONITIS

- Give a combination of antibiotics until delivery (**page C-35**):
  - ampicillin 2 g IV every six hours;
  - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
  - If the **woman delivers vaginally**, discontinue antibiotics postpartum;
  - If the **woman has a caesarean section**, continue antibiotics and give metronidazole 500 mg IV every eight hours until the woman is fever-free for 48 hours.
- Assess the cervix (**page P-18**):
  - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (**page P-17**).
  - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using prostaglandins and infuse oxytocin (**page P-24**) or deliver by caesarean section (**page P-43**).
- If **metritis is suspected** (fever, foul-smelling vaginal discharge), give antibiotics (**page S-110**).
- If **newborn sepsis is suspected**, arrange for a blood culture and antibiotics (**page S-149**).

IMMEDIATE NEWBORN CONDITIONS OR PROBLEMS

PROBLEMS

- The newborn has serious conditions or problems:
  - gasping or not breathing;
  - breathing with difficulty (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting);
  - central cyanosis (blueness);
  - preterm or very low birth weight (less than 32 weeks gestation or less than 1500 g);
  - lethargy;
  - hypothermia (axillary temperature less than 36.5°C);
  - convulsions.
- The newborn has other conditions or problems that require attention in the delivery room:
  - low birth weight (1500–2500 g);
  - possible bacterial infection in an apparently normal newborn whose mother had prelabour or prolonged rupture of membranes or amnionitis;
  - possible congenital syphilis (mother has positive serologic test or is symptomatic).

IMMEDIATE MANAGEMENT

Three situations require immediate management: gasping or not breathing (below), cyanosis (blueness) or breathing with difficulty (**page S-146**).

GASPING OR NOT BREATHING

GENERAL MANAGEMENT

- Dry the baby, remove the wet cloth and wrap the baby in a dry, warm cloth.
- Clamp and cut the cord immediately if not already done.

- Move the baby to a firm, warm surface under a radiant heater for resuscitation.
- Observe standard infection prevention practices when caring for and resuscitating a newborn (**page C-17**).

RESUSCITATION

BOX S-8 Resuscitation equipment

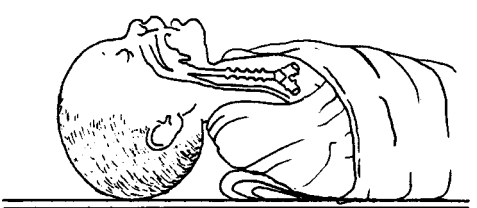
To avoid delays during an emergency situation, it is vital to ensure that equipment is in good condition before resuscitation is needed:

- Have the appropriate size masks available according to the expected size of the baby (size 1 for a normal weight newborn and size 0 for a small newborn).
- Block the mask by making a tight seal with the palm of your hand and squeeze the bag:
  - If you feel pressure against your hand, the bag is generating adequate pressure;
  - If the bag reinflates when you release the grip, the bag is functioning properly.

OPENING THE AIRWAY

- Position the newborn (**Fig S-28**):
  - Place the baby on its back;
  - Position the head in a slightly extended position to open the airway;
  - Keep the baby wrapped or covered, except for the face and upper chest.

FIGURE S-28 Correct position of the head for ventilation; note that the neck is less extended than in adults



- Clear the airway by suctioning first the mouth and then the nostrils. If **blood or meconium is in the baby's mouth or nose**, suction immediately to prevent aspiration.

  Note: Do not suction deep in the throat as this may cause the baby's heart to slow or the baby may stop breathing.

- Reassess the baby:
  - If the **newborn starts crying or breathing**, no further immediate action is needed. Proceed with initial care of the newborn (**page C-75**);
  - If the **baby is still not breathing**, start ventilating (see below).

VENTILATING THE NEWBORN

- Recheck the newborn's position. The neck should be slightly extended (**Fig S-28, page S-142**).
- Position the mask and check the seal (**Fig S-29**):
  - Place the mask on the newborn's face. It should cover the chin, mouth and nose;
  - Form a seal between the mask and the face;
  - Squeeze the bag with two fingers only or with the whole hand, depending on the size of the bag;
  - Check the seal by ventilating twice and observing the rise of the chest.

FIGURE S-29 Ventilation with bag and mask

- Once a seal is ensured and chest movement is present, ventilate the newborn. Maintain the correct rate (approximately 40 breaths per minute) and pressure (observe the chest for an easy rise and fall):
  - If the **baby's chest is rising**, ventilation pressure is probably adequate;
  - If the **baby's chest is not rising**:
    - Repeat suction of mouth and nose to remove mucus, blood or meconium from the airway;
    - Recheck and correct, if necessary, the position of the newborn (**Fig S-28, page S-142**);
    - Reposition the mask on the baby's face to improve the seal between mask and face;
    - Squeeze the bag harder to increase ventilation pressure.
- If the **mother of the newborn received pethidine or morphine** prior to delivery, consider administering naloxone **after** vital signs have been established (**Box S-9, page S-145**).
- Ventilate for 1 minute and then stop and quickly assess if the newborn is breathing spontaneously:
  - If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for 1 minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-76**);
  - If the **newborn is not breathing**, or the **breathing is weak**, continue ventilating until spontaneous breathing begins.
- If the **newborn starts crying**, stop ventilating and continue observing breathing for 5 minutes after crying stops:
  - If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for 1 minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-76**);
  - If the **respiratory rate is less than 30 breaths per minute**, continue ventilating;
  - If there is **severe indrawing of the chest**, ventilate with oxygen, if available (**Box S-10, page S-147**). Arrange to transfer the baby to the most appropriate service for the care of sick newborns.

- If the **newborn is not breathing regularly after 20 minutes of ventilation**:
  - Transfer the baby to the most appropriate service for the care of sick newborns;
  - During the transfer, keep the newborn warm and ventilated, if necessary.
- If there is **no gasping or breathing at all after 20 minutes of ventilation**, stop ventilating; the baby is stillborn. Provide emotional support to the family (**page C-7**).

BOX S-9 Counteracting respiratory depression in the newborn caused by narcotic drugs

If the **mother received pethidine or morphine**, naloxone is the drug to counteract respiratory depression in the newborn caused by these drugs.

Note: Do not administer naloxone to newborns whose mothers are suspected of having recently abused narcotic drugs.

- If there are **signs of respiratory depression**, begin resuscitation immediately:
  - After vital signs have been established, give naloxone 0.1 mg/kg body weight IV to the newborn;
  - Naloxone may be given IM after successful resuscitation if the infant has adequate peripheral circulation. Repeated doses may be required to prevent recurrent respiratory depression.
- If there are **no signs of respiratory depression**, but **pethidine or morphine was given within 4 hours of delivery**, observe the baby expectantly for signs of respiratory depression and treat as above if they occur.

CARE AFTER SUCCESSFUL RESUSCITATION

- Prevent heat loss:
  - Place the baby skin-to-skin on the mother's chest and cover the baby's body and head;
  - Alternatively, place the baby under a radiant heater.
- Examine the newborn and count the number of breaths per minute:
  - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute,

indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (below).

- Measure the baby's axillary temperature:
  - If the **temperature is 36.5°C or more**, keep the baby skin-to-skin on the mother's chest and encourage breastfeeding;
  - If the **temperature is less than 36.5°C**, rewarm the baby (**page S-148**).
- Encourage the mother to begin breastfeeding. A newborn that required resuscitation is at higher risk of developing hypoglycaemia:
  - If **suckling is good**, the newborn is recovering well;
  - If **suckling is not good**, transfer the baby to the appropriate service for the care of sick newborns.
- Ensure frequent monitoring of the newborn during the next 24 hours. If **signs of breathing difficulties recur**, arrange to transfer the baby to the most appropriate service for the care of sick newborns.

CYANOSIS OR BREATHING DIFFICULTY

- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting) give oxygen:
  - Suction the mouth and nose to ensure the airways are clear;
  - Give oxygen at 0.5 L per minute by nasal catheter or nasal prongs (**Box S-10, page S-147**);
  - Transfer the baby to the appropriate service for the care of sick newborns.
- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.

BOX S-10 Use of oxygen

When using oxygen, remember:

- Only use supplemental oxygen for difficulty in breathing or cyanosis;
- If the baby is having **severe indrawing of the chest**, is **gasping for breath** or is **persistently cyanotic**, increase the concentration of oxygen by nasal catheter, nasal prongs or oxygen hood.

Note: Indiscriminate use of supplemental oxygen for premature infants has been associated with the risk of blindness.

ASSESSMENT

Many serious conditions in newborns—bacterial infections, malformations, severe asphyxia and hyaline membrane disease due to preterm birth—present in a similar way with difficulty in breathing, lethargy and poor or no feeding.

It is difficult to distinguish between the conditions without diagnostic methods. Nevertheless, treatment must start immediately even without a clear diagnosis of a specific cause. Babies with any of these problems should be suspected to have a serious condition and should be transferred without delay to the appropriate service for the care of sick newborns.

MANAGEMENT

VERY LOW BIRTH WEIGHT OR VERY PRETERM BABY

If the **baby is very small** (less than 1500 g or less than 32 weeks), severe health problems are likely and include difficulty in breathing, inability to feed, severe jaundice and infection. The baby is susceptible to hypothermia without special thermal protection (e.g. incubator).

Very small newborns require special care. They should be transferred to the appropriate service for caring for sick and small babies as early as possible. Before and during transfer:

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.

- If **maternal history indicates possible bacterial infection**, give first dose of antibiotics:
  - gentamicin 4 mg/kg body weight IM (or give kanamycin);
  - PLUS ampicillin 100 mg/kg body weight IM (or give benzyl penicillin).
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).

LETHARGY

If the **baby is lethargic** (low muscular tone, does not move), it is very likely that the baby has a severe illness and should be transferred to the appropriate service for the care of sick of newborns.

HYPOTHERMIA

Hypothermia can occur quickly in a very small baby or a baby who was resuscitated or separated from the mother. In these cases, temperature may quickly drop below 35°C. Rewarm the baby as soon as possible:

- If the **baby is very sick** or **is very hypothermic** (axillary temperature less than 35°C):
  - Use available methods to begin warming the baby (incubator, radiant heater, warm room, heated bed);
  - Transfer the baby as quickly as possible to the appropriate service for the care of preterm or sick newborns;
  - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).
- If the **baby is not very sick** and axillary temperature is **35°C or more**:
  - Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss;
  - Encourage the mother to begin breastfeeding as soon as the baby is ready;

- Monitor axillary temperature hourly until normal;
- Alternatively, the baby can be placed in an incubator or under a radiant heater.

CONVULSIONS

Convulsions in the first hour of life are rare. They could be caused by meningitis, encephalopathy or severe hypoglycaemia.

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth, cover with a blanket and ensure the head is covered to prevent heat loss.
- Transfer the baby to the appropriate service for the care of sick newborns as quickly as possible.

MODERATELY PRETERM OR LOW BIRTH WEIGHT BABY

Moderately preterm (33–37 weeks) or low birth weight (1500–2500 g) babies may start to develop problems soon after birth.

- If the **baby has no breathing difficulty** and **remains adequately warm** while in skin-to-skin contact with the mother:
  - Keep the baby with the mother;
  - Encourage the mother to initiate breastfeeding within the first hour if possible.
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 per minute, indrawing of the chest or grunting), give oxygen by nasal catheter or prongs (**page S-146**).
- If **axillary temperature drops below 35°C**, rewarm the baby (**page S-148**).

PRETERM AND/OR PROLONGED RUPTURE OF MEMBRANES AND AN ASYMPTOMATIC NEWBORN

The following are suggested guidelines which may be modified according to local situations:

- If the **mother has clinical signs of bacterial infection** or if **membranes were ruptured for more than 18 hours** before delivery even if the mother has no clinical signs of infection:

- Keep the baby with the mother and encourage her to continue breastfeeding;
- Make arrangements with the appropriate service that cares for sick newborns to take a blood culture and start the newborn on antibiotics.

- If **these conditions are not met**, do not treat with antibiotics. Observe the baby for signs of infection for three days:
  - Keep the baby with the mother and encourage her to continue breastfeeding;
  - If **signs of infection occur within 3 days**, make arrangements with the appropriate service that cares for sick newborns to take a blood culture and start the newborn on antibiotics.

CONGENITAL SYPHILIS

- If the **newborn shows signs of syphilis**, transfer the baby to the appropriate service for the care of sick newborns. Signs of syphilis include:
  - generalized oedema;
  - skin rash;
  - blisters on palms or soles;
  - rhinitis;
  - anal condylomata;
  - enlarged liver/spleen;
  - paralysis of one limb;
  - jaundice;
  - pallor;
  - spirochetes seen on darkfield examination of lesion, body fluid or cerebrospinal fluid.

- If the **mother has a positive serologic test for syphilis** or is symptomatic **but the newborn shows no signs of syphilis**, whether or not the mother was treated, give benzathine penicillin 50 000 units/kg body weight IM as a single dose.