# LEVEL III

## ADVANCED HA TRAINING

# LEVEL III
# ADVANCED HEALTH ASSISTANT TRAINING HANDBOOK (COMPREHENSIVE REPRODUCTIVE HEALTH)

## MEDICAL EDITING

The medical editing is mainly surpervised by Dr. Win Myint Than.

## CONTRIBUTING PARTNERS

Organizations who have contributed to the development of this handbook include:

- National Health and Education Committee (NHEC)
- Burma Medical Association (BMA)
- Mae Tao Clinic (MTC)
- Back Pack Health Worker Team (BPHWT)
- Karen Department of Health and Welfare (KDHW)
- International Rescue Committee (IRC)

## FINANCIAL SUPPORT

This handbook was funded by

- The United States Agency for International Development
- The International Rescue Committee

This publication is made possible by the generous support of the American people through a grant from the United States Agency for International Development (USAID) to the International Rescue Committee (IRC) for the program in Thailand. The contents do not necessary reflect the views of USAID or the United States Government.

# ABOUT THIS TRAINING HANDBOOK

## BACKGROUND HISTORY

Health worker training programs was first implemented since 2000.

- Level I Health Worker or community health worker training was developed under supervision of Dr. Alice Khin in 2010.
- Level II medic training curriculum (CCSDPT curriculum) was developed by Dr. Kate Bruck in September 2010, and TOT training has been carried out six monthly.
- Level III training curriculum development (including theory + clinical) was commenced and carried by joint action among NHEC, BMA, IRC and ethnic health CBOs.

Level III training preparation development took place for two months, including arrangements for structure, accommodation and curriculum.

Level III Curriculum Development Committee was designed by Dr Cynthia Maung. Representatives of partner organizations and attendees of the Health Worker Training (HWT) meeting held on October 15, 2010 at BMA office. Following the HWT meeting, a Committee was formed based on participants from MTC, BMA, BPHWT, and IRC. At the same time, the training curriculum development team was also organized, mostly involving medical personnel from MTC and IRC.

There have been total five meetings concerning curriculum development for Level III.
First of all, review of CCSDPT curriculum (by Dr. Kate) and firstly draft out the Level III curriculum based on it. Afterwards, Level III curriculum outline was validated by all health organizations, aiming for mid-level health workers at global level (both for duties and curriculum topics). There are 67 additional topics added to CCSDPT curriculum and 13 additional topics to Community Medicine part. Rules and regulations for exam, practical session, trainer and trainers have also been developed and proposed. Timing schedule for part I, II and III of Level III Health worker training was also set up.

**On review of training materials:-**

- For Part I (Basic Science), there are 17 major topics
- For Part II (Medicine or Clinical), there are 18 major topics
- For Part III (Community Medicine), there are 14 major topics

**Training Schedule**

Part I – 1.8 months (Basic science)
Part II – 6 months (Medicine or Clinical)
Part III – 4 months (Community Medicine + Reproductive Health Care + Comprehensive Child Care)
Practical I– 4 months (Medical + Traumatology) – first 4 months
Practical II – 6 months – second 6 months
Total ---------- 22 months
The Level III advanced health assistant trainees should study the following training supportive materials basically to accomplish this course.

1. Level III Advanced Health Assistant Training Handbooks
2. Burmese Border Guidelines (BBG 2007)
3. Powerpoint presentation handouts from individual trainers during lecturers.

# TABLE OF CONTENTS

# 1 COMPREHENSIVE REPRODUCTIVE HEALTH

## OBSTETRICS

### Obstetric History

Fill out required ANC forms (refer to the ANC form), the history should be taken as below:

1. Name
2. Age
3. Number of pregnancies (Gravidity), birth of alive or death (Parity) and Abortion
4. Age of the youngest child
5. Problem of previous pregnancies which history of every pregnancy must be taken by asking the following questions

Abortion or normal or early or late or difficult delivery

- If any surgical intervention such as Caesarean section, forceps or vacuum extraction
- If any bleeding before or after delivery
- If any retained placenta
- If any history of toxaemia of pregnancy (oedema, convulsion)
- If any medical history such as diabetes, heart disease, TB or kidney disease
- If any trauma or tear of genital
- If any still birth
- If any premature labour

6. Problem of present pregnancy by asking the following question
   - Have you been
     - Sick?
     - Tired?
     - Nausea?
     - Vomiting?
     - Blurring of vision?
     - Back pain?
     - Dysuria?
     - Bleeding?
     - Discharge?
     - Have you had fever?
     - If at least 5 months pregnant: Do you feel the baby move?
7. Any pre-existing medical condition?
   - Heart diseases
   - Hypertension
   - Kidney problems
   - Diabetes
   - Tuberculosis
8. Last menstrual date (LMP); if she dose not remember, ask her how many month is she pregnant at the time of examination.

9. Calculate the expected date of delivery (EDC) by adding 7 days to LMP and subtract three months. For example, if women's LMP was March 21, add 7 days (March 28) and subtract three months; so her baby is due on December 28.

## STAGES OF DEVELOPMENT IN A PREGNANCY

**1st Trimester**


3 months

**0 week** - The woman's last period before fertilization occurs.

**2 Weeks of Pregnancy** - Fertilization occurs. The fertilized egg (zygote) begins to develop into a hollow ball of cells called the blastocyst.

**3 Weeks of Pregnancy** - The blastocyst implants in the wall of uterus.The amniotic sac begins to form.

**5 Weeks of Pregnancy** - The area that will become the brain and spinal cord (neural tube) begins to develop.

**6 Weeks of Pregnancy** - The heart and major blood vessels are developing. The beating heart can be seen during ultrasonography.

**7 Weeks of Pregnancy** - The beginnings of arms and legs appear.

**9 Weeks of Pregnancy** - Bones and muscles form. The face and neck develop. Brain waves can be detected. The skeleton is formed. Fingers and toes are fully defined.

**10 Weeks of Pregnancy** - The kidneys begin to function. Almost all organs are completely formed. The fetus can move and respond to touch (when prodded through the woman's abdomen). The woman has gained some weight, and her abdomen may be slightly enlarged.


6 months

**2nd Trimester**


9 months

**14 Weeks of Pregnancy** - The fetus's sex can be identified. The fetus can hear.

**16 Weeks of Pregnancy** - The fetus's fingers can grasp. The fetus moves more vigorously, so that the mother can feel it. The fetus's body begins to fill out as fat is deposited beneath the skin. Hair appears on the head and skin. Eyebrows and eyelashes are present.

**20 Weeks of Pregnancy** - The placenta is fully formed.

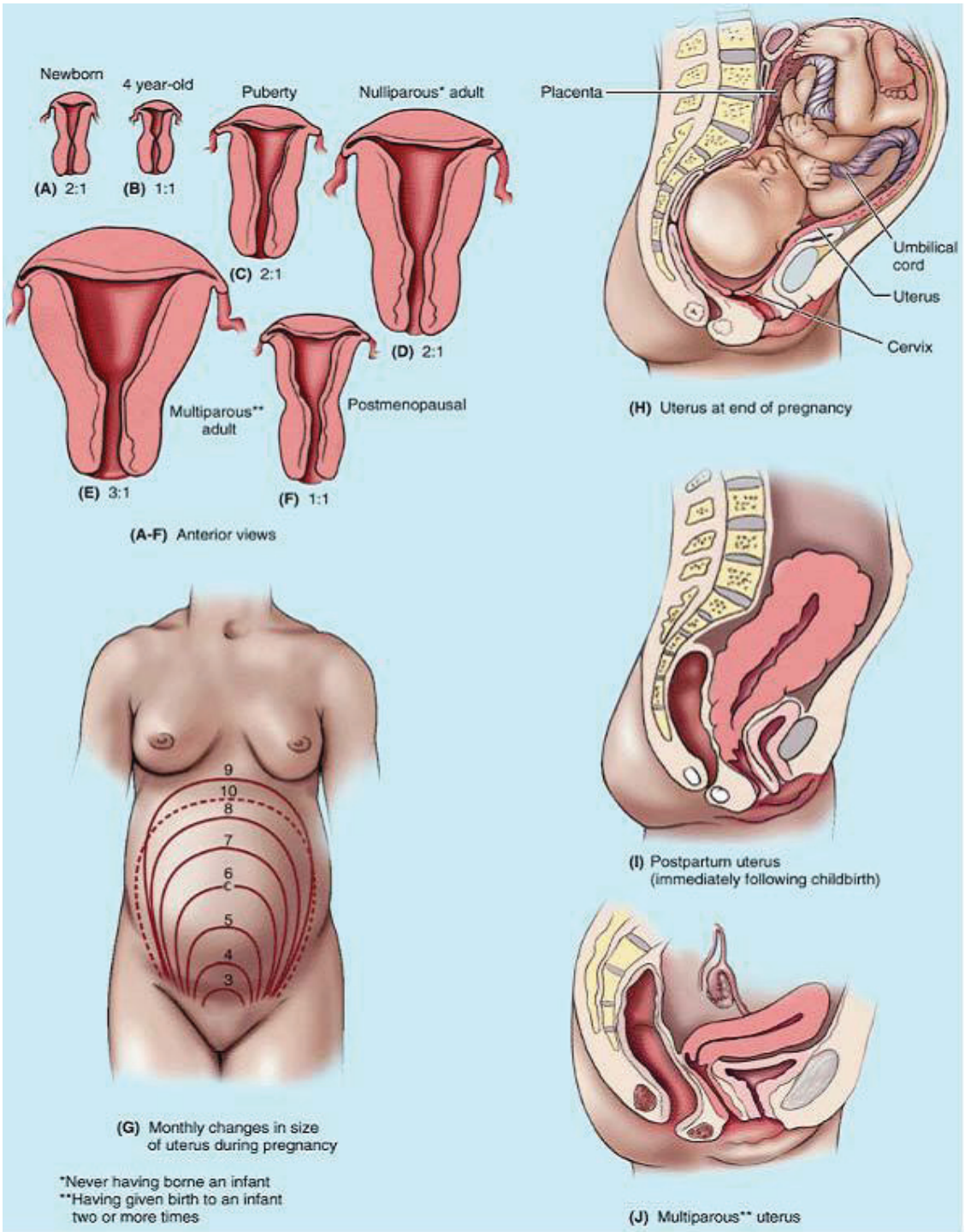
**24 Weeks of Pregnancy** - The fetus has a chance of survival outside the uterus. The woman begins to gain weight more rapidly.

**3rd Trimester**

**25 Weeks of Pregnancy** - The fetus is active, changing positions often. The lungs continue to mature. The fetus's head moves into position for delivery. On average, the fetus is about 20 inches long and weighs about 7 pounds. The woman's enlarged abdomen causes the navel to bulge.

**37 - 42 Weeks of Pregnancy** - Delivery

## The changes in the uterus as the fetus grows




*Never having borne an infant
**Having given birth to an infant two or more times

## OBSTETRIC HISTORY TAKING

**Introduce yourself.**

- Name of patient
- Age of patient
- Consent for questioning

**Current pregnancy**

- 1st day of last menstrual period
- Regularity of normal cycle
- Was this a planned pregnancy?
- Previous contraception
- Any antenatal problems?

**Past Obstetric History**

- Gravidity and Parity
- Dates of deliveries
- Length of pregnancies
- Induction of labour/Spontaneous
- Normal Delivery or not?
- Weight of babies
- Gender of babies
- Complications before, during and after delivery

**Past Medical History**

- Current or past illnesses
- Hospital admissions
- Past surgeries

**Drug History**

- Prescribed medications
- Non-prescribed medications/herbal remedies
- Recreational drugs

**Family History**

- Medical conditions
- Obstetric complications

**Social History**

- Occupation
- Supportive network or neighbours
- Smoking
- Alcohol

# Examination of the Pregnant Woman

**Weight**

The mother's pre-pregnancy weight and her weight gain during pregnancy are major determinants in the birth weight of the infants. Also excessive weight in mother or obese gravidas are more likely to have a postpartum haemorrhage. Average weight gain during pregnancy is approximately 12.5 kg mainly in the second half of pregnancy and usually 0.5 kg per week.

**Height**

Less than 145 cm is considered high risk i.e. This pregnant mother might have problems in labour.

**Blood pressure**

(Can do at the clinic) Blood pressure should not be more than 140/90mm Hg, that means > 140 systolic and/or >90 diastolic BP is the early indicator for pre-eclampsia and pre-existing hypertension.

**Eyes (for anaemia or jaundice)**

**Extremities of oedema**

**Examination of the abdomen**

Ask the pregnant woman to lie down on a bed. The MCH worker should examine the pregnant woman as follows:

**Measuring the height of the fundus**

Measuring the height of the fundus will help to know if the baby is growing according to the normal age of pregnancy. The table below is the normal height of the uterus according to the month of pregnancy:

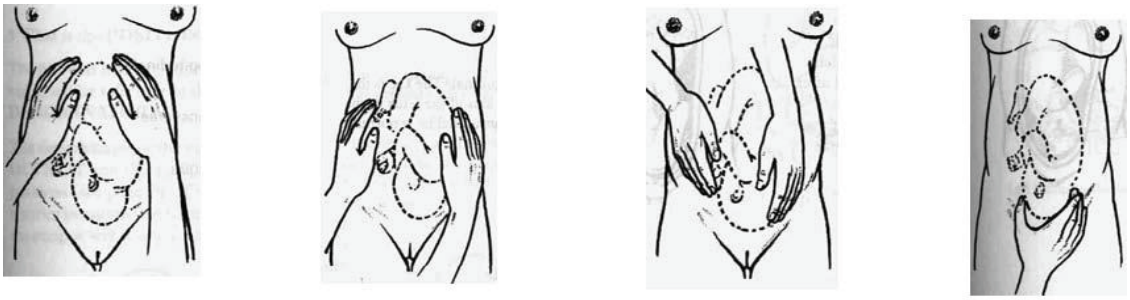
- 3 months (12 weeks)= at the level of 2 pubic bones meet
- 4 months(16 -18 weeks)= half way to umbilicus
- 5 months (20 weeks)= at the level of umbilicus

The height of the fundus in centimetres should equal approximately the week of gestation
If there is no measuring tape the medic can measure the width with fingers. The height of a finger is approximately equal to 2 centimetres.

**Palpate the abdomen**

Look at the size and shape of the abdomen and if the baby moves, feel the side of the uterus with both hands. Examine the position of the baby by palpating the fundal (top), lateral (sides) and pelvic part of the uterus. Feel for the head (hard and round), buttock (soft and not perfectly round), back (curved and firm) and limbs (soft with irregular shape) of the baby.

- Lie (longitudinal, transverse or oblique lie)
- Number of babies (single or twin)
- Presenting part (head or breech presentation)
- Different positions of the fetus



ABDOMINAL PALPATION

Engagement of the presenting part means the descent largest diameter of baby through the pelvic brim. Feel the baby's head at the pubis with your right hand, try to move the baby's head with both hands to see if it is "engaged" in the pelvis after 34 weeks (8 months and a half) the presenting part (head or breech) should pass through the pelvis bone.
Position of the baby means the relationship of the presenting part to the mother's pelvis. The presentation of the baby's head is determined with the occiput lateral and anterior positions are regarded as normal (Refer to the panel).

The head of the baby should be down in the uterus in last month of pregnancy. If the position of the head is high then there may be a problem and she should be referred to the hospital.

**Calculating the Date of Delivery**

The doctor calculates the approximate date of delivery by counting back 3 calendar months from the first day of the last menstrual period and adding 1 year and 7 days. For example, if the last menstrual period was January 1, the doctor counts back 3 months to October 1, then adds 1 year and 7 days. The calculated due date is October 8 the next year.
Only 10% or fewer of pregnant women give birth on the calculated date, but 50% give birth within 1 week and almost 90% give birth within 2 weeks (before or after the date). Delivery between 3 weeks before and 2 weeks after the calculated date is considered normal.

## Care of a Normal Pregnancy

### PRINCIPLES OF ANC (ANTENATAL CLINIC)

- Risk factors
- Detailed history
- Self-medication
- Diet
- Exercise
- Antenatal visits
- Pathology tests
- Common discomforts of pregnancy

**Risk Factors**

- Physical
  - Age <15 or >35 years
  - Height < 145 cm
  - Weight < BMI 18 or > BMI 30
- Smoking/Alcohol
- Problems in a previous pregnancy
- Medical conditions

**Disorders that need reporting:**

- Persistent or unusual headaches
- Persistent nausea and vomiting
- Dizziness
- Disturbances of eyesight
- Pain or cramps in the lower abdomen
- Contractions
- Vaginal bleeding
- Leakage of amniotic fluid (described as "the water breaks")
- Swelling of the hands or feet
- Decreased urine production
- Any illness or infection
- Tremor (shaking of the hands, feet, or both)
- Seizures
- Rapid heart rate
- Decreased movement of the fetus

**Signs of High Risk**

Mother under the age of 17 and over the age of 35 (especially for the first pregnancy) are more likely to have pre- eclampsia, prolonged labour difficult labours, babies born too early (premature) and obstructed labour. Older mothers who have had many babies often have prolonged labour, difficult birth and post-partum hemorrhage.
Mother who had problems with past pregnancies such as fits, birth by operation, heavy bleeding, a too-early or too-small baby or still birth or neonatal death are more likely to have problems in another pregnancy or birth.

Anemia makes complications more likely if bleeding does occur (hemorrhage) during birth, become ill after childbirth or even die. Mother's with Diabetes Mellitus can have very serious problems. The baby can die before birth or sometimes grows very large and gets stuck in the pelvic. High blood pressure can lead to severe headache, fit and even death.
Woman with disabilities-especially woman with a loss of feeling in the body or difficult walking can have problem during both pregnancy and birth. Mother who has height < 145 cm can have problem during birth(especially primigravida).
If the fetus is in the wrong position such as breech position, transverse position or some part of the body presenting first this can be a problem. Mother suffering from chronic or acute illnesses such as heart diseases, UTI, TB, malaria. Grand multipara is also at risk.

**ANC Visits**

Visits are usually monthly to 28 weeks, fortnightly to 36 weeks, then weekly to delivery. Each visit should involved checks on maternal and fetal well-being.

- Weight gain (12-15 kg in total, with 3kg in first 20 weeks)
- BP (a diastolic pressure>90, or increase of >20 from first visit is significant)
- Urinalysis (watch for protein, glucose, and UTIs)
- Fetal movements
- Uterine size in accordance with dates and ultrasound
- Fetal lie, presentation, and engagement, especially after 36 weeks

**Pathology Tests**

- First visit: FBC, Blood group, TPHA/RPR, Rubella, MSU, Hep B and C, Pap smear if nil recent, and offer HIV screening after counseling
- 15-18 weeks: Ultrasound
- 28 weeks: Hb
- 36 weeks: Hb

## COMMON COMPLAINTS IN PREGNANCY

**Nausea or vomiting**

Nausea and vomiting are due probably to the effects of large amounts of circulating estrogen and HCG and they rarely last beyond the 16th week. Normally, this is worse in the morning, during the second or third month of pregnancy. The pregnant woman can eat something dry smaller meals several times a day and avoid greasy foods.

**Burning or pain in the stomach**

Enlarged uterus encourages oesophgeal reflux of gastric acid. Encourage small meals. It may help to sleep with the chest and head raised with some pillows or blankets.

**Swelling of the feet**

It usually comes from the pressure of the fetus in the uterus during the last months. It is worse for mother who is anemic, malnourished, or who eats a lot of salt.
Other advice you can give:

- Rest at different times during the day with the feet up in a upper position when she sits down, she can put her feet up high.
- She can sleep with the feet raised.
- If the feet are very swollen, and the hands and face also swell, this can be complications of pregnancy and she needs to seek medical advice.

**Low back pain**

The following advice can be given:

- Take care to stand and sit down with the back straight

- Do not carry heavy things
- It is possible to work and exercise

**Swollen veins (varicose veins)**

Varicose veins are veins that are swollen, twisted, and often painful. They are common in pregnancy, due to the weight of the baby pressing on the veins that come from the legs. Advice that can be given:

- Raise your legs when sitting or lying down
- If the veins get very big or hurt, use elastic bandages but take the bandage off at night
- Do not spend too much time standing or sitting with your feet down

**Constipation**

This is due mainly to the relaxing effect of progesterone on smooth muscle. Drink plenty of water (about 2 or 3 liters/day. Eat fruit and food with a lot of natural fiber.

**Vagina discharge**

Increased secretion of cervical mucus and the vascularity of the vagina combine to produce a fairly amount in pregnancy. If is not offensive or itchy, ordinary hygiene should be the only treatment required.

## IMMUNIZATION FOR PREGNANT WOMAN

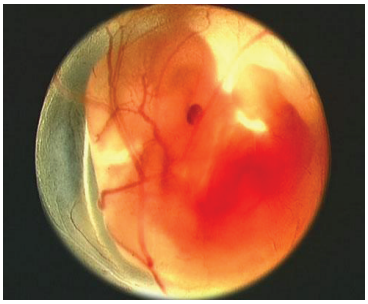
Every woman between the ages of 15 and 44 should be fully immunized against tetanus. Many mothers give birth in unhygienic conditions. This puts both mother and child at risk from tetanus. Tetanus germs grow in dirty cuts. This can happen, for example, if an unclean knife is used to cut the umbilical cord or if anything unclean is put on the stump of the cord.

If the tetanus germs enter the mother's body, and if she is not immunized against tetanus, then her life will also be at risk. Tetanus vaccination is very important, especially pregnant women, the first dose should be given as soon as possible. The second dose can be given four weeks after the first. The third injections need to use 6 months after the first injection.

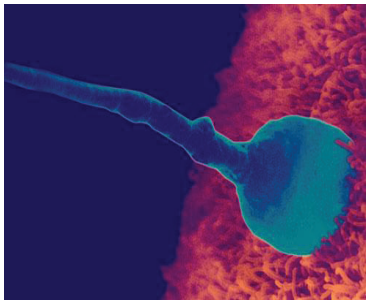
All women of child bearing age should be immunized against tetanus, so that the babies will be protected against tetanus of the new born. Tetanus immunization of pregnant woman:

- 1st injection T.1
- 2nd injection T.2 (1 month after T.1)
- 3rd injection T.3 (6 months after T.2 or more than 6 months)
- 4th injection T.4 (1 year or more after T.3)
- 5th injection T.5 (1 year or more after T.4)
- 0.5 cc of vaccine in the arm or in the leg by subcutaneous injection

**Fetal Development**

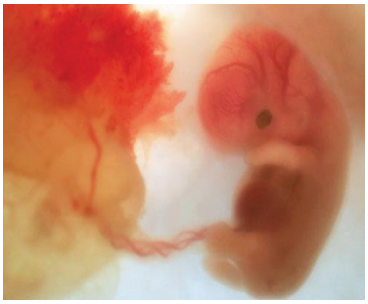


**Conception**



**Fetal Development 4 weeks**

**Fetal Development 8 weeks – size of a grape**



**12 weeks**

**16 weeks**

The fetus measures about two and a half inches and starts to make its own movements. You will start to see the top of the uterus above the pelvic bone. Your doctor may hear the baby's heartbeat with special instruments. The sex organs of the baby should start to become clear.

The baby's eyes can blink and the heart and blood vessels are fully formed. The baby's fingers and toes should have fingerprints.

**20 weeks**

**28 weeks**

**36 weeks**

# Normal Labour

## DEFINITION

Labour is defined as the physiological process lasting from the time when the cervix begins to be taken up (and the presenting part its passage through the pelvis) to the delivery of the placenta and membranes.
Labour is conveniently divided into three stages, the first, second and third, though in practice the process is a continuous one, and the change from the first to the second might not always be clear.

**A. Normal labour is one in which:**

- The labour starts spontaneously at term.
- The foetus presents as a vertex.
- The whole process is completed within 20 hours.
- No complications arise.
- Only minimal damage, e.g. an episiotomy, is done to the maternal birth canal.
- The child is born alive and requires only minimal resuscitation.

**B. The onset of labour**

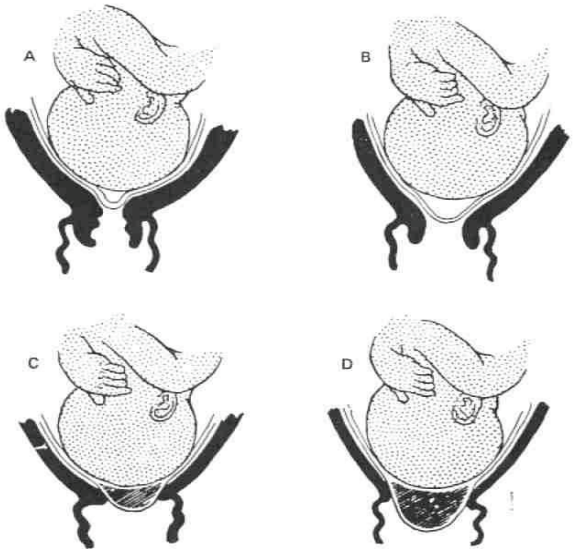
- A woman is really in labour if the following signs and symptoms are present:
- Contractions of the uterus which are increasingly strong, painful and regular;
- Shortening and dilatation of the cervix is taking place;
- There is a 'show';
- Sometimes rupture of the membranes.

**C. THE STAGES OF LABOUR**

**The first stage of labour**

This stage begins when regular, painful uterine contractions start and is detected clinically by the thinning and effacement of the cervix, followed by its dilatation (i.e. the normally thick cervix becomes thinned out and stretched over the presenting part). The first stage is completed when the cervix is fully dilated and the presenting part starts being expelled.

This is the stage of dilatation of the cervix. On the average it lasts 8-12 hours in a primigravida and 6-8 hours in a multipara. It should not go beyond 14 hours in either. The uterus doing an immense amount of muscular work in contracting and relaxing characterizes this stage.




Contractions at the start of labour come every 10 to 15 minutes and last between 30 and 45 seconds. They increase in frequency and strength as labour progresses until they are separated by a minute or two and towards the end of the first stage last for one minute. The relaxation phase during which the muscle remains retracted also shortens.
As the uterus contracts and retracts more and more, the upper muscular part becomes

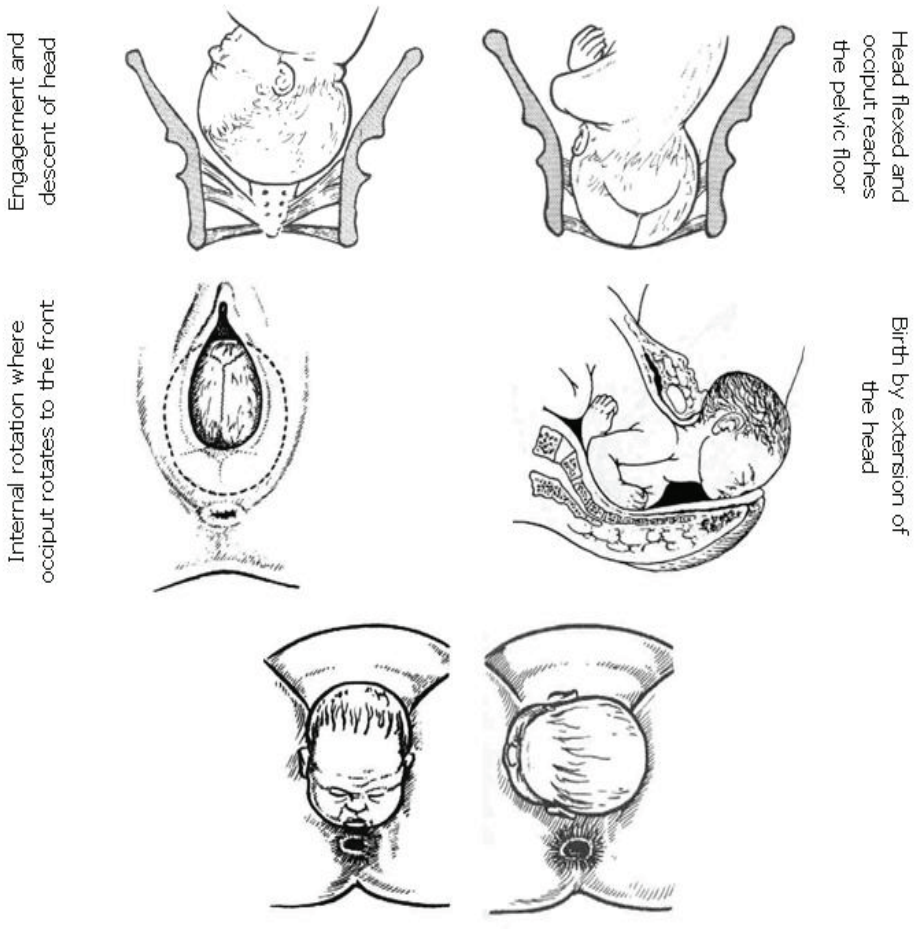
progressively thicker. The less muscular lower segment gets pulled upwards over the presenting part and becomes thinner. The cervix gets effaced. The effacement is followed or accompanied by progressive dilatation of the cervix until full dilatation when the uterus becomes a continuous cavity with the vagina (see Figure).

A fully dilated cervix is 8-10 cm dilated. During the first stage the uterine cavity gets progressively smaller but the fetus moves down very little. The presenting part helps in dilating the cervix. During this stage the woman should not use her volunteer efforts to bear down as this will exhaust her unnecessarily and cause oedema of the cervix and fetal distress.

**The second stage of labour**

This starts with the full dilatation of the cervix and the expulsion of the presenting part and finishes with the complete delivery of the baby. The second stage begins at full dilatation of the cervix. It is the stage of descent and expulsion of the baby. It normally lasts from 1-2 hours average in primigravida and 1/2 - 1 hour in multipara. If it goes beyond two hours it is considered abnormal. The contractions become stronger, lasting 40-60 seconds with a one-minute relaxation interval.

ILLUSTRATION OF MECHANISM OF THE SECOND STAGE OF LABOR



The retracted and contracting uterus pushes the fetus down into the pelvis. During the relaxation phase the pelvis floor pushes the presenting part up again but the retracted uterus does not allow all the progress achieved to be lost. Progressively the presenting part moves down until it reaches the pelvic floor. When the presenting part reaches the pelvic floor it starts stretching the vulva, causing much pain, especially in the primigravida. For some time it keeps popping out during a contraction and receding back during the relaxation phase. After some time it can no longer slip back. This is known as 'crowning'. The perineum becomes stretched and paper-thin and it is at this stage that an episiotomy should be performed. The next contraction normally expels the presenting part.

**Mechanism of the second stage of labour**

The mechanism of labour is a series of movements the fetus has to make to pass through the birth canal. To be able to manage labour skillfully you need to understand these natural movements made by the baby so that when you have to assist you can follow them rather than oppose them. You should study these using models of the female pelvis and a fetus in your hands.

The mechanism of labour in head (vertex) presentation is described below;

- Engagement and descent continues with head flexed and occiput reaches the pelvic floor.
- Internal rotation where the occiput rotates to the front. The head is now occipital- anterior position.
- Birth by extension of the head
- Restitution and external rotation

**The Third Stage of Labour**

This is the interval between the delivery of the baby and the complete expulsion of the placenta and membranes, in which one of the greatest complications of pregnancy and labour can occur. This stage should not longer than 30 mins to 1 hour, provided that there is no bleeding.

These various stages in the process of labour will now be considered in some detail with particular attention being paid to the physiological and mechanical changes that are involved.

## MANAGEMENT OF NORMAL LABOUR

**Introduction**

Proper management of labour is essential if you are to avoid problems or detect them early when they occur. The patient will come to you believing she is in labour. You should therefore admit her and it is up to you to assess her and decide whether she is in labour or not. If in labour she might be in early labour but in many cases she might arrive in the late second or even third stage. You should therefore follow the following steps:

- admit her and check if she is in labour (see onset of labour)
- if you are sure she is not in labour send her home to wait
- if in labour, keep her on the ward and check the following:

**General examination in the first stage of labour**

**History**

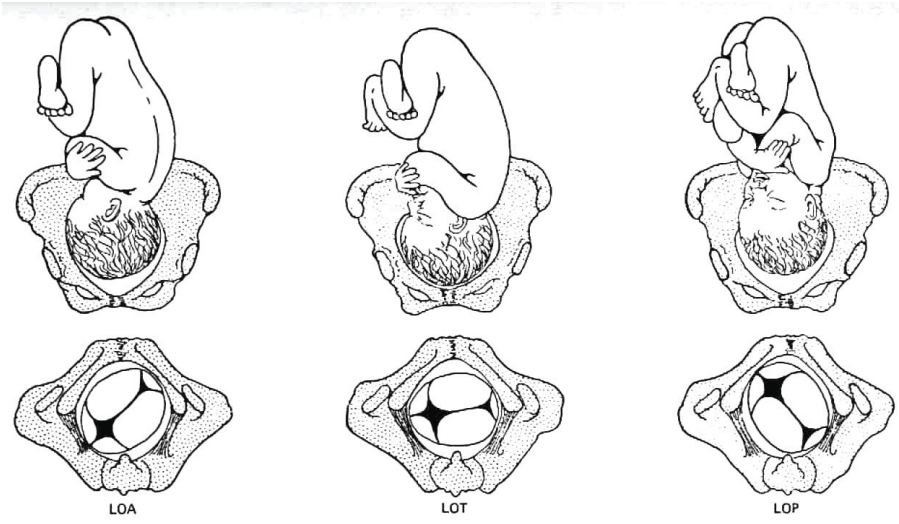
- Ask about the following:
  - Onset of contractions
  - Presence or absence of contractions
  - Activity of the fetus
  - Rupture of membranes or a show
  - Any treatment given

Check the mother's antenatal card and note any identified risk factors. If she has not been attending an antenatal clinic take a more detailed history.

**Physical examination**

Examine her and check the following:

1. The general condition
   – Exhausted, anemic, in great pain, dehydrated or with generalized edema.
2. Vital measurement
   – The blood pressure, pulse, temperature, respiratory rate.
3. Abdominal examination
   – Check and note the following:
     - Height of fundus
     - Over-distension of the abdomen, scars or other abnormality
     - Over-distension of bladder
     - Possible presence of twins
     - Contractions – frequency, length, type and strength
     - Lie of fetus – this is the relation of the long axis of the fetus to the long axis of the uterus. It can therefore be longitudinal, oblique or transverse
     - Rate and rhythm of the fetal heart.
     - *Presentation* - Which part of the fetus is at the pelvic brim? Is it a head (cephalic) or the buttocks (breech)
     - *Attitude* - Check whether the head is well flexed or extended. A well-flexed head presents the smallest diameter and delivers easier. A deflexed head presents a larger diameter and causes delayed or obstructed laboured.
     - *Position* - This is the relation of the fetal parts to the mother. This is confirmed by a vaginal examination by checking the position of the fetal occiput relative to the mother. The position of the fetal spine is the same as that of the occiput.
     - *Engagement* - Check whether the presenting diameter has passed through the pelvic brim.




4. Vaginal examination in labour

This is an important examination for it can give you a lot of information which you might not get from the abdominal examination. On the other hand, if you do it often it is uncomfortable for the woman and you might introduce infection into the uterine cavity, especially if the membranes have ruptured.

To avoid infection you should scrub and put on gloves as for any other sterile procedure. Then thoroughly swab the perineum of the woman with an antiseptic solution such as cetavlon or hibitane, or boiled water if these are not available.

**The indications for vaginal examination are:**

- To check if the patient is in labour and what stage. This is done on admitting the patient.
- To assess progress of labour. This is done every 4 hours during the first stage of labour. The degree of effacement, and dilatation of the cervix and the station of the head relative to the ischial spines will give you the necessary information.
- To check that there is no prolapsed of the cord when the membranes rupture.
- If you suspect full dilatation and you want to encourage the woman to push.
- You should not do a vaginal examination if the patient has antepartum hemorrhage because if there is placenta praevia, severe hemorrhage will occur.

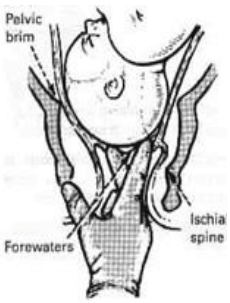
**Technique**

Scrub the hands for at least five minutes before any vaginal procedure in labour. Put on sterile gloves and at least put on a clean gown or apron if you cannot get a sterile one each time.
Make the patient lie on her back with the knees flexed and abducted at the hip (lithotomic position). Swab the inside of the thighs and the vulva with antiseptic solution. Separate the labia major with the left hand and swab the vulva from above downwards. Use each swab once only.
Apply an antiseptic lubricant to the right hand introduce the first two fingers into the vagina.

**Points to note on a vaginal examination**

- Vagina
  - Is it firm or lax?
  - Is it moist and cool or dry and hot? In prolonged labour when the women is in maternal distress and is dehydrated the vagina feels hot and dry.
  - Is it odematous?

- Cervix
  - Is it bruised or oedematous?
  - Is it hard or soft?
  - Is it taking up/effaced?
  - How far is the os dilated? The number of fingers, which fit into the diameter and is expressed as so many finger dilated, measures this or the same measure converted into centimeters.



Measuring the dilatation of the cervix and level of head

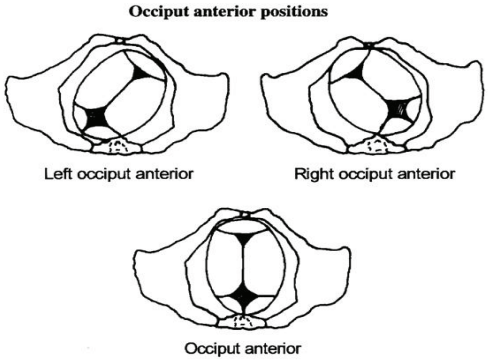
- Membranes
  - Are they ruptured or intact?
  - If intact, are they bulging?

- Cord
  - Is it presenting or prolapsed?
  - If prolapsed, is it pulsating?

- Presenting part
  - What is it? (Confirm with findings of abdominal examination)
  - Is it fitting the pelvis and cervix well?
  - If it is a head, can you feel a suture or fontanels? Which one?
  - Is it well flexed? Is occiput in anterior part of mother's pelvis?
  - Is there a caput succedaneum or excessive moulding?

– Position of the presenting part
  This is the relation of the fetal parts to the parts of the pelvis. A point on the fetus, such as the occiput in a vertex presentation, is usually used as a reference point, and its position relative to the pelvis stated:
  e.g. occiput anterior = occiput pointing in front
  occiput posterior = occiput pointing towards the back of sacrum
  left occiput anterior = occiput pointing half way to the front and to the left side of the mother
  right occiput posterior = occiput pointing half way towards the back and to the right side of the mother

To get the position right you have to palpate the sutures and fontanel and determine their position relative to the pelvis. His can be confirmed by abdominal examination.
In a breech or a face presentation the reference points on the fetus are the sacrum and the chin (mentum). In a vertex presentation, when the occiput is persistently posterior this cause prolonged labour.




– The pelvis
  The pelvis is assessed to check if it is adequate. The following are checked:
  - Is it roomy?
  - Are the side walls well spaced?
  - Can you touch the promontory of sacrum easily?
  - Is the ischial tuberosity wider than a knuckle?
  - Is the pubic arch wide enough?
– The discharge
  Withdraw the fingers and check if there is :
  - Any vaginal discharge?
  - Any smell?
  - Any liquor or meconium staining?
  - Any bleeding?
– Investigation
  - Take a urine sample for albumin and sugar.
  - Check for ketones especially if the patient is in prolonged labour.
  - Take blood for hemoglobin and cross-matching if the patient is anemic or might need an operation.

By this time you will have gathered enough information as to the stage of labour and whether the patient belong to the at risk category and needs referral to hospital.

## MANAGEMENT OF THE FIRST STAGE

Admit the patient to the waiting room, reassure her and introduce her to other patients. Reassure her and explain what is being done at every stage. Ask her to take a bath and change clean clothes.

Give her an enema only if she is in early labour in order to reduce the risk of faecal soiling and infection at delivery. Do not allow any solid food as the stomach takes a long time to empty in labour, and should she need an operation and anesthesia emptying of the stomach will be difficult and she might vomit and inhale the vomit.

The progress of the labour is to record in partograph by checking vital signs; vagina examination; FHS; contractions regularly.

**Towards the end of first stage**

Discourage pushing or bearing down before the cervix is fully dilated. Early pushing only exhausts the women and will cause oedema of the cervix and interfere with normal dilatation. She can rest in any position she finds comfortable.
If the bladder is full at the end of first stage and she cannot empty it on her own, catheterize her aseptically. When the membranes rupture, usually at the end of first stage, check the color of the liquor for meconium staining, the fetal heart rate and do a vaginal examination to exclude prolapsed of the cord.

## The Partograph

### I. INTRODUCTION

Approximately half a million women lose their lives every year because of complication of pregnancy and about 99% of these occur in developing countries. Prolong labour with obstructed labour and ruptured uterus cause as many as 70% of all maternal death followed by post-partum hemorrhage and sepsis in developing countries.

To take a positive action to reduced maternal mortality and morbidity a relevant technology " The Partograph" was created, by WHO and other international organizations working for safe motherhood.

The partograph as a tool is to help in management of labour. A partograph is used to record all observation made on a women in labour. Its central feature is a graph, where dilatation of the cervix as assessed by vaginal examination is plotted. By noting the rate at which the cervix dilates, it is possible to identify women whose labour are abnormally slow and who requires special attention. These women are at risk of developing prolonged and obstructed lobour due to cephalopelvic disproportion (CPD), which may lead to serious problems, such as ruptured uterus and death of fetus.

### II. PRINCIPLES

The partograph is based on the following principles:

- The active phase of labour starts at 3 cm cervical dilatation.
- The latent phase of labour should be not longer than 8 hours.
- During active labour, the rate of cervical dilatation should not be slower than 1 cm/hour.
- A lag time of 4 hours between a slowing of labour and the need for intervention can endanger fetus or the mother [and unnecessary intervention may required].
- Vaginal examination should be performed as infrequently as is compatible with safe practice (once every 4 hours is recommended).

### III. WHO SHOULD NOT HAVE A PARTOGRAPH IN LABOUR?

It is important to realize that the partograph is a tool for managing labour only. It does not help to identify other risk factors, which may have been present, before labour started.

Only start a partograph when you have checked that there are no complications of the pregnancy that require immediate action. Any women who should not be allowed to deliver in MCH should not start a partograph. In another way any women who have high risk and need to refer should not have a partograph.

In camps situation it can only be used for low risk labours where spontaneous vaginal delivery is anticipated. High-risk patients should be transferred to hospital immediately.

## IV. COMPONENTS

The partograph is basically a graphic representation of the events of labour plotted against time in hours. It consists of three components:

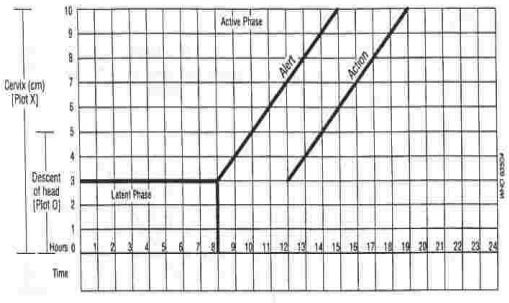
- The progress of labour
- The fetal condition
- The maternal condition

### A. The progress of labour

This part of the graph has as its central feature a graph of cervical dilatation against time. It is divided into a latent phase and active phase. There are 2 lines, ***the alert line and the action lines*** *drawn in the graph*.

The progress of labour can assess by:-

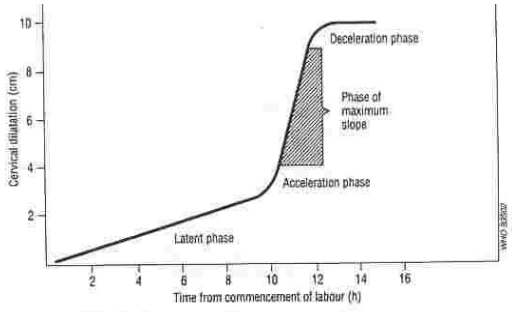
1. Monitoring the latent and active phase of labour
2. Cervical dilatation
3. Descent of the fetal head
4. Uterine contraction




#### 1. The latent and active phase of labour

Before assessing the progress of labour, as a health worker you need to understand the dynamic of labour. The labour starts slowly, often with several days of weak irregular contraction followed by stronger regular contractions take over and then labour progresses quickly. The whole labour is divided into 2 phases:

- The latent phase
- The active phase



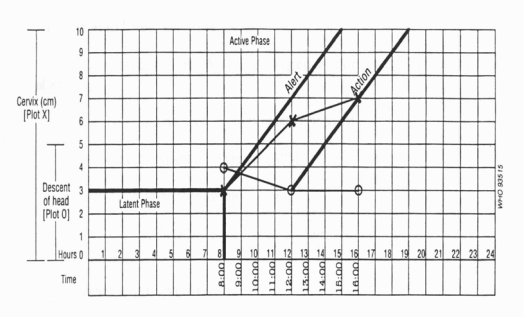

***The latent phase of labour***

It is the slow early part of labour, when the cervix is beginning to dilate up to 3 cm and become shorter. During this period contractions are strong enough to cause discomfort. This phase of labour should not continue for more than 8 hours, although there may be several days before this of weak, irregular contraction.

***The active phase of labour***

It is the main part of labour with cervical dilatation from 3 to 10 cm (full dilatation). The progress should be more rapid, normally at 1 cm/hour or faster.

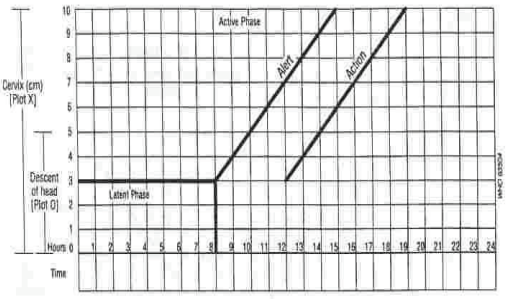
The alert line drawn from 3-10 represents the normal rate of cervical dilatation. Therefore, if cervical dilatation moves to the right of the alert line, it is an indication of delay in labour and she should be transferred to hospital.
The action line is drawn 4 hours to the right of the alert line, if cervical dilatation reaches this line, there is a critical delay in labour and a decision about appropriate management should be taken in hospital.



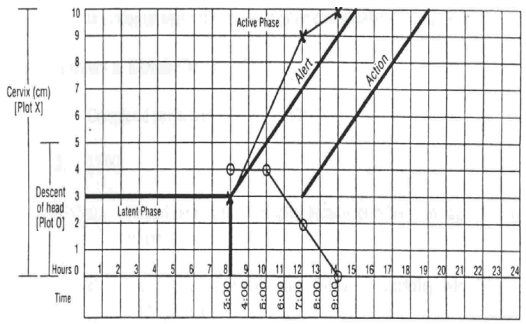

Health workers must understand that the active phase may appear to be harder work for the women because her contractions are stronger. The progress of labour become quicker and more efficient as the cervix dilates more quickly.

**2. Cervical dilatation**

The rate of cervical dilatation changes from latent to active phase of labour.
The latent phase is from 0-3 cm with gradual shortening of the cervix. The active phase is from 3 cm to 10 cm (full cervical dilatation).

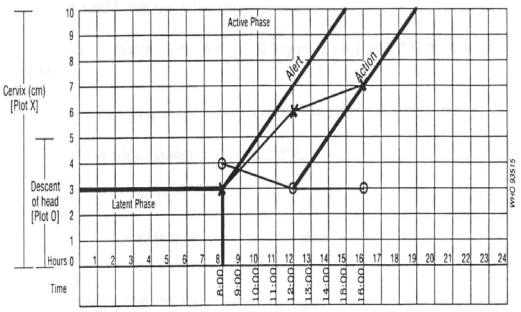



***Recording the cervical dilatation on the partograph.***
In the centre of partograph is a graph. Along the left side are numbers 0-10 against squares: each represents 1cm dilatation. Along the bottom the graph are numbers 0-24: each square represents 1 hour.




Dilatation of the cervix is measured in centimeters (cm). The dilatation of cervix is plotted (recorded) with an "X".
The first vaginal examination, on admission, includes a pelvic assessment and the finding is recorded.
Decide if the labour is in the latent phase or in active phase and put "X" mark on the right place on the partograph. Thereafter, vagina examinations are made every 4 hours, and continue to record the cervical dilatation on the graph, unless contraindicated.

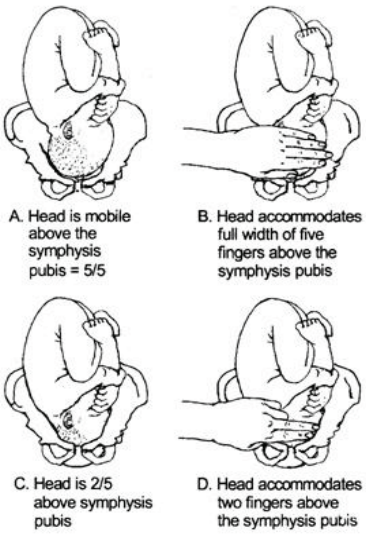
***Points to remember***
The latent phase is from 0-3 dilatation and is accompanied by gradual shortening of the cervix. It should normally not last longer than 8 hours. The active phase is from 3-10 and dilatation should be at the rate of at least 1cm/hr.
When labour progresses well, the dilatation should not move to the right of alert line. When



admission to health centre takes place in active phase, the admission dilatation is immediately plotted on the alert line.

When labour goes from latent to active phase, plotting of dilatation is immediately transferred from the latent phase area to alert line.

**Abdominal palpation for descent of the fetal head**




### 3. Descent of fetal the head

For labour to progress well, dilatation of the cervix should be accompanied by descent of the head. However, descend may not take place until the cervix has reached about 7 cm dilataion.

***How to measure the decent of head***

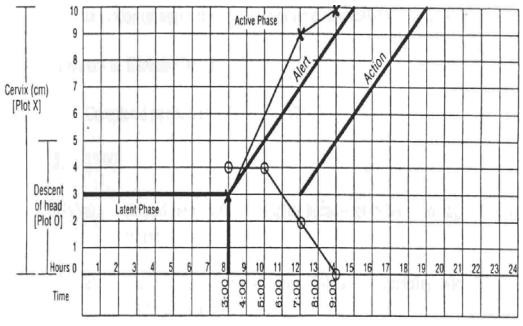
– It is measured by abdominal palpation.
– It is expressed in terms of fifth above the pelvic brim.
– It is more reliable way of gauging decent than vaginal examination where large caput formation often leads the inexperienced to confuse scalp decent with skull descent.

***Recording head decent on the partograph***

Assess the level of the fetal head abdominally before every vaginal examination (normally once every 4 hours). Note the number of fifths that can be felt above the pelvis, i.e. the number of fingers of head that can be felt. This number measures the level of head.

Record the level by an "O" on partograph. This means that every time you mark "X" for cervical dilatation, you must also mark an "O" for the level of fetal head. If "X" is transferred to the alert line when labour enters the active phase the "O" should also be transferred.

The head should normally descend during labour so that you can feel less and less abdominally. This means that as "X" rises up the graph, the "O" should drop down the graph.




### 4. Uterine contraction

For labour to progress well, there must be good uterine contractions. In normal labour they usually become more frequently and last longer as labour progresses.

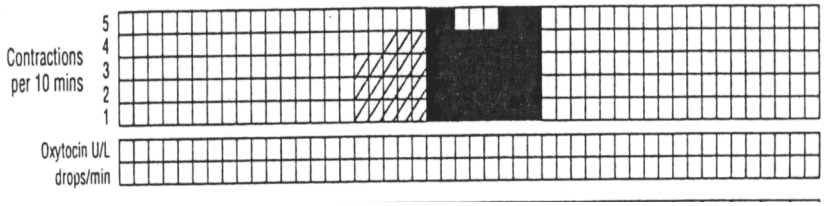
***Observing Uterine Contractions***

There are 2 observations made of the contraction:
– The frequency - How often are they felt?
– The duration - How long do they last?

The frequency of contractions is assessed by number of contraction in 10 minutes period. The duration of contractions is from the time the contraction is first felt abdominally to the time when contraction passes of, measured in seconds.

***Recording contractions on the partograph***

Uterine contractions are measured and recorded on the partograph more than cervical dilatation or level of fetal head. Observations on the contractions are made every hour in latent phase and every half- hour in the active phase. Assess contractions in at last 10 minutes of each half-hour or hour.




Count all contractions in that 10 minutes and measure in seconds how long each lasts. Fill in one box at the right time on the partograph for each contraction counted ( up to 5 contraction-there are only 5 boxes). The longer the contraction last, the more heavily the box is filled in.

## ASSESSMENT ON PROGRESS OF LABOUR

**Satisfactory 1st stage**

Findings suggestive of satisfactory progress in the first stage of labour are

- Regular contractions of progressively increasing frequency and duration
- Rate of cervical dilatation at least 1 cm per hour during the active phase of labour (cervical dilatation on or to the left of alert line)
- cervix well applied to the presenting part.

**Unsatisfactory 1st Stage**

Findings suggestive of unsatisfactory progress in the first stage of labour are

- Irregular and infrequent contractions after the latent phase
- OR rate of cervical dilatation slower than 1 cm per hour during the active phase of labour (cervical dilatation to the right of alert line)
- OR cervix poorly applied to the presenting part.

**Satisfactory 2nd Stage**

Findings suggestive of satisfactory progress in the second stage of labour are:

- Steady descent of fetus through birth canal
- Onset of expulsive (pushing) phase

**Unsatisfactory 2nd Stage**

Findings suggestive of unsatisfactory progress in the second stage of labour are:

- Lack of descent of fetus through birth canal
- Failure of expulsion during the late (expulsive) phase

**Fetal Condition**

If there are fetal heart abnormalities (less than 100 or more than 180 beats per minute), suspect fetal distress.

**Unsatisfactory progress**

Positions or presentations in labour other than occiput anterior with a well flexed vertex are considered malposition or malpresentations. If unsatisfactory progress of labour or prolonged labour is suspected, manage the cause of slow progress.

**The Maternal Condition**

- Evaluate the woman for signs of distress.
- If the woman's pulse is increasing, she may be dehydrated or in pain. Ensure adequate hydration via oral or IV routes and provide adequate analgesia.
- If the woman's blood pressure decreases, suspect hemorrhage.
- If acetone is present in the woman's urine, suspect poor nutrition and give dextrose IV.

***When should we refer to hospital?***

When cervical dilatation cross right to the alert line, this mean that the "x" are in between the Alert and Action line. When there is delay in the descend of head, where you can feel the head abdominally as the labour continues. This means that the "O" do not drop down the graph.

When there contractions are not strong, this means that numbers of contractions in 10 minutes does not increase and duration does not last longer, as labours. All the above recorded assessment should be observed and refer if any abnormal recording is observed.

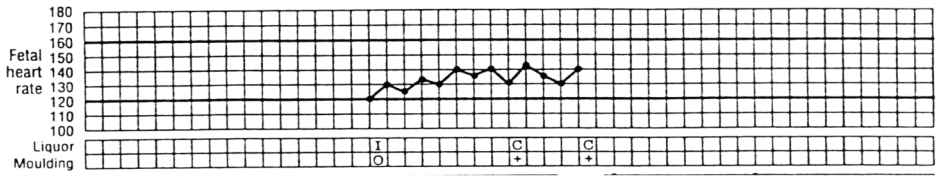
**B. The fetal condition**

The fetal condition in labour is assessed by observing:

1. Fetal heart rate
2. State of liquor
3. Moulding of fetal skull bones

**1. Fetal heart rate**

Fetal heart rate is recorded every half-hour. Fetal heart rate is to be recorded on the fetal heart rate graph part of the partogrph. The fetal distress condition, which needs an immediate action taken, can be detected by any abnormal observation on fetal heart rate together with the state of liquor. The normal fetal heart rate is between 120-140/minutes.




**2. State of liquor**

The state of liquor can assist in assessing the fetal condition. It is recorded once every 4 hours at the time of vagina examination. There are 4 different ways to record the state of liquor on the partograph, immediately below the fetal heart rate recording.

1. If the membranes are intact: → record as the letter "I" for intact
2. If the membranes are ruptured → record as the letter "C" for clear and liquor is clear:
3. If the membranes are ruptures → record as the letter "M" for meconium and liquor is meconium-stained:
4. If the membranes are ruptured → record as the letter "A" for absent and liquor is absent:

If there is thick meconium at any time or absent liquor at the time of membrane rupture, listen to the fetal heart more frequently, as these may be signs of fetal distress.

**3. Moulding of the fetal skull bones**

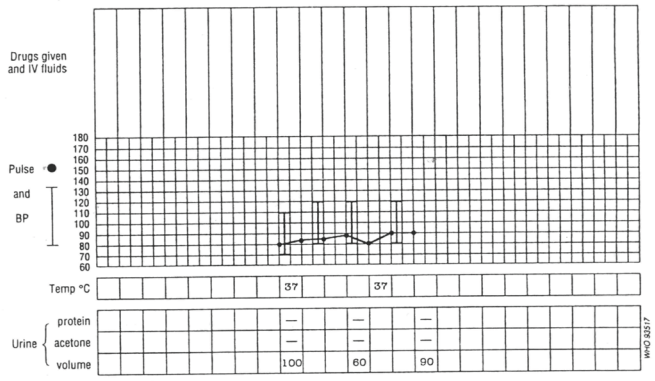
Moulding is an important indication of how adequately the pelvis can accommodate the fetal head. Increasing moulding with high head in pelvis is an obvious signs of cephlopelvic disproportion (CPD). There are 4 different ways to record the moulding on the partograph, immediately beneath those of the state of liquor.

1. If bones are separated and sutures can be felt easily: record as the letter "O"
2. If bones are just touching each other: record as +
3. If bones are overlapping: record as ++
4. If bones are overlapping severely record as +++

Moulding may be difficult to assess in the presence of large caput, but that in itself should allert the health worker to possible CPD. Moulding is recorded at each vaginal examination.

**C. The maternal condition**

Regular assessment of the maternal condition is achieved by charting maternal temperature, pulse and blood pressure and by regular urinalysis. These vital signs are recorded on the bottom part of the partograph.




**Drugs, intravenous fluid and oxytocin.**

Many health workers may not have access to these, but when they are used, they should be recorded on the partograph. No drugs, oxytocin, or IV fluid are likely to be needed in normal labour.

## MANAGEMENT OF THE SECOND STAGE

**1. Equipment for the delivery**

The following equipment should be ready and at hand:

- For the attendant
  - A clean plastic apron
  - Sterile glove

- For cleaning
  - One clean uniform
  - Clean plastic sheet for the delivery

- For the episiotomy and repair
  - Scissors

- Syringe, needles and holder
- Local anesthetic.

– For the baby and cord
  - Two artery forceps to clamp the cord ( four in case of twins)
  - Scissors to cut cord
  - Ligature for cord
  - Mucous extractor for baby
  - Clean towel to receive baby
  - Labels for baby (two if twins)

– To control bleeding in the third stage
  - Bowel to collect and measure blood loss and receive the placenta
  - syringes for Methergin and local anaesthesia
  - Pressure forceps (artery and sponge forceps) for bleeding point in cervix and perineum
  - Methergine ready and drawn into syringes

**2. Observation of the patient**

Once the cervical os is fully dilated you should expect delivery at any time. On the other hand the patient may remain in the second stage up to one hour in a primigravida and half an hour in multigravida before you need get worried.

***The following steps are suggested in management of the second stage***

– Do not leave the patient alone at any time.
– Put the patient in dorsal position and support her on pillows.
– Swab the thighs and vulva with antiseptic. Repeat this if the patient passes stool or the second stage is prolonged.
– Scrub, put on a clean apron and sterile gloves.
– Check the following:
  - Pulse of the mother every 15 minutes
  - Feral heart rate, after every contraction if possible
  - Make sure the bladder is empty
  - Watch for descent of the head.

**The pushing stage**

When the head reaches the pelvic floor encourage the patient to push or bear down. Bearing down before the head reaches the pelvic floor exhausts the mother unnecessarily and there is a risk of pushing the head against the pelvic brim instead of into it, and thus delaying the delivery. On the other hand, if there are signs of maternal or fetal distress you might have to hurry up the second stage by encouraging bearing down earlier or applying a vacuum extractor in equipped health centers with experienced health workers.

Tell the patient to wait for a contraction. When it comes she should take in a full breath, close her mouth and bear down as strongly as she can, then quickly take in another breath and bear down again. She should be able to make at least two efforts during each contraction. Encourage her all the time and explain the progress that is being made towards the birth of her baby. Tell her about the value of co-operating with her attendants.

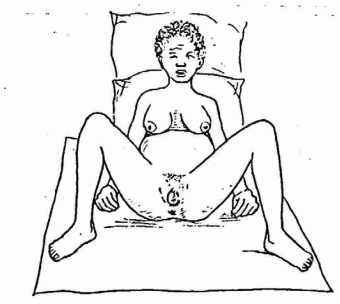


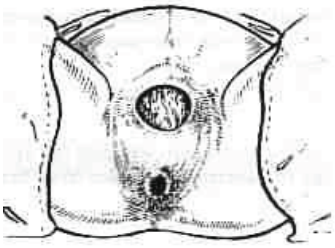
Figure The dorsal position for delivery

Discourage her from pushing between contractions. This does not help progress and only exhausts her and cut off blood supply to the fetus. Between contractions she should rest and breathe in and out deeply.

She may feel an urge to pass stool as the head passes the rectum. This might embarrass her and discourage her bearing down efforts. Reassure her that this is normal and that she should just continue pushing and relaxing. If the passes stool, clean her anus with a sterile pad or boiled piece of cloth, wiping away from the vagina.

**Active assistance to the mother**

At this stage the head might start distending the perineum. The anus starts dilating and the head is seen at the vulva. It keeps receding between contractions. Place the palm of your left hand on the advancing head and try to keep it flexed. Have a cloth in your right hand placed over the perineum and anus.



**Doing an episiotomy**

Figure Infiltrating local anaesthetic for the episiotomy

If the perineum looks over-stretched or likely to tear (getting shiny and very thin) or your have already identified indications for doing an episiotomy (see below). Sometimes local infiltration is not needed.

**Crowing of the head**

Next is the crowning of the head. The parietal eminences pass through the bony outlet. At this stage the head no longer recedes between contractions. Tell the mother to stop pushing as this might lead to too rapid delivery of the head and consequent brain damage. Tell her to breathe rapidly and stop pushing.

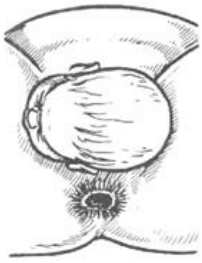
**Extension of the head**

Allow the head to extend naturally, spread your fingers equally over the vertex and keep a little pressure on it to avoid too quick delivery. Let the head come out slowly and naturally assisting in extension of the head. When the nose and mouth come out wipe away the mucus with a sterile swab. After this the whole head is out.

Feel for the cord around the baby's neck.
If it is there, slip it from the baby's neck. If it is too tight put two artery forceps on the cord and cut it between them.

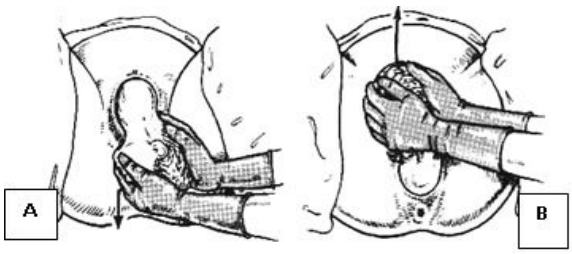
**The stage of restitution and external rotation**

By this time the head will have restituted and rotated spontaneously to face the mother's left or right thigh. This shows you that the shoulders have descended and rotated to the anterior posterior diameter.



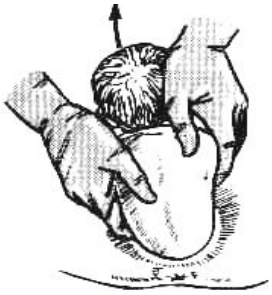
**Stage of delivering the shoulders by lateral flexion of the baby**

Place one hand above and one below the foetal head, and follow the natural movements of lateral flexion of the baby. Direct the head downwards towards the anus to deliver the upper or anterior shoulder (see A); then lift it gently to deliver the lower or posterior shoulder (see B). As long as there is no foetal distress there is no need to hurry. No traction should be used as this might damage the Bachial nerve plexus of the baby. If an episiotomy was not done the shoulders can also tear the perineum.

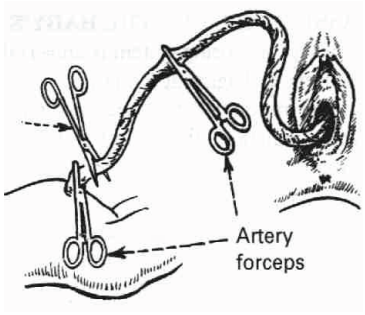



**Delivering the trunk and legs**

Hold the shoulders and apply a little traction to deliver the trunk and legs (see the illustration).



**Immediate care of the baby**




As soon as the baby is born, place him in a vertical position, head down, between the legs of the mother to drain him. Clean his mouth carefully - make the airways, free by sucking mucus from the mouth and nostrils.

When the pulsations have stopped, tie or clamp the cord 5 cm away from the umbilicus. Make sure the ligature is really tight before you cut the cord. Apply Tetracycline Eye Ointment (TEO) to both eyes of the baby. Examine and record APGAR scores (see the table below). Give injection vitamin K 0.5 mg (IM) to protect against hemorrhagic disease of the newborn. Wrap the baby in a clean cloth and give him to the mother to put to her breast.

**Record the following about the baby**

- Date
- Time of delivery
- Sex and if the genitals are normal
- Mother's name  label the baby with it
- Height
- Weight
- Anus - check if patent or imperforate.
- Normal baby or abnormality

## MANAGEMENT OF THE THIRD STAGE

### A. Introduction

This time interval between delivery of the baby and delivery of the placenta is one in which one of the greatest complications of pregnancy and labour can occur. This is excessive bleeding or postpartum haemorrhage (PPH).¬You should therefore never leave the mother alone even for a short while during this stage. This stage should not longer than 30 mins to 1 hour,if there is no bleeding.
Any third stage longer than that period or bleeding should be intervened.
There are two distinct methods for managing the third stage of delivering the placenta and membranes. You should know both methods. They are:

- The passive or natural method In this method the placenta is left to separate naturally and descend into the vagina without any interference.
- The active management.

After delivering of placenta, if an episiitomy has been performed or if a tear has occoured, repair should be carried out promptly.

### B. Delivering of placenta

***The Passive or natural method***

As soon as the baby is born, clear the airway, wrap him in a clean cloth and then give him to the mother to breast feed. Check if her bladder is empty. Place a bowl near the perineum to collect any blood. Place the clamped cord in the bowl. Be ready with methergin 0.2 mg.

Place a hand above the uterus and keep it still. Do not rub, massage or fiddle with the uterus at all as this may cause partial separation of the placenta leading to PPH. Keep the other hand on the patient's pulse to detect any change, e.g. tachycardia or a feeble pulse. Await the signs of spontaneous separation of the placenta. These are:

- The uterus rises in the abdomen and contracts so that it feels hard
- The patient may feel new contractions
- The cord lengthens
- There is some vaginal bleeding (a gush).

Once you notice the uterus is hard rub up a contraction. Do not rub the uterus if it is not hard. Ask the patient to bear down and expel the placenta. While it is being delivered hold it with both hands and gently twist it to allow the membranes to peel off completely. Massage the uterus to help it to contract.
Repeat methergin 0.2mg IM if you find the uterus is not well contracted or there is some bleeding.
Inspect the perineum, vagina, cervix and labia for any tears. Clean up the patient and put a sterile pad over her vagina to collect the lochia. Observe the patient over the next six hours.

***The advantages of this method are:***

- It is gentle to the patient.
- It is painless and natural.
- There is no danger of causing an hour glass contraction of the uterus and retaining the placenta.
- There is no danger of causing retention of an undiagnosed second twin.

***The disadvantages are:***

- There is a great danger of PPH with this method. The patient might be losing a lot of blood behind the placenta.

- In patients who have had maternal distress, obstructed or prolonged labour, or over distension of the abdomen, the uterus may not contract, thus causing a prolonged third stage. It might also contract or retract weakly, leading to PPH or a retained placenta.
- It is very slow at a time when the mother needs to rest. With this method you can wait up to an hour for a contraction to separate the placenta.

Because of the danger of PPH, which might lead to gross anaemia or collapse and death of the mother, or to unnecessary blood transfusions, this method has been abandoned in favour of 'active management' of the third stage.

**Active management**

This method is now used in all patients except those with severe heart disease or any kind of hypertension. It must be used in the following patients who are at greater risk of developing PPH:

- those with a history of PPH
- those who have had anteparturn haemorrhage (APH) in the present pregnancy
- those whose abdomen is distended with twins or hydramnios
- those who had prolonged, obstructed labour, or maternal distress
- grandmultiparae
- fat women
- anaemic women

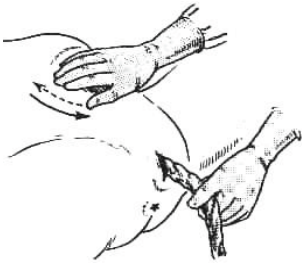
***Active management consists of two processes:***

- giving of methergin which stimulate uterine contraction
- controlled cord traction with the first contraction.

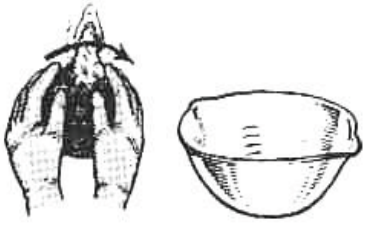
Methergin : 0.1-0.2 mg IM causes a uterine contraction to occur 5 - 7 minutes after the injection.Given IV, it acts within 45 seconds. The disadvantage is that the IV method needs a trained assistant to give it.

***Cord traction***

The uterus must be firmly contracted before this method can be used. It is very important that you start cord traction with the first uterine contraction, i.e. about 6- 8 minutes after the methergin IM injection. If you delay because you are busy resuscitating the baby, the placenta will be retained. Take the cord in the right hand. The other hand is placed just above the symphysis pubis and applies upward pressure on the uterus to prevent any pull being transmitted to the fundus of the uterus thus causing inversion of the uterus.



Apply gentle traction in a downwards then upwards direction as the placenta descends (to follow the direction of the vagina). Apply the traction gently and steadily, without jerking, to avoid breaking the cord. If the uterus relaxes, stop the traction temporarily, then apply traction with the next contraction. If the membranes are sticking inside the uterus rotate the placenta as it comes out. This will twist the membranes into a strong rope and they will be drawn out without breaking.



If the cord breaks, the placenta can be delivered by fundal pressure. Place your hand on the fundus and press downwards towards the pelvis. The placenta should then appear at the vulva. If the placenta is retained, refer the retained placenta section.

When the placenta comes out catch it in a receiver and examine it to make sure it is complete with its membranes. After delivering the placenta rub the uterus at the fundus to make sure that the

contraction is sustained. Do not apply downward fundal pressure while doing cord traction as this can lead to inversion of the uterus.

***Note:*** When using methergin it is important not to allow a long time to pass before starting this process of controlled cord traction as the drug also makes the cervix close down and the placenta may therefore be trapped (or retained) inside. The average blood loss with the third stage is 150 ml, and when this exceeds 500 ml it is termed a post¬partum haemorrhage. Again, it is advisable not to wait until the full amount of blood has been reached before calling for assistance.

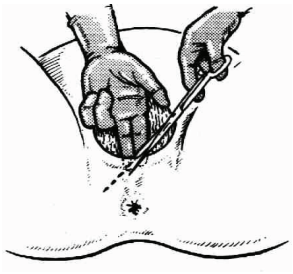
**C. Repair of episiotomy**

Episiotomy is to make an incision in the perineum at the time of delivery.

***Indication for episiotomy***

- To prevent a perineal tear which you suspect may involve the anal sphincter
- When the perineum obstructs delivery
- Fetal distress
- Instrumental deliveries, i.e., vacuum & forceps.

***Technique to make episiotomy***

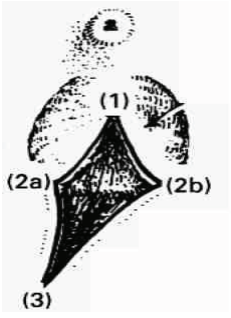


Use 'postero-lateral' incision because it gives the most extension and the best protection against anal sphincter damage. The timing of an episiotomy is difficult, and improves with experience. If the perineum becomes 'white' and you think it will tear or the perineum is not stretching to allow enough space for the baby to be born, do the episiotomy while the woman is pushing (less pain, less blood loss).

***Technique to repair the episiotomy***

Two fingers are placed inside the perineum to protect the fetal head and one long cut is made with sterile, sharp scissors. Before suturing, anesthetize the area with 5 cc of xylocaine (1-2%). Repair is done in three layers using absorbable suture material.

- Vaginal skin: always start the 1st stitch in the highest part of the vagina, at the apex of the wound (1) and end at the hymen tags, bringing together points (2a & 2b).
- Muscle and fat layers: interrupted sutures.
- Perineal skin: continuous or interrupted, starting at anus (3) and ending at (2a-2b).




A finger must be inserted into the anus after episiotomy repair is finished. If stitches are found in the rectum, they must be removed. [Don't forget to remove vaginal balls/swabs].

## TOCOLYTIC DRUGS

**Tocolytic drugs* to stop the uterine contractions**

| Drug | Initial Dose | Subsequent Dose | Side Effects and Precautions |
|---|---|---|---|
| Salbutamol | 10 mg in 1 LIV 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.<br><br>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. |

*Alternative drugs include terbutaline, nifedipine and ritodrine.

## MODIFIED PARTOGRAPH

The WHO Partograph has been modified to make it simpler and easier to use. The latent phase has been removed and plotting on the Partograph begins in the active phase when the cervix is 4 cm dilated. A sample Partograph is included. Note that the partograph should be enlarged to full size before use. Record the following on the Partograph:

**Patient information**: Fill out name, gravida, para, hospital number, date and time of admission and time of ruptured membranes or time elapsed since rupture of membranes (if rupture occurred before charting on the paragraph begin).
**Fetal heart rate** – Record every half hour.

**Amniotic fluid**

Record the colour of amniotic fluid at every vaginal examination.
- I: membranes intact
- R: membranes ruptured
- C: membranes ruptured: clear fluid
- M: meconium stained fluid
- B: blood- stained fluid

**Moulding**

1: sutures opposed
2: sutures overlapped but reducible

3: sutures overlapped and not reducible

**Cervical dilatation**

Assessed at every vaginal examination and marked with a cross (X). Begin plotting on the paragraph at 4 cm.

**Alert line**

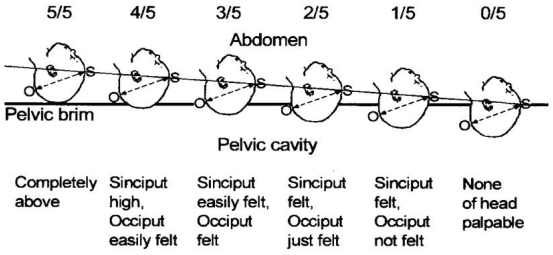
A line starts at 4 cm of cervical dilatation to the point of expected full dilatation at the rate of 1 cm per hour.

**Action line**

A line parallel and four hours to the right of the alert line.

**Descent assessed by abdominal palpation**

It refers to the part of the head (divided into five parts) palpable above the symphysis pubis: recorded as a circle (0) at every abdominal examination. At 0/5, the sinciput (S) is at the level of the symphysis pubis.




**Hours**: Refers to the time elapsed since onset of active phase of labour. (observed or extrapolated). Time: record actual time.

**Contractions**: Chart every half hour: count the number of contractions in a 10 minute time period, and their duration in seconds.

- Less than 20 seconds
- Between 20 and 40 seconds
- More than 40 seconds

**Oxytoxin**: Record the amount of oxytoxin per volume IV fluids in drops per minute every 30 minutes when used.
**Drugs given**: Record any additional drugs given.
**Pulse**: Record every 30 minutes and mark with a dot. (•)
**Blood pressure**: Record every 4 hours and mark with arrows.
**Temperature**: record every 2 hours.
**Proteins, acetone and volume**: record when urine is passed.

## Sample Partograph

It is a sample partograph for normal labour:

- A primigravida was admitted in the latent phase of labour at 5 AM
  - Fetal head was 4/5 palpable;
  - Cervix dilated 2 cm;
  - Three contractions in 10 minutes, each lasting 20 seconds;
  - Normal maternal and fetal condition.

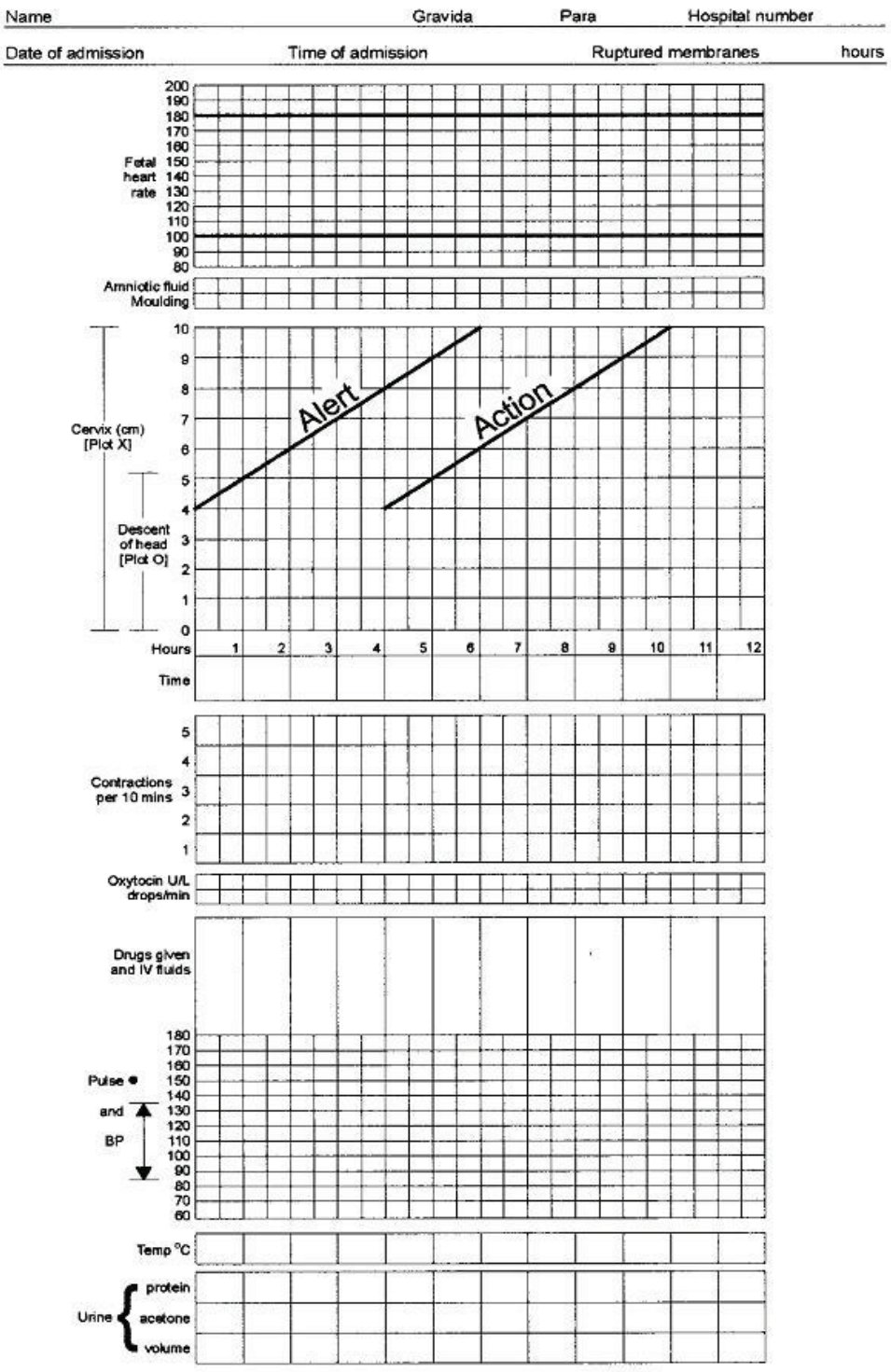
***Note***: Because the woman was in the latent phase of labour, this information is not plotted on the partograph.

- At 9 AM:
  - Fetal head 3/5 palpable;
  - Cervix dilated 5 cm;
  - Four contractions in 10 minutes, each lasting 35 seconds.

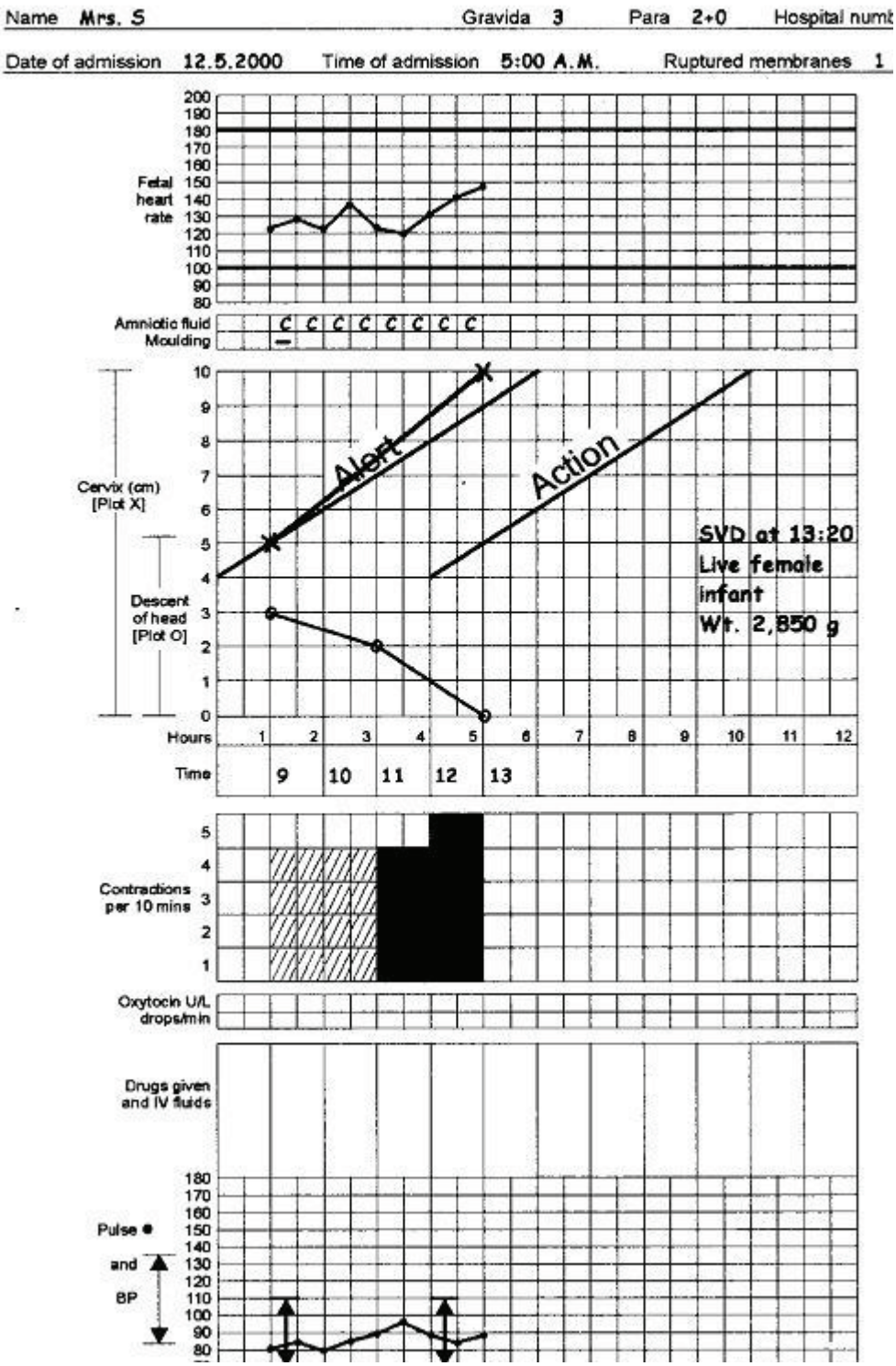
***Note***: The woman was in the active phase of labour and this information is plotted on the partograph. Cervical dilatation is plotted on the alert line.

- At 11 AM:
  - Fetal head 2/5 palpable;
  - Four contraction in 10 minutes, each lasting 45 seconds.
- At 1 PM:
  - Fetal head 0/5 palpable;
  - Cervical dilatation progressed at rate of more than 1 cm per hour and cervix fully dilated;
  - Five contractions in 10 minutes each lasting 45 seconds;
  - Spontaneous vaginal delivery at 1:20 PM.

## The modified WHO Partograph



## Sample partograph for normal labour



## Obstructed Labour

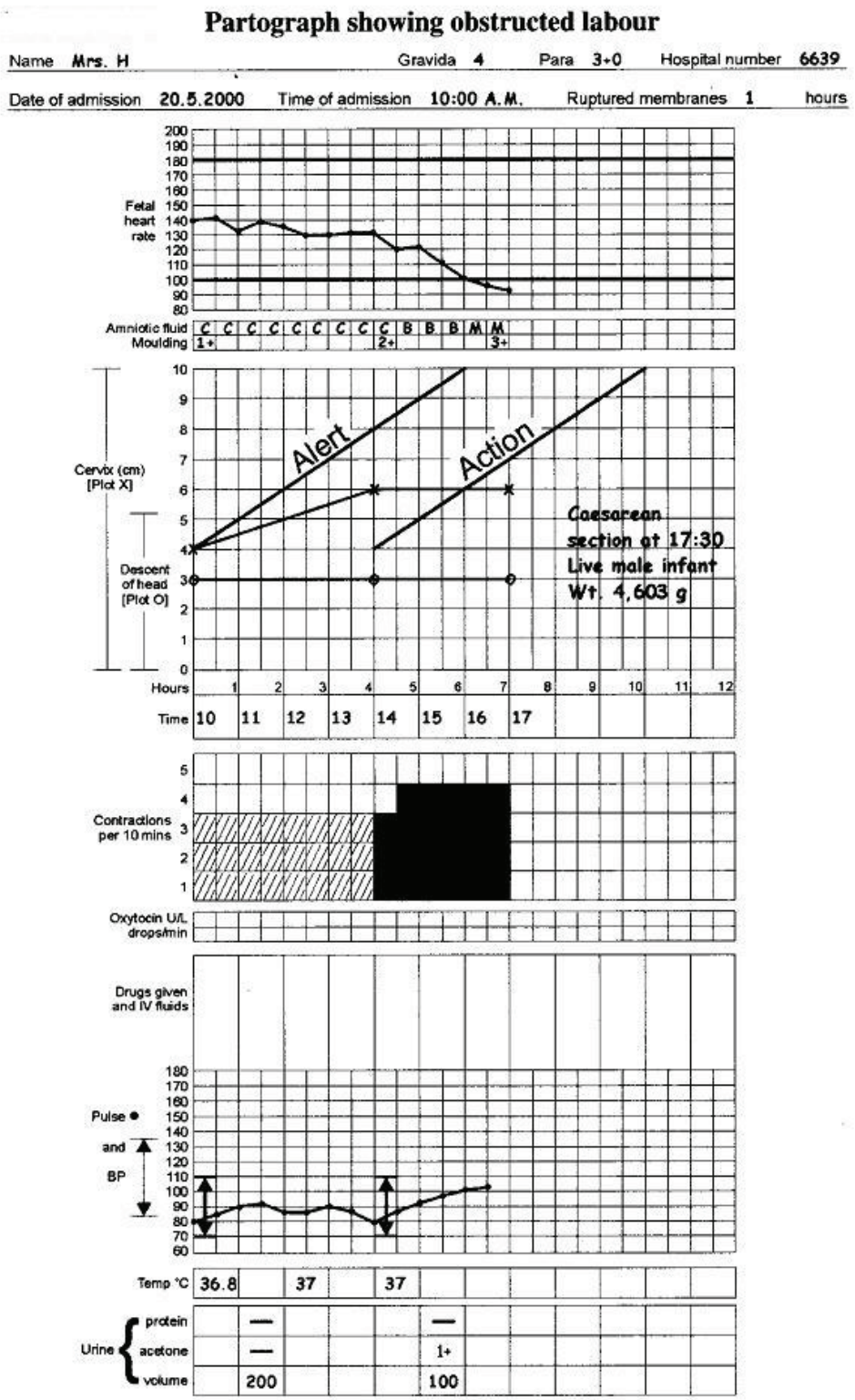
It is a sample partograph showing arrest of dilatation and descent in the active phase of labour. Fetal distress and third degree moulding, together with arrest of dilatation and descent in the active phase of labour in the presence of adequate uterine contractions, indicates obstructed labour.

- 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 inprovement 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.

**Partograph showing inadequate uterine contractions corrected with oxytoxin**

It is a sample partograph for poor progress of labour due to inadequate uterine contractions corrected with oxytocin.

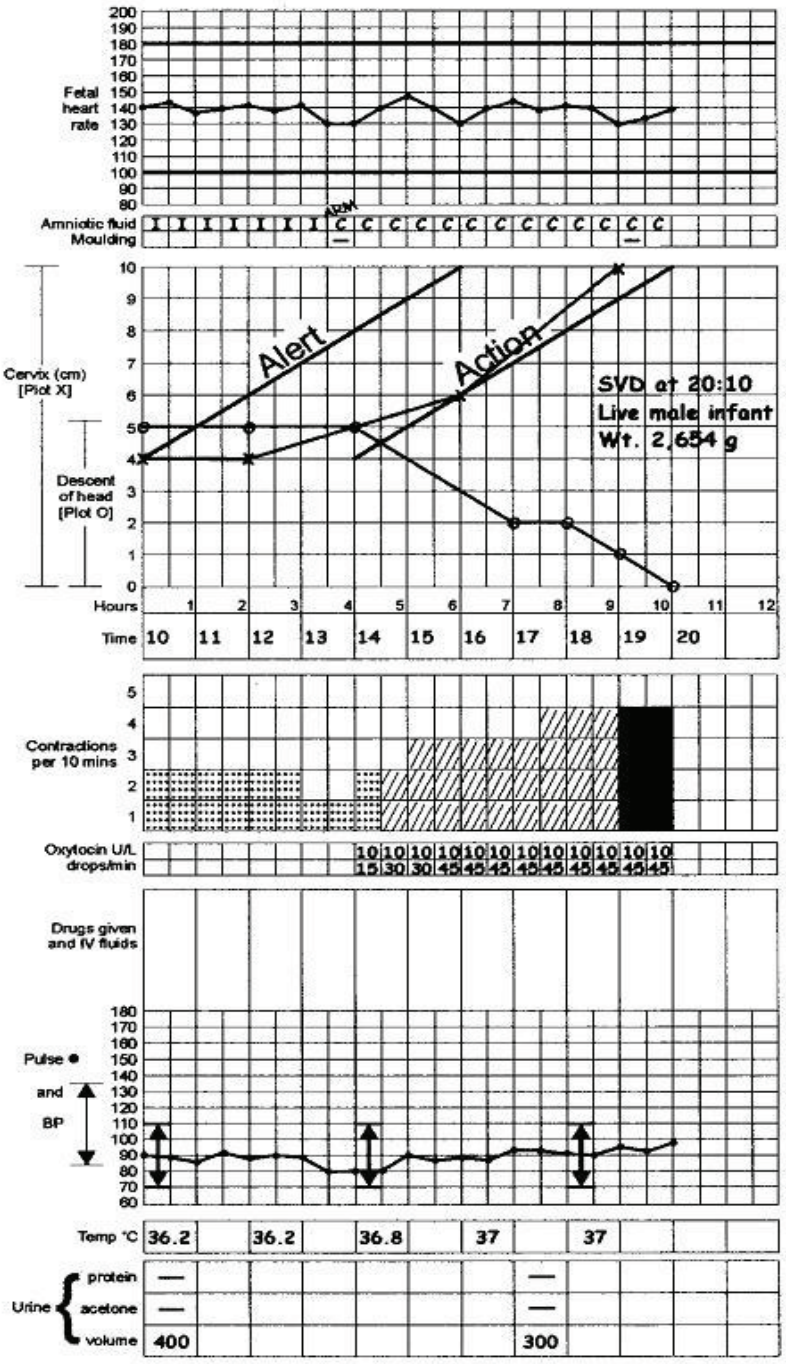
- The woman was admitted in active labour at 10 AM:
  - Fetal head 5/5 palpable;
  - Cervix dilated 4 cm;
  - Two contractions in 10 minutes, each lasting less than 20 seconds.
- At 12 PM:
  - Fetal head still 5/5 palpable;
  - Cervix still dilated 4 cm and to the right of the alert line;
  - No improvement in contractions.
- At 2 PM:
  - Poor progress of labour due to inefficient uterine contractions diagnosed;
  - Augmented labour with oxytocin 10 units in 1 LIV 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.


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
Fetal heart rate
Amniotic fluid
Moulding
Cervix (cm) [Plot X]
Descent of head [Plot O]
Alert
Action
Caesarean section at 17:30
Live male infant
Wt. 4,603 g
Hours
Time
Contractions per 10 mins
Oxytocin U/L drops/min
Drugs given and IV fluids
Pulse
and
BP
Temp °C
Urine
protein
acetone
volume

## Partograph showing inadequate uterine contractions corrected with oxytocin

Name Mrs. J Gravida 1 Para 0+0 Hospital number 1443

Date of admission 2.5.2000 Time of admission 10:00 A.M. Ruptured membranes 13:30 hours



## 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** |
| • Diastolic blood pressure 90-110 mm Hg before 20 weeks of gestation<br>• Proteinuria up to2+ | | **Chronic Hypertension with Superimposed mild pre-eclampsia** |
| • Two readings of diastolic blood pressure 90-110 mm Hg 4 hours apart after 20 weeks gestation<br>• No proteinuria | | **Pregnancy-induced hypertension** |
| • Two readings of diastolic blood pressure 90-110 mm Hg 4 hours apart after 20 weeks gestation<br>• Proteinuria up to 2+ | | **Mild pre-eclampsia** |
| • Diastolic blood pressure 110 mm Hg or more after 20 weeks gestation<br>• Proteinuria 3+ or more | • Headache(increasing frequency, unrelieved by regular analgesics)<br>• Blurred vision<br>• Oliguria (passing less than 400 mL urine in 24 hours)<br>• Upper abdominal pain (epigastric pain or pain in right upper quadrant )<br>• Pulmonary oedema | **Severe pre-eclampsia*** |
| • Convulsions<br>• Diastolic blood pressure 90 mm Hg or more after 20 weeks gestation<br>• Proteinuria 2+ or more | • Coma (unconscious)<br>• Other symptoms and signs of severe pre-eclampsia | **Eclampsia** |
| • Trismus (difficulty opening mouth and chewing) | • Spasms of face, neck, trunk<br>• Arched back<br>• Board-like abdomen<br>• Spontaneous violent spasms | **Tetanus** |

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

### 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<br>• Past history of convulsions<br>• Normal blood pressure | | **Epilepsy*** |
| • Fever<br>• Chills/rigors<br>• Headache<br>• Muscle/joint pain | • Enlarged spleen | **Uncomplicated malaria** |
| • Symptoms and signs of uncomplicated malaria<br>• Coma<br>• Anaemia | • Convulsions<br>• Jaundice | **Severe/complicated malaria** |
| • Headache<br>• Stiff neck<br>• Photophobia<br>• Fever | • Convulsions<br>• Confusion<br>• Drowsiness<br>• Coma | **Meningitis*** or Encephalitis *** ** |
| • Headache<br>• Blurred vision | • Vomiting | **Migraine***** |

– *If a diagnosis of eclampsia cannot be ruled out, continue treatment for eclampsia.
– **Examine cerebrospinal fluid and give appropriate treatment for meningitis or encephalitis.
– ***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.**

## Preterm Labour

### AT RISK

– Multiple pregnancy
– Polyhydramnios
– Abnormal fetus
– Injury
– Antepartum haemorrhage
– Surgery in pregnancy
– Premature rupture of membranes
– Past history of premature labour
– Maternal infections: Urinary tract infections, Respiratory infection, Genital infections, Malaria, Typhoid, other infections

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 intervention carried out to stop contractions.

### MAKE EVERY EFFORT TO CONFIRM THE GESTATIONAL AGE OF THE FETUS.

### TOCOLYSIS

The intervention aims to delay delivery until the effects of corticosteroids have been achieved. 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:

- Betamathasone 12 mg IM, two doses 12 hours apart:
- Or Dexamathasone 6 mg IM, 4 doses 12 hours apart.

***Note***: Corticosteroids should not be used in the presence of frank infection.

Give a tocolytic drug 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.

**28-34 weeks AND cervix < 4cm AND membranes not ruptured**

- Try to stop the labour
- Bed rest

Give nifedipine 20 mg STAT, if still contracting one hour after this dose (> 2 times in 10 mins and more than 20 secs) give a further dose. Then give nifedipine 20 mg TID for 72 hour to stop the contractions.

***Note***: Do not give nifedipine if the patient has low BP or has a heart problem

If no nifedipine available consider indomethacin, or terbutaline (discuss with doctor).

Give Dexamethasone 24 mg in 24 hours (8 mg IM TID for 1 day) or betamethasone (12 mg IM OD for 2 days) to help the baby's lungs to mature. This takes 48 hours to work. If contractions and cervical dilatation increase, stop dexamethasone and prepare for delivery.

***Note***: Do not continue dexamethasone after delivery.

**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.**

## 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 the progress of labour using the partograph. If labour continues and gestation is less than 37 weeks, give prophylactic antibiotics 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.

**> 34 weeks or cervix > 4cm dilated or membranes ruptured**

- DO NOT try to stop the labour
- Prepare for the delivery of a premature baby
- In case of a premature rupture of membranes (the water bag leaking before 37 weeks of gestation),no progress of labour AND no sign of infection:
  - Give oral erythromycin (500 mg QID for 7 days) to prevent infection of the mother and the fetus

During labour, give prophylactic antibiotics: ampicillin 2 gram IV QID until delivery. When signs of infection in the mother use ampicillin, gentamicin and metronidazole. If rupture of membranes before 34 weeks also give dexamethasone. Induce labour at 37 weeks of gestation.

## Premature Rupture of Membranes (PROM)

### DEFINITION

It is defined as watery vaginal discharge after 22 weeks gestation. Ruptured membranes prior to labour may be partial (small amount of water or amniotic fluid leaking) or complete (big rush of water). The management depends on the number of weeks of pregnancy but the risk of infection is the main problem, even if the leak is small.

**General Management**

Confirm accuracy of calculated gestational age if possible. Use a high level disinfected speculum to assess vaginal discharge. If there is vaginal bleeding after 22 weeks, do NOT do a digital vaginal examination.

**At risk**

- Multiple pregnancy
- Polyhydramnios
- STD and vaginal infections
- Previous history of premature rupture of membranes

### DIAGNOSIS

Confirm diagnosis with speculum examination & try to visualise water coming from cervix, especially when the women gives a push. Fern Test: crystallisation of amniotic fluid results in the formation of a typical fern pattern. Take a swab of suspected amniotic fluid and smear on a glass slide. Allow it to dry and observe under the microscope. Urine and normal vagina discharge will not show this pattern.

### MANAGEMENT

Pre-term (≤ full 32 weeks): the baby is too small to survive outside→ delay delivery

- Rupture of membrane (ROM) at any duration
- Admit
- Daily temperature check: if signs of infection (fever, smelly vaginal discharge) treat with triple antibiotics - Ampicillin or amoxicillin, Gentamicin and Metronidazole
- Give IM steroids to mother if there are no signs of labour, to help mature the foetal lungs. Dexamethasone 24 mg dose: give 3x 8 mg IM 8 hrly. OR Betamethazones 24mg total dose: give 2X12mg IM 12 hrly
- If labour, prepare for premature delivery and resuscitation.

Near or at term (≥ 33 weeks): the fetus has good chance of survival outside → deliver

**When rupture of membranes (ROM) < 24 hours,**

- Check temperature: if afebrile, wait; most women will come into labour by themselves

- If signs of infection (fever, smelly vaginal discharge): treat with antibiotics: Ampicillin/Amoxicillin, Gentamycin & Metronidazole IV if necessary.
- If STD suspected follow guidelines.

**When ROM > 24 hours,**

- Induction of labour with Syntocinon drip in equipped hospital is required→REFER.
- If signs of infection, e.g., Fever or bad smelling discharge, fetal distress, treat with antibiotics: Ampicillin/Amoxicillin, Gentamycin & Metronidazole IV if necessary.

## Hypertension and Pregnancy

### DEFINITION AND OUTLINE

The hypertension 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 for more information on diagnosis.

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 **a**fter 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 anemia, 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.

### PREGNANCY INDUCED HYPERTENSION

- May progress from mild disease to a more serious condition
- Hypertension without proteinuria
- Mild pre eclampsia
- Severe pre eclampsia
- Eclampsia

In pregnancy induced hypertension, there may be no symptoms and the only sign is an elevated blood pressure.

**Management of Pregnancy induced Hypertension**

- Early detection and management critical
- Monitor BP ,urine and fetal condition weekly
- If BP worsens manage as for pre-eclampsia
- Signs of fetal growth retardation admit to IPD
- If all observation remain normal allow to proceed to normal labour

**Complications of Pregnancy induced Hypertension (PIH)**

- Fetal growth restriction
- Increase drowsiness of coma
- Heart kidney or liver failure
- Failure to clot
- If IV lines in she is prone to infection
- IV fluids- watch for fluid overload

**Chronic Hypertension**

Blood pressure should not be lowered to less than prior to pregnancy. Continue same medication she was on prior to pregnancy if BP was well maintained. If diastolic pressure > 110mm Hg treat with hypertensive drugs. Consider Preclampsia if proteinuria present.

## Pre Eclampsia and Eclampsia

### DEFINITION

Pre-eclampsia and eclampsia are syndromes found at the late stage (>20 weeks) of pregnancy. These conditions can remain until, or even start after delivery. Eclampsia is very serious and there is risk of maternal and child death. It is very difficult to predict whether pre-eclampsia will become eclampsia so it is essential to be very cautious.

High Blood Pressure (HBP) during pregnancy ≥140mm Hg systolic and /or >90 mm Hg diastolic OR
An elevation of 15 mm Hg diastolic from the previous visit during pregnancy.

1. Pre-Eclampsia HBP>140/90 AND
   - Protein in the urine (urine stick) OR
   - Oedema (legs, hands, face, sudden weight gain, oedema may be present but is not required to make the diagnosis of pre-eclampsia)
   - Between 20 weeks of pregnancy and 6 weeks post-partum

2. Severe Pre-Eclampsia
   - HBP > 160/110 AND
   - 3+ proteinuria (urine stick) OR
   - Marked oedema may be present
   - Between 20 weeks of pregnancy and 6 weeks post-partum
   - Headache, upper abdominal pain and blurred vision are symptoms indicating the severity of the preeclampsia and can quickly develop into eclampsia
   - Hyperreflexia is a sign of severity

3. Eclampsia, Pre-eclampsia + convulsions or coma
4. HELLP syndrome
   - Haemolysis (break down of red blood cells)
   - Elevated liver enzymes.
   - Low platelets

### RISK FACTORS

- First pregnancy (primipara)
- Age> 35
- Twins
- History of HBP

- History of Pre-eclampsia in previous pregnancy
- Hydatidiform mole
- Too much amniotic fluid (polyhydramnios)

**What to do when a person with pre-eclampsia presents to the clinic**

- Check the past medical history and history of previous pregnancies for HBP
- Check the Antenatal Card for previous BP
- Ask about symptoms of oedema, headache, blurred vision and abdominal pain
- Ask about foetal movement, vaginal bleeding and uterine contractions
- Look for oedema and hyperreflexia

## TREATMENT

**Pre-Eclampsia**

- If less than 37 weeks of gestation:
  - Admit to IPD and check BP regularly.
  - Start methyldopa (aldomet) 250 mg PO BD-TID and increase progressively to 750mg PO TID (max 3 gram) Note: methyldopa is slow acting
  - It will take 2 or 3 days for the drug to have full effect

- If rest AND methyldopa do not control the BP in 7 days:
  - Add nifedipine 20 mg BID and increase progressively to a max 60 mg/day;
  - Or propranolol 40 mg PO BID (if no nifedipine available), increase progressively to a max 360 mg/day.

Do NOT use diuretics (furosemide or hydrochlorothiazide). Discharge when BP normalises and there are no symptoms: advise the patient to return twice weekly for a follow-up of BP and a weekly urine stick. Explain to the patient about the danger signs of pre-eclampsia (headache, blurred vision, abdominal pain etc).
If more than 37 completed weeks start methyldopa and start induction of labour. If less than 34 weeks give dexamethasone and methyldopa. Consider referral. Continue medication until after delivery and then slowly reduce dose if BP is normal.

**Severe pre-eclampsia**

- The treatment of severe pre-eclampsia is delivery by the quickest method
- Start IV with normal saline or Ringer to hydrate the patient (2-3 lt/24 hours)
- Start magnesium sulphate if available
- If BP> 180/110 start hydralazine IV 5 mg

Note: Be careful, hydralazine can reduce BP very quickly and the patient may go into shock (therefore a test dose of 2.5 mg IV is recommended).
Refer the patient for delivery as soon as possible. If no referral service is available, induce delivery. Measure urine output when a patient is on MgSO4 treatment and make sure the hourly urine output is at least 30 cc/hour.

**Eclampsia**

The treatment of eclampsia is first to stabilise the patient, then deliver the baby. Follow treatment for severe pre-eclampsia before referring. Give Magnesium Sulphate. Refer the patient as soon as the condition is stable. Put the patient in a safe position, lying on the left side and prevent injuries. Maintain a clear airway for secretions and vomit.
If no magnesium sulphate available stop persisting convulsions with Diazepam. (Note: Diazepam will cause respiratory depression in the neonate so prepare for neonatal resuscitation after delivery). Put in a urinary catheter and monitor fluid balance. If no referral service is available, induce delivery.

**Treatment after delivery**

Apply same treatment. Continue treatment for severe pre-eclampsia and eclampsia for 48 hours after delivery. Do not stop methyldopa, nifedipine or propanolol suddenly. Reduce dose slowly with weekly patient review. ***Note:*** 25% of cases present after delivery.

## UTI in Pregnancy

Urinary tract infection (UTI) is common in pregnancy. Although asymptomatic bacteriuria occurs with similar frequency in pregnant and nonpregnant women, bacteriuria progresses to symptomatic infection more frequently during pregnancy. All woman should have an MSU at first ANC visit.

**Treatment of asymptomatic bacteriuria**

- Amoxicillin-clavulanate (Augmentin) 500 mg PO BID for three days
- Nitrofurantoin (Macrodantin) 50 mg PO QID for seven days
- Cefixime 250 mg PO QD for three days

Relapse typically occurs in the first two weeks after treatment. Such infections should be treated with two weeks of oral antibiotics.

**Suppressive therapy is recommended for women with persistent bacteriuria.**
Nitrofurantoin (Macrodantin) 50 to 100 mg orally at bedtime, for the duration of the pregnancy is one option, or cephalexin (Keflex) 250 to 500 mg orally at bedtime. A culture for test of cure is obtained one week after completion of therapy and then repeated monthly until completion of the pregnancy.

### Cystitis

Acute cystitis should be considered in any gravida with frequency, urgency, dysuria, hematuria, or suprapubic pain in the absence of fever and flank pain.

**Treatment**

- Nitrofurantoin (Macrodantin) 100 mg BID
- Cephalexin (Keflex) 500 mg BID to QID

Each of these drugs is given for three to seven days.

### Pyelonephritis

Pyelonephritis complicates 1 to 2 percent of all pregnancies. Risk factors include asymptomatic bacteriuria, previous pyelonephritis, renal and collecting system anomalies, and renal calculi. Presentation consists of fever, chills, and costovertebral angle tenderness. Other symptoms include dysuria, nausea, vomiting, and respiratory distress.

**Parenteral Regimens for Empiric Treatment of Acute Pyelonephritis in Pregnancy**

| Antibiotic | Dose Interval |
|---|---|
| Ceftriaxone | 1 g 24 hours |
| Gentamicin | 1 mg/kg (+ampicillin) 8 hours |
| Ampicillin | 1-2 g (plus gentamicin)* 6 hours |

### Chicken Pox and Pregnancy

Although rare, chickenpox during pregnancy can cause complications both for the pregnant woman and the unborn baby.

**Complications to the mother**

- Higher risk of developing complications from chickenpox when pregnant if the patient:

- smokes
- Has a lung condition, such as bronchitis or emphysema
- Is taking steroids, or have taken steroids during the previous three months, or are more than 20 weeks pregnant

Up to one in 10 pregnant women with chickenpox develop pneumonia (inflammation of the lungs). Other rare complications can include inflammation of some parts of the body. For example:

- the brain (encephalitis)
- the liver (hepatitis)
- the heart muscle (myocarditis)
- the kidneys (glomerulonephritis)
- the appendix (appendicitis)
- the pancreas (pancreatitis)

Very rarely, complications resulting from chickenpox during pregnancy can be fatal.

**Complications to the fetus**

There is a small risk that chickenpox during pregnancy can cause complications for the fetus. These complications vary, depending on how many weeks pregnant the patient is when she contracts chickenpox. However, if an unborn baby is infected with chickenpox in the first 20 weeks of pregnancy, there's a small risk that they can develop a rare condition called foetal varicella syndrome (FVS). Research has shown that less than 1% of unborn babies were affected by FVS when their mothers had chickenpox while pregnant.

**Fetal Varicella Syndrome**

FVS can cause serious birth defects. For example:

- scarring of the skin
- eye defects, such as cataracts, which cause the lens in the eye to cloud over
- shortened limbs
- brain damage

**Complications that can affect the newborn**

If the patient contracts chickenpox after week 37 of their pregnancy, the baby is at risk of being born with chickenpox. The risk of the baby being born early (prematurely) is also slightly increased. If the patient get chickenpox seven days before or after giving birth, the baby may develop a severe type of chickenpox. If a newborn baby comes into contact with chickenpox or develops the condition, they may need treatment.

**Herpes Simplex and Pregnancy**

See BBG guidelines.
Need a LSCS if active genital lesions at time of delivery. Active Herpes Simplex lesions on the genitals at time of delivery – patient should have a Caesarian Section. Active Herpes Simplex – genitally during delivery is very dangerous to the baby.

**Sexually Transmitted Diseases and Pregnancy**

Guidelines for Screening from BBG.
All pregnant women should be tested for HIV infection as early in pregnancy as possible. Testing should be conducted after the woman is given pre test counseling.

**HIV and pregnancy**

Testing pregnant women is vital not only to maintain the health of the patient but also because interventions (i.e., antiretroviral and obstetrical) are available that can reduce perinatal transmission of HIV.

Retesting in the third trimester (i.e., preferably before 36 weeks' gestation) is recommended for women at high risk for acquiring HIV infection (i.e., women who use illicit drugs, have STDs during pregnancy, have multiple sex partners during pregnancy, or have HIV-infected partners).

**HIV testing**

Rapid HIV testing should be performed on women in labour with undocumented HIV status. If a rapid HIV test result is positive, antiretroviral prophylaxis (with consent) should be administered without waiting for the results of the confirmatory test.

**PMTCT = Prevention of Mother to Child Transmission**

When a pregnant woman is HIV positive, she has a high chance (15 to 45%) of passing the infection to her baby. This is called vertical transmission. The virus can reach the baby in several ways:

- Before delivery, while the baby is still in the uterus.
- During delivery, when the baby is exposed to infected blood and fluids from the mother.
- After delivery, when the baby is breastfed, because the virus is also in the breast milk.

The goals of the PMTCT program are to prevent HIV transmission from HIV-positive women to their infants. There are three main ways of doing this:

- Providing ARVs during pregnancy
- Avoidance of invasive procedures during labour and delivery
- Counselling women on their infant feeding options.

Besides medical support, the pregnant woman with HIV needs special care. Her first response to diagnosis of HIV may include shock, depression and anxiety. She is worried about what will happen to her own health, her pregnancy, her child's health, or family relationships. She needs psychological and social care. She will need education and a lot of explanation about living with HIV. She needs extra food supplies. This support should be given by specially trained health workers (a PMTCT-team) who are experienced in taking care of pregnant women with HIV.

**Using ARV during pregnancy**

HIV transmission from mother to the infant may be reduced by giving antiretrovirals during pregnancy and after delivery. Many different protocols exist- the most common use two or three of zidovudine, iamividune and/or nevirapine in various combinations during pregnancy and labour and after delivery to the mother and the newborn.

Some pregnant women may also need treatment with ART for their own HIV infection depending on their clinical state and CD4 count. This will also reduce the risk of HIV transmission to the infant. Refer to the ARV protocols in your clinic for further information on drugs, dosages and potential side effects.

**Care of the pregnant woman with HIV**

Avoidance of invasive procedures such as artificial rupture of the membranes and episiotomy. Discuss the issues of infant feeding. Follow up closely.

**Syphilis and pregnancy**

A serologic test for syphilis should be performed on all pregnant women at the first prenatal visit. 2.4 million units of benzathine penicillin G intramuscularly in a single dose for patients with primary, secondary or early latent syphilis and 7.2 million units intramuscularly administered in 3-weekly doses of 2.4 million units each for patients with late latent syphilis or latent syphilis of unknown duration. This treatment has been shown to be effective and, since no data are available on HIV positive patients, the same regimen should be used for such patients.

**Congenital Syphilis**

Congenital syphilis is syphilis present in utero and at birth, and occurs when a child is born to a mother with Secondary syphilis. Untreated syphilis results in a high risk of a bad outcome of pregnancy, including Mulberry molars in the fetus. Syphilis can cause miscarriages, premature births , stillbirths, or death of newborn babies.
Some infants with congenital syphilis have symptoms at birth, but most develop symptoms later. Untreated babies can have deformities, delays in development, or seizures along with many other problems such as rash, fever, swollen liver and spleen anemia and jaundice. Sores on infected babies are infectious. Rarely, the symptoms of syphilis go unseen in infants so that they develop the symptoms of late-stage syphilis, including damage to their bones, teeth, eyes, ears, and brain.

**Hepatitis B**

All pregnant women should be routinely tested for hepatitis B surface antigen (HBsAg) during an early prenatal visit (e.g., first trimester) in each pregnancy, even if they have been previously vaccinated or tested.

**Chlamydia**

All pregnant women should be routinely tested for Chlamydia trachomatis. The reported prevalence of chlamydia infections in pregnancy range from 5-30% depending on age and other risk factors. Pregnant women infected with chlamydia, like non-pregnant women, are at risk for cervicitis, urethritis and pelvic inflammatory disease. Chlamydia infections during pregnancy can also cause chorioamnionitis and post-partum endometritis and may be associated with gestational bleeding, premature rupture of membranes and preterm labour and delivery.

Perinatal transmission and neonatal complications of chlamydia occur in up to 50% of newborns whose mothers were infected with chlamydia at delivery. Exposed infants are at risk for conjunctivitis (20-50% of exposed) and neonatal pneumonia (10-20% of exposed).

**Gonorrhea**

All pregnant women at risk for gonorrhea or living in an area in which the prevalence of Neisseria gonorrhoeae is high should be tested at the first prenatal visit for N. gonorrhoeae. Pregnant and infected with gonorrhea, can lead increased risk of miscarriage, stillbirth and preterm labour.
During birth, it is possible to transmit the infection to the baby as it passes through the birth canal. Gonorrhea infects the eyes and can lead to blindness. Gonorrhea can also cause septic arthritis, meningitis and pneumonia, which may be life threatening, in infants. To prevent an infection many babies receive medicated eye drops, often silver nitrate, immediately after birth.

**Malaria and Pregnancy**

Why is Malaria dangerous during pregnancy?
Pregnancy is a period of great stress to the mother's body (breakdown of acquired immunity) and malaria has grave effects both on mother and baby. Also pregnant women are at risk to develop severe malaria very rapidly.

**Effects of Malaria on Pregnancy, Labour and Puerperium**

**Mother**

- Severe maternal anemia: →cardiac failure; PPH (weakness of muscles) and puerperal sepsis (reduced resistance to infections)
- Develop severe malaria very rapidly
- Maternal death from above complication

**Baby**

- Abortion, Stillbirth, Fetal distress, Low birth weight, Increase perinatal mortality, Premature delivery
- Abortion- high fever (1st trimester), severe anemia (2nd trimester)
- Premature labour - high fever, severe anemia, placental insufficiency
- Low-birth-weight baby: placental insufficiency → impairment of fetal growth
- Intrauterine death- high fever, severe anemia, placental insufficiency →asphyxia
- Neonatal death- malaria parasites cross to the baby →congenital malaria.

**Malaria and anaemia**

Without any malaria (Blood for malaria smear MS – negative) 27% of Pregnant Woman have anemia. With only 1 malaria attack (MS +) 35% of Pregnant Women has anemia. So with a regular follow up you can:

- Decrease Malaria because of regular MS and treatment
- Decrease anemia by prevention with Folic Acid and iron tablets
- Decrease the risks of premature delivery and low birth weight

## COMPLICATIONS FOR PREGNANT WOMAN

**Hypoglycemia:**

Occurs more easily because a lot of energy required for the fetus growth →Abnormal behavior, Sudden loss of consciousness, Sweating, epigastria pain. [Check dextrose, to avoid mistakes of diagnosis and think that it is cerebral malaria] It occurs more easily also with Quinine treatment. Check Dextrose regularly. Give water with sugar or Dextrose 50% IV if necessary. This is an emergency.

**Acute pulmonary edema:**

- Occurs more easily with pregnant woman
- Commonly after delivery (or abortion)
- RR increases and becomes superficial
- Pulses increase
- Crepitating on both sides
- Saliva foam in the mouth

If your pregnant woman is conscious, she will be anxious and will feel drowning sensations.

***Treatment for acute pulmonary oedema***

- Reduce the infusion rate or stop it temporarily
- Sitting position
- Lasix (Furosemide) 2 to 4 vials IV (40-80 mg) that you can repeat if it's necessary (even if Lasix is contra-indicated for pregnant woman when you are facing this emergency, you have no choice)
- Oxygen: 3 to 5 liters/min

**Severe Anemia**

For pregnant woman the needs in iron, folic acid, protein are higher, it is the reason why pregnant woman have anemia more easily (27% of pregnant women have). With the hemolysis due to malaria, the pregnant womanget anemia (35%) even more and have severe signs of anemia more quickly. Clinical signs of severe anemia are:

- Pallor, fatigue, dyspnoea, tachycardia, odema, cardiac murmur
- RR>50, BP<80/50, pulse>120, Hb<6g(Hct<18)

Treatment of severe malaria are:

- Treat malaria with effective anti-malaria drug using BBG
- All patient with Hb <6g (Hct<18) must be referred to IPD where transfusion is available

## BLEEDING BEFORE 24 WEEKS PREGNANCY

**Definition**

– Spontaneous or induced termination of pregnancy before 22 weeks

Bleeding in early pregnancy can be divided into threatened abortion, complete abortion, incomplete abortion and septic abortions. All have different therapies.

– always carry out a speculum examination and bimanual vaginal examination.
– look for products (placenta and foetus)
– remove all products immediately if in the cervix.

***Note:*** For all cases, ultrasound examination (if available) could help you making the correct diagnosis.

## THREATENED ABORTION

**Definition**

"Threatened abortion" is a pregnancy before 22 weeks where there is bleeding and/or cramping.

**Signs and Symptoms**

– mild vaginal bleeding, no shock
– mild cramping abdominal pain
– no products passed
– cervix closed

**Treatment**

Patient rests in IPD until the bleeding stops. Advise the patient to return to clinic if bleeding returns.

## COMPLETE ABORTION

**Definition**

A complete abortion is where all the products of conception have been lost from the uterus.

**Signs and Symptoms**

– Vaginal bleeding
– Abdominal cramps
– Complete passage of products seen
– Bleeding reduces after abortion, the cervix closes and the uterus becomes smaller and non tender

**Treatment**

1. Rest in IPD
2. Paracetamol for pain
3. Check Hb next day

## INCOMPLETE ABORTION

**Definition**

An incomplete abortion occurs when tissue has been passed, but some products of conception remain in the uterus.

**Signs and Symptoms**

– vaginal bleeding- may have shock
– abdominal cramps
– some products passed
– you may see products in cervix

– the cervix is open

**Treatment**

Remove all products from cervix using sponge forceps or a vacuum aspirator. If unable to remove all products or bleeding is heavy and continuous:
– Place IV line, give IV NSS/RL/Haemacel
– Consider transfusion
– Give Oxytocin IV 10-20 IU, Misoprostol (if available) or Ergometrine IV/IM 0.2mg
– REFER for curettage

## MISSED ABORTION

**Definition**

A missed abortion occurs when the embryo or fetus has died, but an abortion has not yet occurred.

**Signs and Symptoms**

– Little or no bleeding
– The cervix is closed
– Uterus is smaller than expected

**Treatment**

Most missed abortions will abort spontaneously. If available misoprostol can be given per vagina to induce abortion. Patient may need referral for curettage if products remain in uterus beyond 1 month.

## SEPTIC ABORTION

**Definition**

A septic abortion occurs when the tissue from a missed or incomplete abortion becomes infected. The infection can spread very easily through the body and is a high risk to the life of the woman.

**Signs and Symptoms**

– Manage the same as an incomplete abortion plus:
  • Fever
  • Shock
  • Vaginal discharge, bad smell
  • Cervix tender
  • Pelvic pain

**Treatment**

Manage the same as incomplete abortion plus:
– Tetanus injection if not given during pregnancy
– 7-10 days of antibiotics (start antibiotics before curettage):
  • Ampicillin IV 1g QID AND gentamicin IV/IM 7mg/kg OD [max 360 mg] AND
  • Metronidazole PO 500 mg TID
  • Switch to oral amoxicillin and metronidazole when clinically better
  • If you suspect STI, follow guidelines in BBG

## ECTOPIC PREGNANCY

**Definition**

The foetus grows outside the uterus, usually in the fallopian tube. After a few weeks (typically 8 weeks but it may be before or after), bleeding starts and the tube may rupture (break). Rupture causes very dangerous bleeding and shock, with high risk of death.

**Signs and Symptoms**

- Positive pregnancy test
- Lower severe abdominal pain, usually one-sided
- Slight bleeding which may be very dark in colour
- The patient may suffer shock. There may be minimal external bleeding, because the bleeding is internal
- Vaginal examination-tender cervix or to one side of the cervix

**Diagnosis**

Clinical, or when ultrasound is available: positive pregnancy test and no fetus in the uterus. Always suspect Ectopic if a woman has lower abdominal pain in early pregnancy.

**Treatment**

- Start IV NSS or Ringer
- Blood transfusion may be needed if heavy bleeding
- REFER for surgery urgently

## HYDATIDIFORM MOLE

**Definition**

Hydatidiform mole (also called Molar pregnancy) is an abnormal pregnancy due to abnormal growth of the placenta, which rarely develops into a cancer. There is no fetus in a molar pregnancy. Signs and symptoms are usually noticed at 10-16 weeks of the pregnancy.

**Signs and Symptoms**

- Severe morning sickness (nausea and vomiting) and tiredness
- Irregular bleeding with passage of vesicles (they look like grapes)
- The uterus is mostly larger than expected for the age of the pregnancy and soft
- Absent fetal heartbeat
- The pregnancy test is positive
- Symptoms of hyperthyroidism- rapid heart rate, restlessness, nervousness, heat intolerance, unexplained weight loss, trembling hands

**Treatment**

Refer the patient for ultrasound and curettage (Note: curettage in molar pregnancy has a high risk of haemorrhage or uterine perforation. Should not be done without blood for transfusion on standby).
If patient's condition is unstable, start IV fluids. The patient may be severely anaemic and need transfusion.

**Complications**

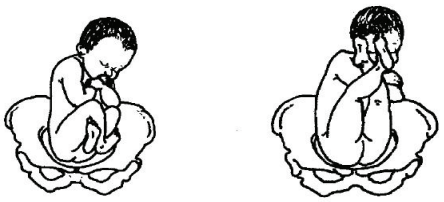
- Infection, bleeding and perforation during curettage
- Disseminated hydatidiform disease (spreading of the molar cells through the body as cancer)

**Follow-up**

The patient should be followed-up for one year and a pregnancy test (preferably B-HCG levels) done every 2 months. She should be offered contraception and be advised not to become pregnant for at least one year. The patient's future pregnancies should be followed closely. There is an increased risk for a second hydatidiform mole.

# Breech Delivery

**Breech presentation**



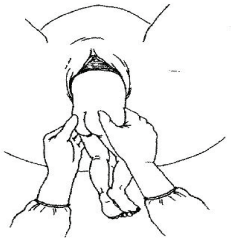
A. Complete (flexed) breech

B. Frank (extended) breech

**COMPLETE OR FRANK BREECH**

- Review for indications. Ensure that all conditions for safe vaginal breech delivery are met.
- Review general care principles and start an IV infusion.
- Provide emotional support and encouragement. If necessary, use a pudendal block.
- Perform all manoeuvres gently and without undue force.

**Hold the baby at the hips, but do not pull**



## DELIVERY OF THE BUTTOCKS AND LEGS

- Once the buttocks have entered the vagina and the cervix is fully dilated, tell the woman she can bear down with the contractions.
- If the perineum is very tight, perform an episiotomy.
- Let the buttocks deliver until the lower back and then the shoulder blades are seen.
- Gently hold the buttocks in one hand, but do not pull.
- If the legs do not delivery spontaneously, delivery one leg at a time.
  - Push behind the knee to bend the leg.
  - Grasp the ankle and delivery the food and leg.
  - Repeat for the other leg.

**Do not pull the baby while the legs are being delivery.**

- Hold the baby by the hips, as shown in figure. Do not hold the baby by the flanks or abdomen as this may cause kidney or liver damage.

## DELIVERY OF THR ARMS

**ARMS ARE FELT ON CHEST.**

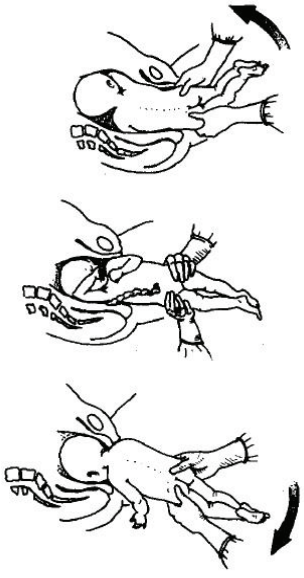
Allow the arms to disengage spontaneously one by one. Only assist if necessary. After spontaneously delivery of the first arm, lift the buttocks to words the mother`s abdomen to enable the second arm to delivery spontaneously. If the arm does not spontaneously delivery, place one or two fingers in the elbow and bend the arm, bringing the hand down over the baby`s face.

**ARMS ARE STRETCHED ABOVE THE HEAD OR FOLDED AROUND THE NECK.**

Use the Lovset`s manoeuvre.

- Hold the baby by the hips and turn half a circle, keeping the back uppermost and applying downward traction at the

**Lovset's manoeuvre**



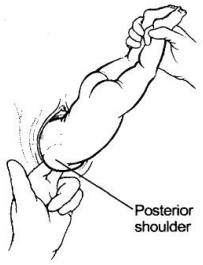
same time, so that the arm the was posterior becomes anterior and can be delivered under the pubic arch.
- Assist delivery of the arm by placing one or two fingers on the upper part of the arm. Draw the arm down over the chest as the elbow is flexed, with the hand sweeping over the face.
- To deliver the second arm, turn the baby back half a circle, keeping the back uppermost and applying downward traction, and delivery the second arm in the same way under the pubic arch.

## LOVSET`S MANOEUVRE

**BABY`S BODY CANNOT BE TURNED.**

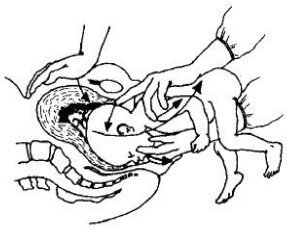
If the **baby`s body cannot be turned to deliver the arm that is anterior first**, delivery the shoulder that is posterior.
- Hold and lift the baby up by the ankles.
- Move the baby`s chest towards the woman`s inner leg. The shoulder that is posterior should deliver.
- Deliver the arm and hand.
- Lay the baby back down by the ankles. The shoulder that is anterior should now deliver.
- Deliver the arm and hand.

Delivery of the shoulder that is posterior




## DELIVERY OF THE HEAD

The Mauriceau Smellie Veit manoeuvre



Deliver the head by the Mauriceau Smellie Veit manoeuvre as follows:
- Lay the baby face down with the length of its body over your hand and arm.
- Place the first and third fingers of this hand on the baby`s cheekbones and place the second finger in the baby`s mouth to pull the jaw down and flex the head.
- Use the other hand to grasp the baby`s shoulders.
- With two fingers of this hand, gently flex the baby`s head towards the chest while pulling on the jaw to bring the baby`s head down until the hairline is visible.
- Pull gently to deliver the head.

***Note***: Ask an assistant to push above the mother`s pubic bones as the head delivers. This helps to keep the baby`s head flexed.
- Raise the baby, astride the arm, until the mouth and nose are free.

## THE MAURICEAU SMELLIE VEIT MANOEUVRE

**ENTRAPPED (STUCK) HEAD**
- Catheterize the bladder.
- Have an assistant available to hold the baby while applying Piper or long forceps.
- Be sure the cervix is fully dilated.
- Wrap the baby`s body in a cloth or towel and hold the baby up.
- Place the left blade of the forceps.
- Place the right blade and lock handles.
- Use the forceps to flex and deliver the baby`s head.
- If **unable to use forceps**, apply firm pressure above the mother`s pubic bone to flex the baby`s head and push it through the pelvis.

**FOOTLING BREECH**

A footling breech baby should usually be delivered by caesarean section.

**Single footling breech presentation, with one leg extended at hip and knee**

- Limit vaginal delivery of a footling breech baby to:
  - Advanced labour with fully dilated cervix;
  - Preterm baby that is not likely to survive after delivery;
  - Delivery of additional baby(s) in multiple gestation.
- To deliver the baby vaginally:
  - Grasp the baby`s ankles with one hand;
  - If only one foot presents, insert a hand into the vagina and gently pull the other foot down;
  - Gently pull the baby downwards by the ankles;
  - Deliver the baby until the back and shoulder blades are seen;
  - Proceed with delivery of the arms.

Single footling breech presentation, with one leg extended at hip and knee

## BREECH EXTRACTION

- Wearing high-level disinfected or sterile gloves (wear long gloves if available), insert a hand into the uterus and grasp the baby`s foot.
- Hold the foot and pull it out through the vagina.
- Gently pull on the foot until the back and shoulder blades are seen.
- Proceed with delivery of the arms.
- Give a single dose of prophylactic antibiotics after breech extraction:
  - Ampicillin 2 g IV PLUS metronidazole 500 mg IV;
  - OR cefazolin 1 g IV PLUS metronidazole 500 mg IV.

## POST-DELIVERY CARE

- Suction the baby`s mouth and nose.
- Clamp and cut the cord.
- Give oxytocin 10 units IM within one minute of delivery and continue active management of the third stage.
- Examine the woman carefully and repair any tears to the cervix or vagina or repair episiotomy.

## BLEEDING IN LATE PREGNANCY

**Definition**

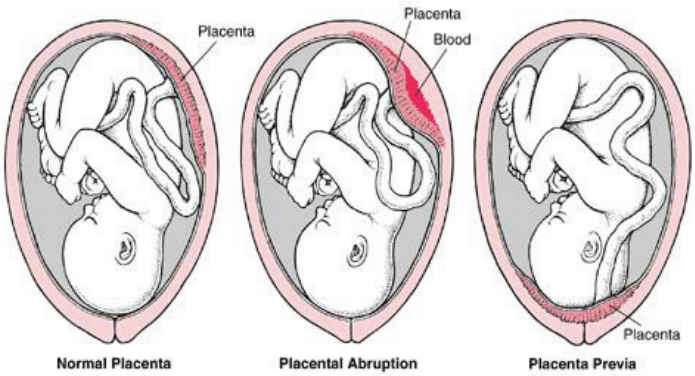
- Vaginal bleeding after 6 months of pregnancy (and before the labour starts)

All patients must be admitted to a health structure. Placenta Previa & Placenta Abruptio account for > 85% of hemorrhage during the last trimester of pregnancy.

- Placental Praevia - PP (all or part of the placenta covering the internal cervical os)
- Placental Abruption - PA (separation of the placenta from the uterine wall

| | PLACENTA PRAEVIA | PLACENTAL ABRUPTION |
|---|---|---|
| Definition | • All or part of the placenta covering the internal cervical os. Abnormal implantation site of the placenta (in the lower segment of the uterus) that it partially or totally covers the internal os or cervix. | • Separation of the placenta from the uterine wall; (or) premature separation of the normally implanted placenta. |
| History | • Causeless, painless bleeding | • Severe pain often with loss of fetal movement, bleeding may be concealed. |

| | | |
|---|---|---|
| Examination | • SHOCK & ANEMIA<br>• Even if bleeding has been heavy, uterus soft, non-tender.<br>• Presenting part high or malpresentation.<br>• FHB is usually normal or absent. | • SHOCK & ANEMIA<br>• Even if bleeding has been slight, uterus hard, tender.<br>• Fetal parts difficult to feel because uterus is hard.<br>• FHB may have fetal distress but is usually absent. |




**Management**

**Severe bleeding -Placenta previa or Abruptio placenta**

- IV fluid (if severe bleeding insert 2 IV)
- Refer with a suitable blood donor
- **No Pelvic Examination** with fingers; speculum examination only, because you can tear the placenta

**Slight bleeding & painless - probably Placenta previa**

- Refer with a suitable blood donor

**Slight bleeding & painful - may be small ABRUPTIO PLACENTA**

- If no further bleeding, no signs of internal bleeding, FHB is present:
  - Rest (IPD)
  - Allow home in 2 - 3 days
  - If bleeding returns - return to clinic immediately
  - Not to have sex → ↑vaginal bleeding

## Multiple pregnancy, breech and abnormal presentations

### MULTIPLE PREGNANCY

It is the term used to describe pregnancy with more than one fetus in uterus. The majority of such pregnancies are cases of twins. Uterus is large for dates. Presentation is difficult to feel and more than one pole. FHS heard in two (or three) different places.

**Complications**

Anemia is more common, due to high demand. Pre-eclampsia is as a result of large placenta. Antepartum hemorrhage (APH) is seen more often because of intrusion of large placenta to lower segment. Premature labour is a problem as the large uterus is more irritable after 32 weeks. Postpartum hemorrhage is due to overstretch uterus.

**Various Presentations**

- Both baby with head presentations - 40%
- Head presentation followed by a breech - 40%
- Both baby with breech presentations - 15%
- Longitudinal lie (head or breech) followed by transverse lie - 2%
- Breech presentation followed by transverse lie - 2%
- Both baby with transverse lie -1%

**Management**

- Pregnancy
  - Look out for the signs and symptoms of complication during ANC visit
  - Prevention of anemia with supplement of iron, folic acid and food
  - Rest at home as much as possible after 32 weeks
  - Refer the patient for hospital delivery after 38 weeks before the onset of labour

- Emergency twin delivery
  - If you are in a situation where you have to conduct an emergency twin delivery, following are important points to remember, while arranging for referral.

- Delivery
  - 1st baby - head presentation and multipara with no other problems can deliver in IPD only on emergency basis
  - 1st baby - breech presentation or not head presentation or primigravida → REFER

For emergency delivery prepare equipment for doing an episiotomy and extra equipment for clamping and ligating of 2 cords. First stage of labour tends to be longer than the single baby because of over distended uterus, closely watch the progress of labour. Slow IV infusion should start by the end of first stage to open the vein in case of PPH.

Conduct the first and second stage as for normal head or breech presentation, as a transverse lie with first fetus as rare. As soon as the first baby delivered tie the cord in 2 places and then divide it between the ties, as there is danger of one twin bleeding into the other. Mark the first baby as No 1. Check the lie of the second twin by abdominal palpation.

If second twin delivers within 30 minutes with normal head delivery or assisted breech delivery the third stage should be managed actively by giving IV methergin with birth of second twin and do controlled cord traction method to deliver the placenta.

If the baby lies longitudinal and 30 minutes has passed since the 1st twin has delivered membranes are still intact; contractions are good and strong; with head or breech is engaged; can do artificially rupture the membranes (AROM). Make sure the head or breech is engaged before rupture.
If there are no contractions after AROM induction of delivery is needed → REFER
If baby lies transverse and membranes are intact or ruptured → REFER

## BREECH

The presenting part of the fetus is the buttocks, or feet.
***Note:*** The patient needs to be informed that breech delivery is difficult.
When breech presentation is known she should be advised to give birth in IPD. A woman can successfully give birth to a breech, but if you think that the baby is large or if the pelvis has never successfully delivered a baby (e.g., Primipara or a multipara who has had a previous Caesarean Section) → REFER

A breech can deliver spontaneously to the umbilicus, after which the midwife needs to support the body. A minimal touch technique will prevent startle and extension of the fetal arms.

## CORD AROUND THE NECK

**Definition**

- Cord around the neck of baby and not able to remove it.

**Diagnosis**

- Confirmation of delivery of fetal head

**Management**

As part of normal delivery technique, feel for the cord around the neck after delivery of the head. If the cord is felt, try to lift it over the baby's head. If cannot lift over the head, ask the women not to push. Gently lift the cord, place two forceps on the cord and cut the cord between the forceps. At this moment, the patient can push again. Neonatal resuscitation may be necessary.

## MALPOSITION

Abnormalities in position and presentation are frequent cause of failure to progress in labour. If they are recognized promptly and are corrected, the result for both the mother and baby should be reasonably good.

**Definition**

Malposition are defined as any head presentation other than occipito-anterior. In normal position, fetus head is well flex and the occiput points toward one of the anterior quadrant of mother's pelvis. Malposition occurs when fetus head is not well flex or extend. The examples are occipito-posterior, face and brow presentation.

**Dangers of malposition/malpresentation**

- Ill-fitting presenting part
- The presenting part cannot protect the amniotic fluid (water) from uterine contraction and force through an incompletely dilated cervix
- Membrane ruptures early and the cord may prolapse
- Contraction may be irregular and poorly sustained resulting prolongs labour
- Obstructed labour and uterine rupture if unrecognized

**Types of malpositions**

- Occipto-posterior(OP) - 13% of head presentation - A deflexed head placing occiput in posterior quadrant of maternal pelvis
- Face - A full deflexed or extension of the head on neck - 1 in every 300 pregnancies
- Brow-Cannot be delivered normally as it presents the largest head diameter - caused by half-extended head

**Diagnosis of malposition**

- Difficult to do
- Examine abdominally
- Examine vaginally

**Management – refer**

The extended and deflexed fetus head present the large diameter that can be arrested at the pelvic brim. Most of these cases are delivered by CS (Caesarean section). Refer the patient.

## MALPRESENTATION

Malpresentation is a presentation other than by head (vertex). The examples are breech, transverse and oblique lie.

### Complications

As for malposition
- Ill-fitting presenting part.
- The presenting part can not protect the amniotic fluid (water) from uterine contraction and force through an incompletely dilated cervix
- Membrane ruptures early and the cord may prolapse
- Contraction may be irregular and poorly sustained resulting prolong labour
- Obstructed labour and uterine rupture if unrecognized

### Different types

- Breech
- Transverse and oblique lie

## PROLONGED FIRST STAGE OF LABOUR

### Definition

Labour is said to be prolonged when it exceeds 12 hours in primigravida and 8 hrs in a parous woman, false labour should be excluded. Prolonged labour is difficult to define because of the problems in deciding when labour starts. A good history is needed when the true labour started so that you do mot over diagnose or under diagnose the condition. This is why the use of the partograph is essential in labour.

A general obstetric rule is that labour should not be longer than 24 hours. Any prolonged labour requires active intervention. Any labour, which passes the "Action Line", is regarded as prolonged labour. If patient starts labour at home, it is difficult to decide prolonged labour.

### Causes of failure to progress

- Incorrect diagnosis( false labour pain)
- Cephlo-pelvic disproportion-CPD (e.g., large baby, short maternal height with small pelvis)
- Malpresentation/Malposition (e.g. breech, shoulder or occipito-posterior position)
- Multiple pregnancy
- Grandmultipara
- Insufficient uterine contraction (e.g. anemia, dehydration)

### Management

- History of labour to exclude false labour pain, onset of labour ,presence or absence of contractions, rupture of membranes or a show
- General examination (the height and weight of mother)
- Vagina examination to exclude: malpresentation/malposition, in primigravida assessment of pelvis adequacy
- Increased routine observation, with character and frequency of contraction

Give enough oral fluid. Ask the woman to walk around or change position. For cases of insufficient uterine contraction, syntocinon can be use to strengthen the contraction. In order to do this the health worker required a special skills is to ruled out the dangerous contraindication before infusion. If you think that transfer may be necessary, make standby arrangements now. REFER.

## PROLONGED SECOND STAGE OF LABOUR

**Definition**

Second stage of labour is from fully dilated cervix until delivery of the baby. Normally, 1-2 hours is allowed in the primigravida and 40 minutes in a multipara. During this time, it is important for the mother to put effort into pushing. If the condition is good (no maternal hypertension, no fetal risk), the time allowed can be extended.

**Causes of failure to progress**

- Big fetus
- Contracted pelvis
- Anemia
- Tired mother
- Dehydrated mother
- Malposition/malpresentation especially OP
- Diabetic mother
- Primigravidaased movement of the fetus

**Management**

- Depends on the cause of prolonged 2nd stage
- Aim is to deliver the baby safely and as fast as possible
- Explain effective pushing particularly in primigravida
- Encourage to push in an upright position, e.g.squatting
- In between contractions, the patient must breathe the right way (deeply and slowly)
- Rehydrate with sugar water
- Make sure the bladder is empty, use a catheter if necessary

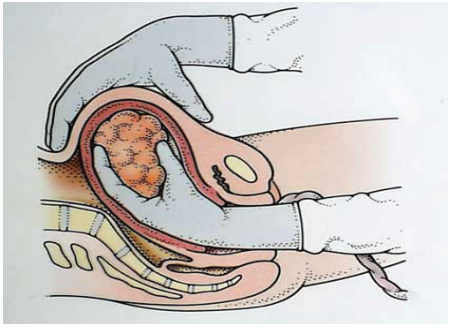
***Note:*** In equipped hospital with skilled workers the prolonged 2nd stage is managed by rupture of membrane, starting a Syntocinon drip if contractions are inadequate, followed by a vacuum delivery

The following are the procedures to pursue to enhance the inadequate uterine contractions:
Give Syntocinon (Oxytocin) if the contraction is not strong enough, after excluding the contraindication. Rupture the membranes if not already and listen to the FHB every 5 minutes. Make an episiotomy only when the head is well down on the perineum and the perineum is obstructing progress. Keep the vaccum extractor ready (Prolonged 2nd stage is one of the indicators for vacuum extraction). If no progress is made, after using the above measures → REFER

## RETAINED PLACENTA

There may be no bleeding with a retained placenta. Apply controlled cord traction to remove placenta. Avoid forceful cord traction and fundal pressure as they cause uterine inversion. If the placenta is not expelled give oxytocin 10units IM if not already done for the management for 3rd stage of labour. Do not give ergometrine for retained placenta.

Ensure the bladder is empty. Catheterize if necessary. If the placenta is undelivered after 30 minutes of oxytocin stimulation and controlled cord traction attempt manual removal of the placenta.



**Manual removal of placenta**

## PLACENTA ACCRETA

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
- Failure to clot will suggest coagulopathy
- If there are signs of infection ie foul smelling discharge give antibiotics as for metritis

**Retained placental fragments**

**Definition and Management**

A portion of the placenta is retained preventing the uterus from contracting effectively.
Feel inside the uterus for placental fragments. Remove placental fragments by hand, ovum forceps or wide curette. As for retained placenta for placenta accreta and possible clotting disorders.

## VAGINAL TEARS

There are 4 degrees of tears that can occur during delivery:
- First degree tears involve the vaginal mucosa and connective tissue
- Second degree tears involve the vaginal mucosa , connective tissue and underlying muscles
- Third degree tears involve complete transection of the anal sphincter
- Fourth degree tears involve rectal mucosa

**Repair of first and second degree tears**

Most of these close spontaneously without sutures. Ensure that there is no 3rd or 4th degree tear by:
- Place gloved finger in anus
- Gently lift the finger to identify the sphincter
- Feel for the tone or tightness of the sphincter

If sphincter is injured you will need to refer for assistance.

# Neonatal Resuscitation

## RAPID ASSESSMENT

- Immediately after the baby is born, the first priority is to assess if the baby cries and is breathing.

**Possible causes of neonatal asphyxia**

Perinatal asphyxia may occur in utero, during labour and delivery, or in the immediate postnatal period. There are numerous causes, including;

- placental abruption
- cord compression
- transplacental anaesthetic
- narcotic administration
- intrauterine pneumonia
- severe meconium aspiration,
- congenital cardiac or pulmonary anomalies
- birth trauma

Postnatal asphyxia can be caused by an obstructed airway, maternal opiates — which can cause respiratory depression and congenital sepsis.

## APGAR

The Apgar score is determined by evaluating the newborn baby on five simple criteria on a scale from zero to two, then summing up the five values thus obtained. The resulting Apgar score ranges from zero to 10. The five criteria (Appearance, Pulse, Grimace, Activity, Respiration) are used as a mnemonic learning aid.

| | Score of 0 | Score of 1 | Score of 2 | Component of Acronym |
|---|---|---|---|---|
| Skin Color/ Complexion | Blue or pale all over | blue at extremities body pink (acrocyanosis) | no cyanosis, body and extremities pink | **A**ppearance |
| Pulse rate | 0 | < 100 | ≥ 100 | **P**ulse |
| Reflex Irritability | no response to stimulation | grimace/ feeble cry when stimulated | cry or pull away when stimulated | **G**rimace |
| Muscle Tone | none | some flexion | flexed arms and legs that resist extension | **A**ctivity |
| Breathing | absent | weak, irregular, gasping | strong, lusty cry | **R**espiration |

Baby should be checked 3 times: at 1, 5 and 10 minutes. The findings can be mentioned as follows:

| Severe birth asphyxia | Mild birth asphyxia | Normal |
|---|---|---|
| [0-3] | [4-6] | [7-10] |

## RESUSCITATION

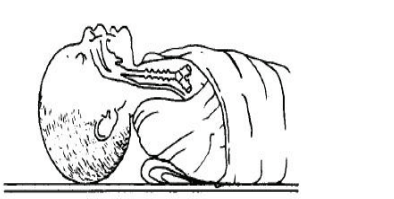
### RESUSCITATION EQUIPMENT

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.
  - Place the baby in 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.



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

**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.
  - If **the baby is still not breathing**, start ventilating.

## VENTILATING THE NEWBORN

- Recheck the newborn`s position. The neck should be slightly extended.
- Position the mask and check the seal:
  - Place the mask on the newborn`s face. It should cover the chin, mouth and nose;
  - From 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.

### 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):


Ventilation with bag and mask

- 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;
  - 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 sings have been established. 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:
- If the **newborn is not breathing**, or the **breathing is weak**, continue ventilating until spontaneous breathing begins.

If the **newborn start 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;
- 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. 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 minute of ventilation**:

- Transfer the baby to the most appropriate service for the care of sick newborn;
- 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.

### 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 sings 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 bay 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.

- 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.

- Encourage the mother to begin breastfeeding. A newborn that required resuscitation is at higher risk of developing hypoglycemia:
  - 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.

## HYPOTHERMIA

### Definition

Temperature <36.5°c
Hypothermia puts the infant at risk from
- Low blood sugar
- Poor weight gain
- Respiratory difficulties

### Treatment of hypothermia

**Step 1**
Temperature 36°c – 36.5°c. Ensure the baby is not wet – may need clean baby cloth. Wrap the baby in extra blankets. Place warm water bottles next to the baby. Place the baby on a warm soft water bottle. Recheck the temperature in 1 hour. If not increased, move to step 2.

**Step 2**
Temperature 35.5°c – 36°c. Kangaroo care with Mother or Father should be done. Recheck temperature in 30 minutes. If not increased, move to step 3. If temperature >36°c over next 4 hours, move to step 1.

**Step 3**
Temperature < 35.5°c. Warm under radiant heater. Recheck temperature in 30 minutes. When temperature > 35.5°c, Kangaroo care with Mother or Father should be done. Check blood sugar.

**Kangaroo Care**
Fold a square piece of cloth diagonally. Put cloth nappy on baby. Place the baby on to the Mother or Father's naked chest. Place the cloth around the baby. Either tie a knot around the parent's back or secure under the arms. Parent to dress with clothing around the baby.

**General Management**

**If the baby very sick or very hypothermic**
- Use available methods to keep warm
- Transfer

**If baby not very sick but hypothermic**
- Ensure baby kept warm
- Encourage breastfeeding
- Monitor

## INITIAL CARE OF THE NEWBORN

**Check the baby**
- Check the baby's breathing and colour every 5 minutes
- Check warmth by feeling the baby every 15 minutes
- Check the cord for bleeding every 15 minutes
- Wipe off any meconium or blood from the skin
- Encourage breast feeding

**Immediate Newborn Conditions or Problems**
- The newborn has serious conditions or problems that need immediate interventions;
  - 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 (axilliary 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 – 2500g)
  - Possible bacteria infection in an apparently normal newborn whose mother had pre labour or prolonged rupture of membranes or amnionitis;
  - Possible congenital syphilis (mother has positive serological test or is symptomatic)

**Immediate management**

Three situations require immediate management: gasping or not breathing, cyanosis, or breathing with difficulty. It will need resuscitation according to WHO guidelines (Child Health).

**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 resuscitation a newborn.

**Cyanosis or breathing difficulty**

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

**Very low birth weight or very preterm baby**

- Less than 1500g or less than 32 weeks
- Requires special care
- Ensure baby kept warm
- If infection suspected given gentamicin and ampicillen
- If baby cyanotic, give oxygen

**Convulsions**

Treat as per BBG and Transfer.

**Conditions requiring early treatment**

- Low birth weight (1500-2500 g)
- Possible bacterial infection – mother may have had premature labour or prolonged rupture of membranes
- Possible congenital syphilis

**Newborns with malformations**

Provide routine care. Transfer to appropriate service.

## Neonatal Sepsis

- Invasive bacterial infection occurring in the first 4 weeks of life.

**Risk factors**

- LBW newborns
- depressed respiratory function at birth
- maternal perinatal risk factors
- newborns with congenital malformations, particularly of Genito-Urinary tract.

**Predisposing Factors**

- Prolonged labour
- Manipulative and resuscitative procedures on the infant
- PRM prolonged rupture of membranes (12 to ≥ 24 hours before birth)
- Immaturity
- Invasive procedures: venous lines, ventilation
- Placenta Praevia
- Abruptio Placentae
- Toxemia
- Maternal infection
  - UTI
  - endometritis

**Pneumonia is the most common invasive bacterial infection in the newborn.**

**Signs and Symptoms**

- Early-onset (6 h - 72 h of life)
- Late-onset (after 4 days)
- Changes in behaviour
- Early signs are nonspecific:
  - changes in behavior: irritability
  - ↓spontaneous activity (lethargic)
  - less vigorous sucking - poor feeding; vomiting; or baby does not 'look well'
  - apnea
  - bradycardia
  - $T^0$ instability (hypo- or hyperthermia)
  - disturbances in respiration; respiratory distress
  - neurologic findings (seizures)
  - jaundice
  - vomiting, diarrhoea and abdominal distension

**Specific Signs**

- periumbilical erythema, discharge or bleeding ← omphalitis
- coma; seizures; opisthotonos; bulging fontanelle ← brain abscess or meningitis
- osteomyelitis or pyogenic arthritis
- abdominal distension; bloody diarrhea ← necrotizing enterocolitis
- early-onset GBS Infection: afterwards prematurity; prolonged rupture of membranes; chorioamnionitis; APGAR score < 5
- viral infections

**Diagnosis**

- awareness of risk factors
- high index of suspicion (1st few weeks of life)
- WBC count, (<4,000 - > 25,000 abnormal)differential and smear
- blood cultures
- Urinalysis: WBCs > 5/HPF (presumptive evidence of UTI)
- "Septic work up": swabs for culture of ear, umbilical cord, full blood count, blood, urine & CSF cultures

**Treatment**

***Early onset Sepsis***

- Ampicillin/penicillin G + gentamycin
- plus metronidazole/clindamycin (if foul-smelling amniotic fluid is present at birth)

***Late Onset Sepsis***

- Nafcillin + aminoglycoside

***Neonatal Pneumonia***

- GBS, *H. influenzae*, *E. coli*, *Klebsiella*
- Tachypnea, respiratory failure,septic shock

***Neonatal Pneumonia (L-O)***

- most commonly in neonatal Intensive Care Units
- *Staphylococcus*

***Neonatal Meningitis (25% of neonatal sepsis)***

- GBS, *E. coli* ,*Listeria monocytogenes*

Manage complications - anemia, shock, hyppoglycemia and DIC.

# Family Planning

Some parents may decide a small number of children are enough. Other may want to space their children several years apart. Some parents want a lot of children and some families want only a few children.

Family planning means:

- Having the number of children you want when you want them.
- Not having a child if the timing is not right for you.

## WHY IS IMPORTANT:

- When a mother has child after child, without much space between, she often becomes weak. Her breasts produce less milk and her babies are more likely to die. Also after many pregnancies the danger is greater that she will die in childbirth, leaving many motherless children.
- With many children it is harder to feed, clothe, and educate them all well.
- If a man and woman have a lot of children, when they grow up there may not be enough land for all of them to grow the food their families need. Children may begin to die of hunger.

Both men and women can make choices about their own fertility and can decide to have or not to have, a child at the particular time. They can choose one of several methods of birth control to prevent a woman from becoming pregnant, for as long as they want.

A pregnancy that is wanted and planned has an excellent chance of being healthy such as the parents have time to train their children well and cash to feed, educate and clothe them, mothers' reproductive health will be stronger and they will be able to raise healthier babies. And that the community will have enough jobs, land, places at school and in clinics for their people. Therefore children who grow up with good family care will be qualified members of the community in the future.

## SPACING BIRTHS

All couples should be told that a space of at least two years between pregnancies is best for their health and the health of their future children. The mother's body can rest between pregnancies and become strong again. She can continue to work and produce food and will also have more time to learn new things. The children will have adequate care and breast milk until they are old enough to eat adult meals and will have stronger immune systems because they were able to breastfeed for longer.

It takes about two years for a woman's body to "recover" from childbirth. If she gets pregnant again too soon, her body may not be ready for another pregnancy. Spacing pregnancy too closely can sometime result in anemia, preterm labour, or a low birth weight birth. Pregnancy can be prevented in a number of ways. The more the couples know about the available contraceptive choices, the better prepare they will be to select one that is right for them.

The important things that women should know about their reproductive health:

- Women should wait until they are twenty to have their first baby try to because their bodies will not be fully mature until this time. Also women should have all their children before the age of thirty-five.
- Mothers and children are safer and healthier if babies are born at least two years apart because a strong and healthy baby comes from a strong and healthy mother.
- If a mother's body has enough time to recover from giving birth, then her body will be strong and ready for the next baby and that will be safer for both mother and child when its time for delivery.
- Mothers and babies are safer and healthier if the mother stops having babies after her fifth child because it is more dangerous for an older woman to have a baby. This is because a body works the same as an engine. The older it is the higher the chance that it will break down. The uterus

of the mother after the fifth child will not produce strong enough contractions. This might cause bleeding after giving birth.

**When you should begin discussing family planning with the couples?**

Family planning can be discussed with people who just got marry. That way they can discuss and decide ahead of time. They can learn if the method they want to use is okay for them, based on their health. However it can be discuss while a woman is still pregnant or during postpartum time or to couples who have many children. Some methods such as female sterilization and the IUD (Intra uterine device) can be provided at the time of delivery.
Pregnancy can occur shortly after of a birth of a child. That is why it is so important for couples to select a method of contraception and learn how to use it.

## DISCUSSING FAMILY PLANNING METHODS:

People need to know the advantages and disadvantages of each method. That way they can decide which method will be the best for them. The best method of family planning is the one a couple will use correctly and consistently.
By teaching the facts about family planning method, health workers must be sure that people gets the right information. People should also be told about the side effect of each method and get advice on what to do about it.

Be sure to tell people that it is okay to change methods if for any reason such as they do not like the one they are using and NONE of the methods causes any kind of diseases. And one method "condom" even actually protect against sexually transmitted diseases.
The following information on the contraceptive methods are available to couples who wish to protect themselves against an unplanned pregnancy. They are natural, barrier, oral, inject able, intrauterine, condom and permanent forms of birth control.

## THE RHYTHM METHOD

In this method the woman keeps track of the days of her monthly cycle by counting the number of days from one period to the next. A woman becomes fertile when she releases an egg from her ovaries about fourteen days before her next period. During this time, if she has sex with her partner, she may become pregnant.

To avoid sex during ovulation period. The woman may have a regular cycle so that she can calculate the approximate date of her ovulation. She has to look for the normal white (clear, vicious) discharge she has just before ovulation.

- Ovulation date = 1st day of last menstruation + 14 days
- Ovulation period = 2 days before and after the ovulation date
- Safe limit = 2 days before and after the ovulation period for a woman with a regular cycle of 28 days.

***Example:***
A woman's monthly bleeding started on June 5, her fertile days are June 14 to 21. This woman can begin have sex again on June 22.

Every woman cannot use this method. To use the rhythm method effectively, the woman must first count and record the number of days of her cycle for at least six months and preferably a year. She must count the number of days from the start of one period to the start of the next period. If the woman has a very regular cycle (i.e. her period comes every 28 days or every 30 days) or her cycle does not vary more than once or twice a year.

She can use the rhythm method effectively. If the number of days between her periods is different every month, then the rhythm method is not good for her. The rhythm method is not useful for women with very irregular cycles.

## BREAST FEEDING

If a woman is breastfeeding, the baby sucking at the breast often delays the release of an egg from the ovaries and the return of periods after the delivery. The more frequently the baby sucks, the longer the delay in ovulation. Babies, who suck on demand all day and all night, keep their mothers infertile for longer than those who start eating porridge at two months.

How effective this method depends on a woman's health and her regular period. Some women return to have their periods a month after giving birth but it takes some women six months after giving birth to return to a regular menstruation cycle. Once the period starts again regularly, which indicates that a woman also ovulates, this method is no longer available.

## WITHDRAWAL

Some people think that if a man withdraws his penis from a woman's vagina before ejaculation it can prevent pregnancy. This method is rarely effective however, because often a man cannot control himself and ejaculates in the vagina anyway. Other times, a small amount of semen can be found in the pre-ejaculatory fluid, which may cause pregnancy. This method should not be recommended.

## ORAL CONTRACEPTIVES (BIRTH CONTROL PILLS)

Women take oral contraceptives or birth control pills orally every day. It consists one or more chemicals female sex hormone (estrogen, progesterone). But most of contraceptives are combined pills, consisting of both hormones.

**How does the hormone works?**

***Estrogen hormone effects:***

- Stops the process of sending the hormone that helps developing an egg. So there is no developing egg in the ovary and that is no egg to be fertilized.

***Progesterone hormone (or progestin) effects:***

- Increases thickness of cervical mucus and dryness, so sperm have hard time getting through
- Incomplete development of the uterine lining, so if an egg does ripen and sperm do make it through the cervical mucus and fertilize the egg, the fertilized egg will not be able to implant.

The pills usually come in packets of 21 or 28 tablets. The amount of hormones differs in different brands.

**How to take the pills-packet of 21?**

When starting this method, take the first pill on the fifth day of the period. Then take one pill every day until the packet is finished (21 days). After the packet is finished, wait 7 days before starting the next packet of pills. Then begin another packet, 1 pill each day. This way a woman will take the pills three weeks out of each month, then go one week without taking any.
Normally, the menstrual period will come during the week when the pill is not taken. Even if the period does not come, start the new packet 7 days after finishing the last one. However, a woman whose period has not come should go to the clinic for a pregnancy test. Taking oral contraceptives while pregnant

can be dangerous to the unborn fetus. If the period fails to come at all after 3 months the woman should consult with the MCH worker.
If the woman does not want to get pregnant, it is important to take the pill as directed (1 pill every day, at the same time everyday). And stop taking the pill when woman wants to get pregnant.

**How to take the pills-packet of 28 (explain with a pill packet)?**

Take the first pill on the fifth day of the period, just as with the packet of 21. Take 1 a day. Seven of the pills will probably be a different size and color. Take these pills after all of the others have all been taken. When one packet is finished, start the next packet immediately. Take 1 a day without ever missing a day, packet after packet, for as long as the woman does not want to become pregnant.
No special diet must be followed when taking the pill. Even if the woman happens to get sick with a cold or something else while taking birth control pills, go right on taking them. If she stops taking the pills before the packet is used up and has sex with her partner, she may become pregnant.

**What should a woman do if she forgets her pill?**

- If a woman forgets a pill one day, she should take it as soon as she remembers, even if it means taking 2 pills in one day.
- If she forgets her pills on 2 or more days in a row, she should use a condom whenever she has sex, or she may get pregnant for how long? Need topractise safe sex for seven days.

**What are some disadvantages of taking the pills?**

Some women get a little nausea, swelling of the breast, spotting of slight bleeding between period, weight gain or other signs of pregnancy when the first start taking the pills. This is because the pills contain the same hormone that the woman's body put into her blood when she is pregnant. These signs do not mean she is unhealthy or should stop the pill. They usually go away after the first 2-3 months. Some women may bleed a different amount than their usual in their monthly period when they are taking the pills. These changes are not important. Sometimes they can be corrected by changing to a different brand with a different amount of hormone.

- May cause high blood pressure.
- Slight increase risk of stroke or heart attack, especially in women over 35 years who smoke?
- The one that on medication; TB drugs

**Benefit and risks:**

In addition to extremely effective contraception, the advantages of pill are decreased incidence of heavy menstrual bleeding, menstrual irregularities...

**Who should not take birth control pills?**

1. Women who have
   - Migraine headache
   - Hepatitis or other liver diseases
   - Cancer of breast or of the reproductive organ
   - Diabetes
   - High blood pressure
   - Pregnant woman
2. Woman over 40 years is high risk of thrombo embolism (blood clotting).
3. Woman who is heavy smoking. It is higher risk of stroke and heart attack.

**What Heath staff should teach the women taking birth control pills?**

Health staff should tell and teach them to do the following:

- Examine the breasts carefully every month for lump or possible signs of cancer.
- Come to check blood pressure every 6 months
- Observe for any problems such as:
  - Severe and frequent migraine, headache

- Dizziness, headache or loss of consciousness followed by difficulties in seeing, speaking or moving part of face or body.

## INJECT ABLE CONTRACEPTIVE (DEPO PROVERA)

The woman has an injection every three months of the female hormone called Mydroxyprogesterone, which stops her from releasing eggs, and makes her mucus in the vagina too thick for the sperms to swim through. This method is good for women who have to travel far from the clinic or hospital. The first injection can be given on the fifth day of a period, just as the pill method and then the next injection can be given three months later.

**What are some of disadvantages?**


A few women have problems from the injection such as:

- Weight gain
- Headache
- Dizziness
- Depression
- Frequent urination
- Fewer periods or no period
- Heavy bleeding during menstruation

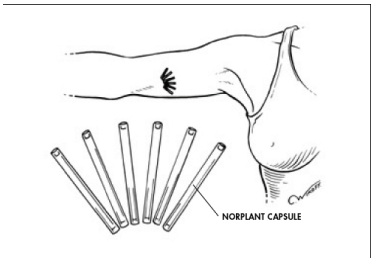
If the woman has any of the following signs, come to see the health staff;

- Severe leg or chest pain
- Yellow coloration of the eyes (Jaundice)

**To stop using injection**

You can stop having birth control injections any time you want. But after you stop, it can take a year or to become pregnant and for your monthly bleeding to return to normal. But also it may come back sooner. So if you do not want to become pregnant right away, you must use another family planning method during this time.

## NORPLANT




This method must be done at the hospital. The woman is inserted six capsules, filled with a progestin hormone, just under the skin in the inner part of the arm. The norplant slowly release the progestin hormone, a tiny amount each day. This hormone thickens the cervical mucus so sperm cannot reach the cervix (refer to the pill session). The capsules will protect against pregnancy for 5 years. However they can be removed at the hospital at any time if the woman decides she wants to become pregnant or wants to use another method of contraceptive.

**What are the advantages?**

- highly effective (within 24 hours of insertion)
- long-term protection- 5 years
- no estrogen side effects
- Nothing to do at the time of sex
- When norplants are removed, a woman's normal fertility returns right away.

**What are the disadvantages?**

- It must be done at the hospital.
- Requires a minor surgical procedure to insert or to remove Norplant.
- Norplant can be seen under skin's surface.

– Possible infection at place on arm where Norplant inserted

**How does this method affect breast milk?**

– It does not interfere with the amount or quality of breastfeeding.

**Are there any side effects?**

– Some women have bleeding irregularities such as longer periods after Norplant insertion and some have spotting between periods, or no periods at all for some months.
– Headaches

## CONDOM

A condom is a tube of thin stretchy rubber, which is worn over the erect penis during sex. It prevents pregnancy by catching all the sperm in the man's fluid so that they cannot enter the vagina and swim into the womb to meet an egg. It can also prevent most STD's.

**How do you use a condom?**

Before having sex with your partner take the condom out of the packet. Make sure that the tip of the condom is in a position where it can be unrolled when placed on the penis. Pinch the tip of the condom to make sure that no pocket of air fills the top of the condom. Place the condom at the top of the man's penis and slowly unroll the condom onto the penis. Make sure that the condom is unrolled all the way to the base of the penis and that there is no pocket of air at the top.

Also make sure that after sex that either the man or the woman holds the base of the condom while withdrawing the penis from the vagina. If this is not done, the condom may fall off inside the vagina or may spill sperm, which could make a woman pregnant.

**Special reminders for using condoms:**

a. Look at the date on the condom packet. Never use one that is over one year old.
b. Heat and damp damage condoms. Buy condoms that have been stored in a cool, dark place and that are in packets that can't be seen through.
c. Keep condoms in a cool place, out of the heat and sun.
d. Never use a condom, which looks brittle or dry.
e. Don't reuse condoms.
f. Always buy lubricated condoms.
g. Never lubricate condoms with anything except KY Jelly.

**How effective are condoms?**

If used properly, condoms are more than 90% effective. However, condoms are often misused, which means that some people think that they are not effective.

**What are the advantages of using condoms?**

– Condoms are the best way to protect against STDs.
– Using condoms is clean and easy.
– If used properly they are very effective in preventing pregnancy

**What are the disadvantages of using condoms?**

– Often men do not like to use condoms and create a problem
– If used improperly, condoms can break
– If there is insufficient lubrication, sex for the man and the woman can be uncomfortable.

**Are there any side effects associated with condoms?**

Some women have a reaction to the lubricants sometimes used on condoms. This reaction might be in the form of itching. Some women complain about soreness after using condoms, but this is an indication that there was not enough lubrication during the sexual act.

**What do they cost?**

Condoms bought in stores cost between 20-60 baht for 3 condoms (depending on the brand). Condoms can be obtained free from MCH family planning centers.

**Benefits of using condoms**

- Condoms are one the least expensive and effective method of birth control. They do not have the side effects associated with many other forms of birth control, because they do not use hormones. A woman who has had difficulty with other forms of birth control should be encouraged to use this form.
- Condoms are the only form of birth control, which can effectively protect against STDs. If a woman's partner has been married before, or she suspects that he might have an STD, she should try to have him use condoms.
- Condoms are the answer to the birth control concerns of a woman who is fearful of using other more intrusive forms of birth control, such an IUDs, injections, or pills.
- Condoms take some getting use to, but should be promoted for use in the village.

## Normal Puerperium

### DEFINITION

This period begins when the placenta and membranes have been delivered and lasts until six weeks after that date. It is a time of great physiological change, accompanied by some anatomical and physiological changes in the body of mother.

**The uterus**

Examine the uterus daily when the mother is still at the health facility to make sure that the process of involution is taking place normally. Following the delivery the uterine fundus is at the level of umbilicus the day after birth. By 10-14 days the fundus should no longer palpable abdominally. As the uterus slowly decreases in size it should become firmer to palpation and at no time should it be tender. Instruct the mother to report back if the uterus continues being tender after she has gone home.

**The lochia**

The lochia should get less profuse in amount as its colour fades and should never have an offensive (i.e. infected) smell. Inform the mother to report back to the health facility if she notices a smell.

**The breasts**

Instruct the mother how to examine her breasts. She should check for cracks on the nipples. If the breasts get overfull she should be shown how to express the milk into a cup with her hands.

**The perineum**

Check the perineum for the first few days after the delivery if the mother has had a tear or episiotomy that has been repaired. Ask the mother to keep it clean and dry.

**The temperature**

When the mother is in the centre, take the temperature daily to detect possible puerperal pyrexia. She should report back if she gets a fever after going home.

**Common Problems**

One common problem is that of 'after pains' during the first 48 hours. These are cramping pains felt by the mother as the uterus shrinks down in the early phase of involution.
Another problem is postpartum chills, where the mother has a mild shivering attack soon after the completion of the delivery. This may be due to some of the fetal blood being squeezed into the circulation of the mother with the delivery of the placenta.
The problem of 'after pains' is dealt with by mild analgesics, that of 'chills' by keeping the mother warm.
The temperature should be taken during these periods of chills and if the temperature rises or she feels feverish, she should report back to check if there is an infection such as malaria or puerperal sepsis.

**Diet**

A balanced, nutritious diet is as important for the mother during the puer¬perium as it was during the pregnancy. Involution takes place better, and lactation is established quicker, in the presence of an adequate protein/calorie intake.

**Discharge from hospital / health centre**

The mother should spend a least the first 24 hours after delivery under medical observation following a normal delivery.

**Hygiene**

Instruct the mother to keep the genital clean by taking regular bath and washing after toilets. Advise her to avoid sexual intercourse until after the end of the puerperium, if possible.

## Post Partum Haemorrhage

### DEFINITION

- (PPH: POST-PARTUM HAEMORRHAGE) Blood loss of > 500 ml.

**PPH IS THE LEADING CAUSE OF MATERNAL DEATH WORLDWIDE.**

### CAUSES

- **UTERINE ATONY** - The uterus is soft not well contracted. This may occur after twin or grande multipara delivery, after prolonged use of oxytocin or it may be a sign of uterine rupture.
- **RETAINED PLACENTA** - A piece of placenta remaining inside the uterus.
- **LACERATION (TEAR) OR HAEMATOMA** - A rip or tear, especially of the cervix or a vaginal blood vessel.
- **Always examine the placenta carefully to see if it is complete.**

Treat for PPH if:
- The patient's sarong is wet from blood within 5 minutes after delivery
- There is constant trickling of blood
- Blood loss is more than 250 cc and there is continual severe bleeding
- The patient delivered outside the hospital and still bleeding on arrival

## TREATMENT

**General**

- Ask for help
- Give oxygen and put legs up (Trendelenburg position)
- Give Syntocinon 10 IU IM and massage (rub) uterus to make it contract until it is hard
- Immediately insert one or two large (16-18 G) IV cannulas and give IV NSS 500cc with 20 IU **Syntocinon**

**Treatment –general**

- **(Oxytocin) at 30 drops/min**
- **Give plenty of fluids- see hypovolemic shock**
- Insert a urinary catheter and monitor fluid balance
- Check and record BP, pulse and uterus contractions every 5 minutes
- Take Hb/Hct and blood group for possible transfusion

**Placenta NOT delivered**

When the uterus is hard, deliver the placenta by controlled cord traction. If this is unsuccessful and the patient is still bleeding, manual removal of placenta is needed. If you cannot perform a manual removal, or if you are not successful (i.e. placenta accreta), then refer the patient. Give antibiotic prophylaxis (amoxicillin and metronidazole).

**Placenta delivered and complete**

Massage the uterus to express any clots, and continue until the uterus is hard. Continue to check the uterus to be sure that it remains firm. If the uterus remains soft, give methergyne 0.25 mg IV (slow) (if the woman had high BP, give only Synto). Continue IV fluids with NSS 500cc with 20 IU Syntocinon 15 drops/min. Consider misoprostol rectally if available.

**Placenta is delivered, but INCOMPLETE**

Perform a manual exploration of the uterus to remove placenta pieces. If you are unable or unsuccessful, refer the patient for curettage (scrape of the inside of the uterus). Give antibiotic prophylaxis (amoxicillin and metronidazole).

**Lacerations -tears**

Look for bleeding from a tear (perineum, vagina or cervix). Apply sponge forceps or pressure to stop the bleeding, then suture. After repair, check there is no further bleeding. 3rd degree tear (including the anus) should be repaired by a doctor, or refer.

**If still heavy bleeding**

Remember the need to replace the lost blood plus the ongoing bleeding. Insert a second large (16-18 G) IV cannula for IV NSS/Ringers plus haemacel. Continue IV fluids with NSS 500cc with 20 IU Synto 15 drops/min. Give a blood transfusion, but do not delay referral by waiting for the transfusion. Bimanual and or aortic compression for uncontrolled bleeding. REFER.

**Normal Bleeding < 500 ml**

- Loss of <500ml of blood at delivery is NORMAL BLEEDING
- Slight bleeding for a few days after delivery is normal
- It should be like a normal period, decreasing over one week

# Puerperial Sepsis

## DEFINITION

Fever > 37.5 $^{0}$C per axilla, up to 6 weeks after delivery. It is problematic because of risk of septic shock.

**At risk**

- Traumatic delivery
- Too many vaginal checks
- Poor sterile technique at delivery
- Fever at delivery
- Retained products (incomplete placenta)
- STDs

**Diagnosis**

- Endometritis → discharge & smell (specula exam.), check for pelvic pain
- UTI or Pyelonephritis →burning urine, back pain, urine stick & sediment
- Chest infection → cough with sputum: listen to chest
- Mastitis → breast tenderness: look for redness, lump, pus discharge
- Blood clot → check for pain, swelling and tenderness in leg and groin
- Malaria → check smear
- Other causes → e.g, dysentery, viral causes, etc

## ENDOMETRITIS

**For severe: treat with triple antibiotics**

- Ampicillin/Amoxycillin IV 1 g 6 hourly x 7 days and Gentamycin 160 mg IV/IM daily x 7 days and Metronidazole 500 mg IV 8 hourly x 7days.

**For mild: treat with double antibiotics orally**

Ampicillin 500 mg QID or Amoxicillin 500 mg TID x 7 days and Metronidazole 400 mg TID x 7 days

***Note:*** If you suspect infection of the genital tract due to STD, the above treatment will not be effective, refer Burma Border Guidelines.

**Treatment**

**UTI -** Treat according to Burmese Border Guidelines.

**Mastitis**

Continue to feed from the breast. Teach the woman to express breast milk 3-4 hourly if baby refuses to feed from the affected breast. This can be helped with warm compresses and gentle massage. If fever or no improvement in 24 hours, start Oral Cloxacillin 500 mg QID x 7 days.

**Breast Abscess**

- Incision and drainage.
- Oral Cloxacillin 500 mg QID x 7 days

**Blood clot- deep venous thrombosis**

If suspected, e.g., swollen leg, then refer to doctor/hospital.

**Malaria -** See BBG

## BREAST FEEDING

### Introduction

Breast milk alone is the best possible food and drink for a baby in the first four to six months of life. To give all nutrients needed (protein, glucose, lipids) and also vitamin and mineral salts. Antibodies from the mother which will protect the baby for a few months from infectious diseases.

### Advice to the mother

- Why breastfeeding is important
- How to start breast feeding
- Care of the breasts
- Timing of feeding

### Breast engorgement, breast abscess, mastitis

### Signs of breast engorgement

Congestion of the breast may appear:

- When a woman stops to give breastfeeding suddenly
- Because of a malformation of the nipple, so that the baby cannot suck well

Description: breast becomes hard, painful. Sometimes there is fever.

### Treatment

- Empty the breast pressing with the hand or using a breast pump.
- Put hot gauzes with alcohol, renew often daily.
- Prevention: teach the mother how to express breast milk after breastfeeding.

### Acute mastitis

### Signs

- Fever
- Red, hard, hot, painful area on the breast with some streaks towards the auxiliary area
- Lymph nodes in the auxiliary area
- You can press the breast and collect the liquid on a gauze → the spot will only have one color; there is only milk, no pus.

### Treatment

- Empty the breast +++. (Continue feeding?)
- Put hot gauzes with alcohol, renew often daily
- Give ASA 3 TID
- Give powdered milk to the baby during that time
- When the mother is cured and when she doesn't take anymore ASA, she can give milk again to her baby

### Breast Abscess

### When does it happen?

Usually it's a complication of breastfeeding, which may occur after cracks or acute lymphangitis.

### How do you recognize a breast abscess?

*First stage: uncollected breast abscess:*

The breast is hot, red, hard, and painful. Your patient may have fever. If you press on the breast, milk and pus will come out and when you collect this liquid on a piece of gauze or cotton, milk will be ab-

sorbed while pus remains on the surface giving a yellow color. Your patient may have lymph nodes in the axially area.

*Second stage: collected abscess:*
Your patient may have very high fever even with an appropriate management of the uncollected abscess.The skin of the breast is red, hot, and painful. One part becomes soften when it's ripe(fluctuation). At that time, your patient needs surgery. Your patient has lymph nodes in the axillary area.

**Treatment**

You need asepsis, general anesthesia. The technique of incision is nearly the same as for an abscess. You have to avoid giving a scar on the areola. If the abscess is superficial and not near the nipples:radial incision: straight incision in direction of the nipples. If the abscess is near the nipple, circular periareolar incision without cutting the areola.

# 2 COMPREHENSIVE CHILD HEALTH

## INTRODUCTION OF PAEDIATRICS MODULE

### AIMS & OBJECTIVES OF TEACHING IN PAEDIATRICS

In broad terms the following main headings are the aims and objectives of teaching of paediatrics module to students. Unfortunately, there will be not feasible to achieve to fulfil all heading in resource-limited setting. However, teachers and facilitators should aware the important of all these heading and try to make highlight the important of aims and objectives in paediatrics module discussion to students.

1. To teach the recognition and management of the well and ill infant and child.
2. To emphasize the importance of growth and development of both the normal and the sick child.
3. To provide a sound basic knowledge of child health and disease.
4. To enable the student to acquire sufficient skill to carry out a full physical examination of a new-born infant, toddler, child and adolescent.
5. To demonstrate adequate medical, developmental, social and behavioural history taking from the parents or guardians of the child.
6. To stress the importance of the child's family and social background in relation to his well-being and illnesses.
7. To emphasize the importance of prevention in paediatrics, in particular this applies to immuniza-tion, nutrition and avoidance of accidents.
8. To demonstrate the relationship between genetic and environmental factors in the causation of malformation of illness.
9. To provide an understanding of the handicapping conditions of childhood and of the services available for their amelioration.

### FOR STUDENTS

Students should set themselves the more simple targets for their own study in paediatrics.

1. To be able to elicit and interpret findings from history and physical examination.
2. To be able to construct a reasonable differential diagnosis and problem list.
3. To be able to prepare plans for appropriate investigation and management.
4. To be able to communicate adequately with children and with their parents.

Recall at all times the ancient adage which is always highlighting a way of learning process.

- I hear and forget
- I see and remember
- I do and understand

# MODULE I. PAEDIATRICS

## History Taking & Clinical Examination

### OBJECTIVES FOR MODULE I

**1. Different between adults and children**

There are major differences between children and adults and between children of different ages that need to be taken into account during history-taking and examination in order to distinguish abnormal from normal patterns. The major differences are

- History is generally obtained indirectly from an adult.
- The impact of genetic, environmental and social factors is often more pronounced.
- The predominant impact of disease may be on the growth and development of children.
- The growth and development status of children may influence the expression of disease.
- Clinical norms in children differ with age and from those of adults.

Because of the fundamental importance of understanding the range of normal growth and development and how this interacts with diseases in children, it is subdivided childhood into age periods.

i. Neonatal period (first 4 weeks of life)
ii. Infant (up to 1 year)
iii. Toddler (1 to 3 year)
iv. Preschool child (3 to 5 years)
v. Schoolchild (5 to 18 years)
vi. Child (up to 5 years)
vii. Adolescent (early: 10 to 14 years; late: 15 to 18 years)

Based on subdivided childhood age periods the diseases are interacted.
*Neonatal period*: infections, nutrition, related with prenatal or perinatal events, prematurity major genetic or congenital abnormalities.
*Infant & Toddler*: nutritional deficiencies, environmental deprivation, accidents.
*Preschool child*: Nutritional deficiencies, accidents, infectious diseases.
*School child*: Learning difficulties, emotional and behavioural problems.
*Adolescence*: accidents, violence and poisoning.

**2. Realize the importance of child health surveillance at every contact**

The aim of child health surveillance is to preserve and improve the health of children in order for them to reach their full potential. It involves the detection of deviations from normal by means of screening, case-finding and vigilance but also includes the preventative and promotive aspects of growth monitoring, promotion of breastfeeding and nutrition and the provision of appropriate immunizations at each opportunity.
During surveillance, history-taking is the key to the early detection of:

- Familial diseases
- Contact with infectious disease
- Visual and hearing defects
- Developmental, behavioural and psychological problems.

Clinical examination is the key to surveillance and detection of

- Congenital abnormalities (i.e squint, undescended testes, cardiac murmur)
- Abnormal nutritional state
- Growth and developmental abnormalities

**3. Communication skills with children**

- Health care provider health care provider needs to communicate with care taker as well as child.
- Do not forget to observe the third relationship which is between the child and caregiver. This relationship may give some indication of what happens at home in this family.
- All children seem to respond well when treated with respect.
- Do not forget that even young children will notice the relationship between health care provider and their caregiver so it is worth ensuring that you have the trust of the caregiver before you start examining the child.
- Children respond very well to genuine interest and concern with their problems. Do not destroy the trust of the child. (saying no pain before injection)

**4. Elements of a complete history**

History taking in paediatric patient is similar to that of adults. It is important to listen carefully to mothers and note what they say. History is the vital cornerstone of paediatric problem solving. The first important ground rule in history taking is: mother is right until proved otherwise. Additional details of the paediatric history which should be specifically obtained include:

- The pregnancy and mother's health during pregnancy
- The events of labour and delivery
- The condition of the baby in the neonatal period
- Growth and development: milestones
- Immunizations
- Diet and feeding history

The problem oriented medical record system (POMR) consists of:

- Basic information on the patient (data base)
- The problem lists
- Plans for each problem (need to discuss with mother)

**5. Complete physical examination**

The standard methods used for examining an adult namely inspection, palpation, percussion and auscultation. However, depending on the child's attitude, to listen to the chest/heart/abdomen and count the respiratory rate first before the child starts to cry and proceed with the other parts of the examination. Health care provider should try to create condition not to cry a child with the assistance of mother.

**Approach to the child**

- The examination should always perform while the parent is present nearby.
- Use warm hands and instruments.
- Make friends first.
- The group of children who show anxiety and lack of cooperation are those aged between one and four years.
- Newborns and infants up to six months of age do not often exhibit appreciation on being examined.
- Examination of infant, toddler and preschool child may helpful using sweets.
- A preschool child may be reassured and distracted by interesting toys.
- Older child cooperation may be gained by complimentary remarks, suitable conversation or a discussion of mutual interests.
- It is a great mistake to remove a child immediately from parent's arm.
- When using stethoscope or other instruments, it often helps to allow the child to play with and feel the instruments prior to use.

***Position/Place for examination***

- Under six months: on the couch or bed.
- Six months to four years: start with child on mother's lap

- Over four years: standing, sitting. May not like lying down.
- Remove clothing gradually but undress fully except underwear.

***Order of examination***

It is flexible in general: look before you feel and listen before you hurt or make the child cry.

**General Appearance**

It is essential to observe carefully (face of a child)
- Does the child look well or ill?
- Does the child appear comfortable or uncomfortable?
- Is the child breathing easily or with difficulty?

**Skin**

Central and peripheral cyanosis, jaundice, pallor, tissue turgor, oedema

**Head**

Fontanelles, shape, size and bossing.
The anterior fontanelle remains open to 18 months. It remaining open for longer than normal in hydrocephalus, rickets. Bulging of the fontanelle occurs with crying or straining but in the relaxed child it is an extremely important sign and suggests raised intracranial pressure due to meningitis, encephalitis, brain tumour or subdual haematoma. A tense bulging fontanelle is best noted if the patient is in the sitting position. It is more easily elicited by the palm of the hand. Depressed anterior fontanelle suggests dehydration.
It is essential to measure the circumference of the head in infant and check whether it is bigger which is in hydrocephalus.

**Face**

Check for Down syndrome, depressed or abnormal nasal bridge and any tics or habit spasms.

**Eyes**

Check for squint, infections, cataracts and conjuntival haemorrages, dryness of the cornea or conjunctiva, Bitot's spots, corneal ulcers.

**Nose**

Patency of the nasal passages in infant must also be ascertained. Check for mucopurulent or blood stained watery discharge of congenital syphilis.

**Mouth & Throat**

Lips, gums, teeth, tongue and palate must be examined. It is essential to exclude cleft palate in neonate.
Proper and secure immobilization of the head is essential and a bright light should be used to visualize the oropharynx and tonsils.
Koplik's spots on the buccal mucosa in measles, herpes ulcers of the tongue and gingivitis must be noted. Check for postnasal drip under good light.

**Ears**

The direction of ear canal in newborns and infants is upwards and in older children downwards and forwards. To visualize the tympanic membrane with the otoscope the pinna is gently pulled up and back in older children and downwards in infants and newborns.
Observe and ask for any discharge from ears and find out pain/tenderness just behind the ears to exclude mastoiditis.

**Neck**

Neck stiffness should always be excluded in all acutely ill children. If present, Kernig's and Brudzinski's signs should be elicited.

Neck stiffness is demonstrated with the palm of both hands in the nape of the neck and the fingers extending under the cranium, so that muscular spasm can be detected in the small or weak child; this can be missed if the head is flexed from the occiput. Free movement of the neck may be limited by inflamed lymph nodes, muscular spasm due to trauma, joint diseases, bony disease, severe tonsillitis and apical lobar pneumonia.

It is also a good opportunity to feel for lymph nodes in the submental, tonsillar, cervical (deep and superficial) and supraclavicular regions.

## Examination of the Respiratory System

### INSPECTION ( LOOK & SEE)

**Type & Rate of breathing**

A newborn child especially premature baby will normally have Cheyne-Stokes type of breathing. Rapid respiratory rate indicates due to pneumonia or shortage of oxygen concentration in the blood. Rapid respiratory rate is considered depend on the age of a child.

- If 60 breaths/minute or above – Up to two months
- If 50 breaths/minute or above – above two months to two years
- If 40 breaths/minute or above – above two years to five years

Consider as normal respiratory rate as follows

- 16 to 20 breaths/minute – six years to 14 years
- 14 to 16 breaths/minute – above 14 years to 16 years

Chest in-drawing, sternal recession and grunting sounds are the features of respiratory distress especially in young children.

All palpatiob, percussion and auscultation are similar as adult. The only different is child has only small and thin chest wall. Because of this reason the clinical signs are more prominent than adult. Breath sounds seem louder in children because of the thin chest wall.

Hyperresonance is found in bronchiolitis and asthma. **Stridor** is common in children. It is a harsh sound made by air passing through an obstruction of the upper airways from the glottis to the bifurcation of the trachea. It is most commonly heard in croup. Generally it is heard better at the month than in the chest during auscultation with the bell of the stethoscope over the mouth. It is usually heard in inspiration and sternal recession during inspiration.

**Wheezing** is a softer and higher pitched sound made by obstruction to smaller peripheral airways like bronchi and bronchioles as in asthma and bronchiolitis. It is louder at the chest than the mouth and more marked on expiration than inspiration. Expiration is also prolonged.

## Examination of the Cardiovascular System

Generally, CVS examination is similar as adult.
Pulse rate is obtained in young infants either by palpation of the femoral artery or auscultation of the heart. The pulse rate is usually increased by 10 to 12 beats/min for each 1° C of fever.
Normal range of pulse rate is considered depend on the age of a child.

- Up to 3 months 120-160/min
- 1 year 80 – 140
- 2 years 80 – 130
- 3 years 80 – 120
- Older 70 – 115

Blood pressure measurements in children are frequently overlooked is commonly due to lack of proper instrument and consider as normal range. It is important to measure especially for sick child as well as kidney problems in children.

**Table Normal upper limits of BP at different ages**

| Years | Systolic (mm Hg) | Diastolic (mm Hg) |
|---|---|---|
| 0-3 | 110 | 65 |
| 3-7 | 120 | 70 |
| 7-10 | 130 | 75 |
| 10-13 | 140 | 80 |

## Examination of Gastrointestinal System

It is impossible to do thorough examination if the child is crying or if the abdominal wall is tense. Visible peristalsis can be normal in children. In infants up to two months of age a visible gastric wave or peristalsis which passes from under the left costal margin to the right may indicate pyloric stenosis.

In congenital pyloric stenosis sometimes it may felt in varies sizes from a pea to terminal phalanx of the finger on deep palpation. It is usually located at the end of the stomach anywhere along the edge of the liver from the costal margin in the midline to the underside of the right lobe of the liver. The sausage-shaped tender mass of intussusception can usually be palpate in the right lower quadrant.

Normal liver can palpate as a superficial mass with clear border 1-2 cm below the right costal margin. But if it is more than 2 cm consider as abnormal and find out the cause.

It is important if the umbilicus is red and/or redness around the umbilicus in neonates. It is the sign of infection.

It is essential to examine the scrotal region in newborn to find out the undecended testis and congenital inguinal hernia.

In newborn, it is essential to check the patent of the anus.

# Examination of the Central Nervous System

Complete examination of Central Nervous System (CNS) impossible in young age. Health care provider should know the general features and assessment of basic cranial nerves.

***General***

- Developmental milestones
- Appropriate behaviour, intelligence, appearance of child
- State of consciousness: awake, confusion, drowsy, coma

***Basic assessment of some important cranial nerves***

- Eyes (cranial nerves 2nd, 3rd, 4th, 6th)
  - Can child see?
  - Is there squint? (longstanding or recent onset: urgent referral)
  - Are eye movements normal in all directions?
  - Are pupils regular and do they react to light?
- Face (cranial nerve 7th): facial asymmetry while smiling or crying?
- Hearing (cranial nerve 8th): Can normal and whispered speech be heard?
- Drinking/swallowing/speech (cranial nerves 9th & 10th): normal?

***Movement and tone of limbs***

- Is there any wasting or asymmetry?
- Movement: Left and right move equally?
- Gait: Is this normal? If cannot walk yet, are all limbs moving or equally?
- Tone: Increased (spastic or hypertonic) or decreased (hypotonic or floppy)?

***Assess for signs of meningeal irritation***

- Neck stiffness or rigidity
- Kernig's sign: Child in supine with hip flexed to 90° and developed pain
- Brudzinski sign: on flexion of neck, involuntary flexion of legs at the knees and hips is positive
- Meningism: neck stiffness is secondary to upper respiratory tract infection or pneumonia and not due to meningitis

***Assess for signs of increased intracranial pressure***

- Altered level of consciousness
- Full fontanelle (in infants less than 18 months)
- Non-specific features: vomiting, high-pitched cry, irritability, headache, bradycardia, hypertension

# Examination of Musculoskeletal System

## INSPECTION

- Areas must be fully exposed and examined in a good light.
- Both sides should be examined.
- Soft tissues: swelling, wasting, asymmetry
- Bones including spine: alignment, deformity, asymmetry
- Skin: colour, texture, erythema, cyanosis, pigmentation
- Scars / sinuses: history of surgery, suppuration

## PALPATION

- Overlying skin temperature: compare both sides.
- Local tenderness

- Soft tissues: described local swelling
- Bones: any thickening or deformity

## MOVEMENT

- Range of active movement: normal or limited
- Range of passive movement: normal or abnormal
- Pain in movement
- Crepitus
- Fixed deformity: Joint cannot be placed in the neutral anatomical position
- Stability of joint: abnormal movement or laxity of joint ligaments

## PERIPHERAL CIRCULATION

Particularly important after trauma or fracture and when limb is in Plaster of Paris.

### 6. Make a diagnosis and/or problems list follow by initial plan

After complete history and examination, health care provider can be defined diagnosis and/or problems list based on finding. For example,
Problem list

1. Pneumonia
2. Failure to thrive
3. Anaemia
4. Delayed milestone

**Initial plans for each problem**

Diagnosis and further tests: CXR if not better; Hb%; review development in next visit
Choice of therapy: Amoxycillin 250 mg syrup tds X 5 days
Explain to care giver: Discussion including when to come back

Overall management should be follow as "SOAP"

| | |
|---|---|
| **S** - Subjective information | What the parent/child says |
| **O** – Objective information | What is your observation during examination |
| **A** – Assessment/Interpretation | Your assessment based on history/examination |
| **P** – Plan for each problem and Follow-up | Diagnosis, Therapy, discussion with parent |

### 7. Ethical issue in children

Most often the parent or guardian is the decision maker for young children. From ethical perspective, health care provider should engage children and adolescents, based on their developmental capacity, in discussions about disease and medical plan.
Health care provider must always discuss with parent about the child's disease, plan for further management. Parent should be involved in decision making process.

**Confidentiality**

Confidentiality means that information about the child/parent should not be shared without consent in normal situation. It is crucial to the provision of medical care and is important part of the basis for a trusting patient-health care provider relationship. It is important requirement for health care provider to act in the best interests of the child.

# MODULE II. PAEDIATRICS

## ALIMENTARY TRACT

### Herpes Gingivostomatitis

#### DESCRIPTION

Acute, painful vesicular eruptions of the lips and mouth caused by *Herpes simplex* virus characterized by:

- Shallow painful ulcers on the lips, gum and tongue
- Fever, malaise and dysphagia
- Tender, enlarged cervical lymph nodes
- Self-limiting infection with symptoms subsiding within 10 days.

#### MANAGEMENT

*General measures*

- Homemade salt mouthwash may help. (½ measure teaspoon of table salt in a glass of lukewarm water). Rinse mouth for 1 minute twice a day.
- Fluid diet for children
- Avoid acidic drinks (orange or soft drink can cause pain)
- Cover lesions on the lips with petroleum jelly
- Ensure adequate hydration
- Improve nutrition including vitamins

*Drug Treatment*

- Chlorhexidine 0.2% 10 ml as a mouth wash or gargle 12 hourly
- Paracetamol 15 mg/kg po 4-6 hourly for 5 days.
- If not better use Ibuprofen 5-10 mg/kg/dose 6 hourly with food for 5 days.
- Extensive oral ulcer:
  - Thin layer of Tetracaine 1% oral application 3-4 times a day.
  - Aciclovir 10-20 mg/kg/dose po 8 hourly for 7 days.
  - Lidocaine 2% applied on the affected areas 3-4 hourly

**Table - Paracetamol dosage**

| Weight (kg) | Dose (mg) | Use one of the following | | Age months/years |
|---|---|---|---|---|
| | | Syrup 120mg/5ml | Tablet 500mg/ tablet | |
| ≥ 3.5-5 kg | 48 | 2 ml | - | ≥1-3 months |
| ≥ 5-7 kg | 60 | 2.5 ml | - | ≥3-6 months |
| ≥ 7-9 kg | 96 | 4 ml | - | ≥6-12 months |
| ≥ 9-14 kg | 120 | 5 ml | - | ≥12 mths – 3 yrs |
| ≥14-17.5 kg | 180 | 7.5 ml | - | ≥3-5 yrs |
| ≥17.5-35 kg | 240 | 10 ml | ½ tablet | ≥5-11 yrs |
| ≥ 35-55 kg | 500 | - | 1 tablet | ≥11-15 yrs |
| ≥ 55 kg | Up to 1000 mg | - | Up to 2 tab | Adult |

**Table — Aciclovir dosage**

| Weight (kg) | Dose (mg) | Use one of the following | | | Age months/years |
|---|---|---|---|---|---|
| | | Susp. 200mg/5ml | Tablet 200mg | Tablet 400mg | |
| ≥ 3.5-5 kg | 80 mg | 2 ml | - | - | ≥ 1-6 months |
| ≥ 7-11kg | 100 mg | 2.5 ml | - | - | ≥ 6-18months |
| ≥ 11-14kg | 120 mg | 3 ml | - | - | ≥ 18 mths-3 yrs |
| ≥ 14-25kg | 160 mg | 4 ml | - | - | ≥ 3-7 yrs |
| ≥ 25-35kg | 200 mg | 5 ml | 1 tablet | 0.5 tablet | ≥ 7-11 yrs |
| ≥ 35-55kg | 300 mg | 7.5 ml | 1.5 tablet | - | ≥ 11-15 yrs |
| ≥ 55 kg | 400 mg | - | 2 tablets | 1 tablet | ≥15 yrs & Adult |

***Referral***
- No improvement after 1 week treatment
- Severe conditions with complication

## Tooth Abscess or Toothache

### DESCRIPTION

Acute or chronic suppuration related to teeth due to infection. It is characterized by:
- Acute, severe throbbing pain
- Swelling adjacent to the tooth or on the face
- Pain worsened by tapping on affected teeth
- Restriction in month opening or difficulty in swallowing
- Pus collection and drainage either intra-orally or on the face

### TREATMENT

- Pain killers: Paracetamol 15mg/kg/dose 4-6 hourly (detail dosage table on paracetamol)
- Amoxicillin 10-20mg/kg/dose 8 hourly po for 5 days
- (If Penicillin allergic) Erythromycin 10-15mg/kg/dose 6 hourly po for 5 days
- Metronidazole 7.5mg/kg/dose 8 hourly for 5 days

### REFERRAL

- Refer to dentist after above medication

## Constipation

### DESCRIPTION

***Constipation***: Infrequent passage of hard stools.
***Faecal soiling***: The involuntary leakage of small amounts of soft or watery stools secondary to faecal loading.

### CAUSES

- Incorrect diet
- Certain medicine

- Chronic use of enemas
- Metabolic causes
- Lower abdominal abnormalities
- Endocrine cause
- Neurogenic cause
- Psychogenic causes
- Lack of exercises

## DIAGNOSIS

- History
- Abdominal X ray
- Abdominal sonar

## MANAGEMENT

***Non-drug treatment: Involves 3 steps***

- Initial clearance of stools
- Prevent re-accumulation of hardened retained stool
- Re-training of the gut to achieve regular toilets habits

***Drug treatment***

- Initial therapy: Faecal clearance if faecal loading. Phosphate –containing enema bd for 3 days OR Polyethylene glycol solution with sodium sulphate and electrolytes: oral or via NGT 10-25ml/kg/hr until clear fluid is passed rectally
- Bowel re-training: Diet change with additional fibre. Ispaghula 1.75-3.5 Gm stirred in water with breakfast AND/OR
- Maintenance therapy: Liquid paraffin 2ml/kg/day PO
- Refractory cases: Lactulose bd daily. Dose is depending on the age. < 1 yr =2,5 ml, 1-6 yr = 5 ml, > 6 yr = 10ml
- If faecal loading persist, maintenance therapy should be continued for months to years.

## REFERRAL

- Inadequate response to therapy
- If suspected organic cause, i.e, constipation from birth in a breast-fed baby

# Acute Diarrhoea

## DESCRIPTION

Diarrhoea is a serious common childhood illness evidenced by the passing of frequent profuse loose watery stools. Vomiting may or may not be present.
It is often cause by viral infection but may be due to bacterial infection, dietary or other causes.
Dehydration and metabolic disturbances are common if treatment is not instituted early and may result in severe disease, irreversible organ damage and death in children.
Malnutrition is a serious co-morbidity and/or result of diarrhoeal disease and must be managed correctly. Ongoing feeding while treatment is given except during shock or abdominal distention due to ileus. It is important not to stop feeding while child has diarrhoea.

## DIAGNOSTIC CRITERIA

Adequate initial assessment and frequent reassessment (4 hourly if dehydration is present more often in the presence of shock) is vital in the care of these children.

***Signs of Shock***

- Increased capillary filling time > 3 seconds and/or cool extremities

- Increased pulse rate, thready pulse
- Late sign: Decreased blood pressure and decreased level of consciousness

***Assess for signs of metabolic, nutritional, infection***

- Level of consciousness
- Respiratory rate & chest indrawing
- Floppiness
- Bile stained vomiting
- Decreased bowel sounds
- Urine for leucocytes, nitrates and blood

## INVESTIGATIONS

- Renal function: Urea and Creatinine
- Electrolyte level: Sodium, Potassium
- Blood acid base assessment
- Stool culture if suspect dysentery, cholera, typhoid

**Non-Drug Treatment**

- Adequate initial assessment and frequent reassessment is vital. Assess level of dehydration based on table of level of dehydration.
- Reassess the condition of the patient continuously (+/- every 30 minutes) while shock persists
- If dehydration is present 4 hourly reassessment and immediate correction of shock or deterioration
- Monitor and maintain:
  - Blood pressure
  - Fluid balance
  - Blood glucose
  - Blood electrolyte
- Monitor urine output: should be at least 1ml/kg/hr
- Monitor body weight every daily especially child is dehydrated and calculate the fluid requirement based on body weight changed is important.
- Continue oral feeds during period of diarrheoa are essential. May be withheld food for few hours if the child is severely dehydrated or shock.
- Educate caregivers about hygiene, oral rehydration solution and danger signs of diarrhea.

**Drug Treatment**

- The most important treatment is correction for dehydration depends on severity.
- Outline of fluid therapy should be followed as mentioned in table for fluid therapy.
- Role of antibiotic is limited. Prescribed only if very severe and due to bacteria.
- Anti-diarrhoeal medications and antiemetics should not be prescribed.
- With severe malnutrition: Inj: Ampicillin, IV, 25–50 mg/kg/dose 6 hourly for 5 days **PLUS** Gentamicin, IV, 7.5 mg/kg as a single daily dose for 5 days

**Homemade sugar & salt solution**

½ level of teaspoon salt + 8 level teaspoons sugar + 1Litre of boiled then cooled water

**Important points to be remember in acute diarrhea**

- MUST do initial assessment and classify SHOCK, severe, moderate or not obvious dehydration.
- After classify immediate implement IV line for SHOCK and Severe dehydration. If IV line cannot be set up within 15 minutes use an intraosseus infusion. If intraosseus is not possible MUST give 20ml/kg/hr via NGT.
- Reassess again in 20 minutes in SHOCK, in 1 hour in severe dehydration.
- Important to check body weight daily to find out dehydration status.

- Advice mother to give ORS or SSS 10ml/kg orally after each loose stool. (Up to 2 yrs – 50 ml; > 2yrs -100 ml per each loose stool)
- Consider urinary tract infection or septacaemia in malnourished, HIV and infant less than 3 months old. Need IV antibiotic; Ampicillin and Gentamicin.
- Tell mother to continue oral feeds (breast/formula) during period of diarrhoea. If vomiting give small amount frequently.
- Tell mother to give extra food for nutritional recovery after diarrhea stop.
- It is important to tell parent about diarrhea and how ORS works.

**Table — Level of dehydration**

| Signs of Dehydration | SHOCK (One of the signs below) | SEVERE DEHYDRATION (Two of the signs below) | DEHYDRATION (Two of the signs below BUT not severe dehydration) | No visible dehydration (None of the signs of dehydration) |
|---|---|---|---|---|
| Level of consciousness | Decreased level of consciousness | Lethargic or unconscious | Restless or irritable | Well, alert |
| Eyes sunken | - | Eye sunken | Eye sunken | Eye not sunken |
| Ability to drink | - | Drinks poorly or not able to drink | Thirsty, drinks eagerly | Drinks normally not excessive thirst |
| Skin turgor / pinch | - | Severe decrease in skin turgor; skin pinch returning in > 2 seconds | Moderate decrease in skin turgor; skin punch returning in < 2 seconds | Skin pinch goes back immediately |
| Capillary filling time | > 3 seconds | - | - | - |
| Cardiovascular | Decreased BP Rapid thready pulse | - | - | - |

| Evaluation | SHOCK<br>*Needs Resuscitation immediately* | SEVERE DEHYDRATION<br>*Needs urgent fluids & resuscitation* |
|---|---|---|
| **ACTION** | Start immediate IIV drip Ringer-lactate (R/L) or 0.9% normal saline 20ml/kg in 10-20 minutes.<br><br>**Reassess after 20 minutes: pulse, BP, extremities, capillary filling time.**<br><br>**If still in SHOCK? If YES**<br><br>Repeat as above and consult or refer.<br><br>If improved continue as in continuation phase in severe dehydration (next column) | Start drip urgently with R/L 30ml/kg in 1 hour.<br><br>**Reassess after 1 hour: pulse, BP, extremities, capillary filling time.**<br><br>**If still severe dehydration or SHOCK?**<br><br>**If YES – move to column 1, shock column**<br>**If NO- improved, passing urine then**<br><br>**CONTINUATION PHASE**<br>Change drip to ½ Darrows with 5% Dextrose at 10ml/kg/hr X 4 hr<br><br>**Reassess in 4 hours**: General state better, able to take oral fluids? If **YES**<br><br>Reduce drip rate to 5ml/hr and start oral rehydration (next column)<br><br>If **NO** – Evaluate urine output, blood & stool test results.<br>Increased drip rate 10-15 ml/hr/hr if necessary. Then<br><br>**Reassess in next 4 hour**: Hydration better, able to take oral fluids<br><br>If **YES** – Reduce drip rate to 5ml/hr and start oral rehydration (next column) |
| **INVESTIGATION** | U&E, BS, Urine dipsticks | U & E, BS, Urine dipsticks |

## Chronic Diarrhoea

### DESCRIPTION

Persistent diarrhoea: an episode that begins acutely and lasts at least 7 days.
Chronic diarrhoea: four or more loose stools per day for longer than two weeks.
Prolonged diarrhoea results in significant morbidity and mortality associated with poor nutrition. Chronic/persistent diarrhoea is most frequently due to temporary loss of disaccharidase activity in the intestinal microvillous brush border, usually lactase loss, or luminal infection/ infestation, which may be non-specific bacterial overgrowth. Rare causes include food allergies.

| **MODERATE DEHYDRATION**<br>**Needs oral rehydration** | **NOT OBVIOUSLY DEHYDRATED**<br>**Potential dehydration for home treatment** |
|---|---|
| Give supervised ORS for of 4-6 hours. Start with small amounts and increase to offer 15-20ml/kg/hr in small frequent sips. If the child wants more offer more. Do not allow to drink large amount because of risk of vomiting.<br><br>If child vomits, wait 10 minutes and give again in small frequent amount of fluid. If continue to vomits consider for ½ Darrows with 5% Dextrose at 10ml/kg/hr X 4 hr.<br><br>**Reassess after 4 hours**: Hydration better not vomiting, wanting food?<br><br>If **YES** – Start small feeds including breastfeeds follow with additional ORS as in next column.<br><br>If **NO** – Check for severe dehydration or SHOCK signs. If there is positive treat as SHOCK or severe dehydration. | Give extra fluids, ORS after small feeds and after each diarrhoeal stool. 10ml/kg orally after each loose stool. (Up to 2 yrs – 50 ml; > 2yrs -100 ml per each loose stool)<br><br>If the child wants more offer more in frequent small sips to avoid vomiting.<br><br>Health education about diarrhea and how ORS can prevent dehydration.<br><br>**Reassess hydration twice daily and measure body weight daily.**<br><br>Weight loss reflects dehydration and gives more fluid.<br><br>Discharge once hydration maintained without drip and stools becoming less watery.<br><br>**Discuss home management before discharge.**<br><br>Diarrhoea should stop within a week.<br>Give extra f ood for nutritional recovery.<br>To come back if diarrhoea not stop in a week time and occur blood-stained. |
| BS & Urine dipsticks | Urine dipsticks |

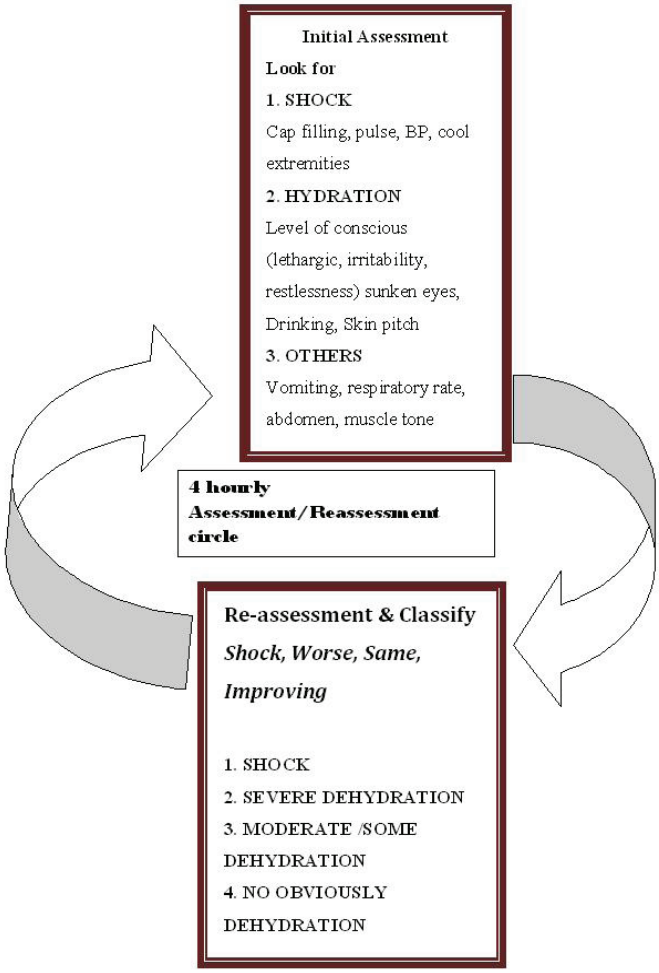
## DIAGNOSTIC CRITERIA

- Diarrhoea without weight loss or dehydration – consider Toddler's diarrhoea
- Diarrhoea with weight loss and dehydration – consider small bowel mucosal injury, e.g. lactose intolerance or small bowel bacterial overgrowth
- Diarrhoea with weight loss but no dehydration – consider a malabsorption syndrome, Consider the possibility of HIV infection.

## NON-DRUG TREATMENT

Treatment strategy includes a stepwise approach with modification of the diet.
Monitor hydration, stools, nutritional status, weight gain, growth and other nutritional parameters such as serum proteins. Nutritional support prior to this or where the stepwise approach is not possible:

iagram for Assessment and Reassessment cycle in acute diarrhoea




- under 4 months:

Encourage exclusive breastfeeding if lactose intolerance is not severe.
If not exclusive breastfeeding, give ORS in addition to a breast milk substitute that is low in lactose, e.g. yoghurt or specialised formulae or lactose free milk formula.

- children aged 4 months and older:

Feeding should be restarted as soon as the child can eat, with small meals 6 times a day. Nasogastric feeding may be required in children who eat poorly. Where commercial special formulae as used in the step wise protocol are not available consider use of:

If the response is good:
Give additional fruit and well-cooked vegetables to children who are responding well.
After 7 days of treatment with an effective diet, resume an appropriate diet for age, including milk, which provides at least 110 calories/kg/day.
Follow up regularly to ensure recover from diarrhoea, continued weight gain and adherence to feeding advice.

## DRUG TREATMENT

### Antibiotic therapy

Antibiotics are only indicated when specific infections are suspected or where they are. Used in the "step-wise drug based empiric protocol for management of Diarrhoea."
All persistent diarrhoea with blood in stool should be treated for Shigellosis:

- Erythromycin, oral, 10 mg/kg/dose 6 hourly for 7 days

For ***Giardia. lamblia***

- metronidazole, oral, 7.5 mg/kg/dose 8 hourly for 5–7 days
- Trimethoprim/Sufamethoxazole, oral, 5 mg/kg/dose of Trimethoprim component 6 hourly for 5 days

### Step-wise empirical protocol for management of chronic diarrhoea

Commence management at the most appropriate step according to previous management – many infants with persistent diarrhoea will already have failed the "day 3–5" stage and will commence management on "day 6–8".

**DAY 0**

Rehydration: Recommence breast or full-strength formula feeds within 12–24 hours.
Additional oral rehydration solution (ORS) to maintain hydration.

**DAY 1-2**

Continue full-strength feeds with additional ORS as required.

**DAY 3-5**

Change to lactose-free feeds.
Continue additional fluids as required.
If diarrhoea resolves, discharge, but continue with lactose-free feeds for 2 weeks.

**DAY 6-8**

- Gentamicin, oral, 8 mg/kg/dose 4 hourly for 3 days only.

PLUS

- Cholestyramine, oral, 1 g 6 hourly for 5 days only.

Continue lactose-free feeds and additional fluids as needed.
If diarrhoea resolves, discharge, but continue lactose-free feeds for 2 weeks.

**DAY 9-11**

Continue additional fluids as required.
If diarrhoea resolves, discharge on semi-elemental feeds for at least 2 weeks.
If *Giardia* is not excluded,

- Metronidazole, oral, 7.5 mg/kg/dose 8 hourly for 5 days

In HIV infected children: Isospora belli and Cyclospora

- Trimethoprim/Sufamethoxazole, oral, 5 mg/kg/dose of Trimethoprim component 12 hourly for 10 days

**DAY 12-13**

- Gentamicin, oral, 8 mg/kg/dose 4 hourly for 3 days only.

PLUS

- Cholestyramine, oral, 1 g 6 hourly for 5 days only.

**DAY 14+**

Consultation required or referral.
Signs/Symptoms of Recovery: Weight gain, return of appetite and decrease of diarrhoea, less elemental diets can be judiciously and slowly reintroduced.

## MINERAL AND MICRONUTRIENT DEFICIENCIES

- Zinc acetate, oral,
  - < 10kg 10 mg/day
  - > 10kg 20 mg/day
- Magnesium, oral, 0.2 mmol/kg as a single daily dose
- Folic acid, oral, 5mg as a single daily dose

If recurrent diarrhoea
- Vitamin A, oral as a single dose
  - 6–12 months 100 000 IU
  - > 12 months 200 000 IU

**Referral**
- Inability to maintain hydration.
- Seriously compromised nutrition.
- Lack of local resources to support the stepwise protocol at any step.
- All cases not responding by day 14 of the stepwise protocol.

# Dysentery

## DESCRIPTION

Passage of blood and mucus in the stools.
Shigella infection is the most common serious cause in children. Other cause is due to *Entamoeba histolytica* (Amoebic Dysentery).

**Complications due to Shigella include:**

- dehydration
- convulsions
- shock
- toxic megacolon
- acidosis
- rectal prolapse
- renal failure
- haemolytic uraemic syndrome

**Complication due to Amoebic Dysentery**
- Amoebic liver abscess

## DIAGNOSTIC CRITERIA

**Clinical**
- sudden onset
- abdominal cramps, peritonism, urgency, fever and diarrhoea with blood and mucus in the stools
- meningismus and convulsions may occur
- exclude intussusception. Evidence of intussusception includes:
  - pain or abdominal tenderness
  - bile-stained vomitus
  - red currant jelly-like mucus
  - appearance of the intussusceptum through the anus

## INVESTIGATIONS

- stool culture to confirm diagnosis
- stool microscopy reveals many polymorphs and blood
- immediate microscopy of warm stool to diagnose amoebic dysentery

**Non-drug treatment**

- monitor fluid and electrolyte balance
- ensure adequate nutrition and hydration

Drug treatment

- Fluid and electrolyte replacement; Correction of dehydration as mentioned in acute diarrhoea
- For *Shigella* Dysentery: Ciprofloxacin, 15 mg/kg/dose 12 hourly po for 3 days. OR
- Inj: Cefotaxime, IV 50 mg/kg/dose 6 hourly for 5 days OR
- Inj: Ceftriaxone, IV, 20–80 mg/kg as a single daily dose for 5 days

For *Entamoeba histolytica*: Metronidazole, 7.5 mg/kg/dose 8 hourly po X 5-7 days

# Acute Viral Hepatitis

## DESCRIPTION

Acute inflammation of the liver with varying degrees hepatocellular necrosis caused by hepatitis A, B and less commonly C, D and E virus.

## DIAGNOSTIC CRITERIA

**Clinical**

- Nausea and vomiting
- Anorexia and malaise
- Right upper quadrant abdominal pain
- Malaise
- Fever
- Jaundice
- Tender hepatomegaly
- High colour urine

## INVESTIGATION

- Liver Function Test (LFT)
- Hepatitis screening test

**Non-drug treatment**

- Isolate patient
- Low fat and high carbohydrate diet
- Avoid heavy activities

**Drug treatment**

*Prophylaxis*

- Hepatitis B vaccine 0.5 ml IMI those who have no immunity
- Hepatitis B immunoglobulin 0.5 ml IMI within 12 hours of delivery to newborn babies born to mother with Hepatitis B infection and Hepatitis B vaccine IMI first dose within 12 hours of delivery.

**Referral**

Acute hepatitis with bleeding tendency and altered consciousness

## Worm Colic

### DESCRIPTION

- Cramps/Pain in abdomen periodically (on and off) due to worms, commonly Ascaris lumbricoides.
- Other worms infestation are due to -
  - Pin worm (*Enterobius vermicularis*)
  - Whipworm (*Trichuris trichiura*)
  - Hookworm (*Ankylostoma duodenale*)
  - Tapeworm (*Taenia solium/saginatum*)

### DIAGNOSTIC CRITERIA

Most infestations are asymptomatic and become apparent with the passage of a worm rectally orally. Other signs and symptoms are abdominal colic, diarrhoea, perianal itch, anaemia, surgical complication i.e vomiting followed by bowel obstruction.

**Non-drug treatment**

- Hand washing after toilet and before handling food is very important preventive measure.
- Improved sanitation will protect the environment from contamination.

**Drug treatment**

*Roundworm and Hookworm*

- Albendazole: under 2yrs :- 200mg po single dose. > 2 yrs : 400 mg single dose PO.
- Mebendazole: 2-5 yrs:- 100mg bd po X 3 days; > 5 yrs: 500mg single dose PO.

*Pin worm*

- Mebendazole: 100mg po single dose, repeat after 2 weeks

*Taenia and Trichuris*

- Albendazole: 1-2 yrs 200mg po X 3 days; > 2 yrs 400mg po X 3 days

### REFERAL

- If suspect surgical complication i.e bowel obstruction

## BLOOD RELATED DISEASES

## Iron Deficiency Anaemia

### DESCRIPTION

Anaemia due to iron deficiency is the most common cause of a haemoglobin below the age related norm. Common causes of iron deficiency are

1. poor nutritional intake
2. blood loss
3. parasites (whipworm and hookworm)
4. malnutrition
5. Chronic infection i.e HIV, TB, malabsorption syndrome

### DIAGNOSTIC CRITERIA

**Clinical**: Signs & symptoms vary with the severity of the deficiency.

- Pallor
- Fatigue

- Irritability
- Behaviour and cognitive effects
- Delayed motor development
- Soft systolic murmur

**Lower Limits of Normal Haemoglobin**

| Age | Haemoglobin (g/dl) |
|---|---|
| Birth | 13.5 |
| 6 weeks | 9.5 |
| 3 months | 10.0 |
| 6-12 months | 10.5 |
| 12-18 months | 10.5 |
| 18 months – 4 yrs | 11.0 |
| 4-7 yrs | 11.0 |
| 7-12 yrs | 11.5 |
| 12 years and older | 12 (Female); 13 (Male) |

## INVESTIGATIONS

- Complete Blood Picture (CPC)
- Iron study

**Drug Treatment**

- Iron 2mg/kg/dose po 8 hourly with meals

**Dosage for Iron preparation**

| Weight (kg) | Elemental Iron mg | Ferrous gluconate 40mg/ 5ml | Ferrous sulphate |
|---|---|---|---|
| 3-6 kg | 10 mg | 85 mg (1.5 ml) | 50 mg |
| 6-10 kg | 20 mg | 170 (2.5 ml) | 100 mg |
| 10-18 kg | 40 mg | 340 (5 ml) | 200 mg |
| 18-25 mg | 60 mg | 513 (7.5 ml) | 300 mg |
| 25-50 mg | 80 mg | 680 mg (10 ml) | 400 mg |

Follow up at monthly intervals.
The expected response is an increase in Hb of 2g/dL or more in 3 weeks. Continue for 3-4 weeks after Hb is normal to replenish body iron stores.
Treat worms.

- Albendazole po daily for 3 days.

Continue for 3-4 weeks after Hb is normal to replenish body iron stores.

- 1-2 yrs —200 mg
- > 2 yrs — 400 mg

## PROPHYLAXIS

- All premature babies day 15 to 1 yr
- Elemental iron PO 2mg/kg daily
- Multivitamin drops PO 0.6 ml daily

## REFERRAL

- Where the underlying cause cannot be established.
- Child not responding to adequate therapy.
- Severe anaemia with heart failure and serious signs/symptoms

# Haemophilia A and B, Von Willebrand Disease

## DESCRIPTION

Haemophilia A, haemophilia B and Von Willebrand disease are chronic bleeding disorders caused, respectively, by a lack of clotting factor VIII, clotting factor IX and von Willebrand factor (carrier protein for factor VIII).

## DIAGNOSTIC CRITERIA

**Clinical**

- Major bleeds:
  - CNS
  - gastrointestinal neck and throat
  - severe injury
  - advanced joint and soft tissue
  - forearm compartment
  - hip and ilio-psoas
- Minor bleeds:
  - early joint bleed
  - muscle
  - soft tissue
  - epistaxis
  - mouth and gum
  - haematuria
  - pain/tingling in the joints suggests bleeding into the joint in a known haemophiliac

## INVESTIGATIONS

- prolonged partial thromboplastin time (PTT)
- factor VIII or factor IX concentration < 25% of normal activity
- prolonged bleeding time (Von Willebrand)

**Non–drug treatment**

- haemophilia register
- alert bracelet
- dental care (see below for management of tooth extraction)

***Acute bleeds into joints***

- apply ice packs
- bed rest and rest of affected joint/limb until pain free and no further bleeding
- no weight bearing
- splint (no circumferential casts)

**Drug treatment**

**Caution**

- taking blood from internal jugular, posterior fontanelle and femoral veins is absolutely *contra-indicated*.
- avoid IM injections
- avoid lumbar punctures
- exercise great caution when taking blood specimens
- when immunising press on injection site for at least 5 minutes after injection
- avoid aspirin and NSAIDS

***For pain***

Non-aspirin containing medicines.

- Paracetamol, oral, 10 mg/kg 4–6 hourly as required OR/PLUS
- codeine phosphate syrup (25 mg/5 mL), oral, 0.5–1 mg/kg/dose 4 hourly as required

***For bleeds***

Emergency treatment while awaiting transfer, if indicated.

If serious bleeding with known haemophilia, and no Factor VIII available,

- Fresh frozen plasma, IV, 10–20 ml/kg OR cryoprecipitate, IV, 20 units/kg

**Factor VIII deficiency (with no inhibitor present)**

Give 12 hourly until patient is pain free and has movement of joint/limb.

***Minor bleeds***

- factor VIII, IV, 15–25 units/kg

***Major bleeds***

- factor VIII, IV, 40 units/kg

**Factor IX deficiency (with no inhibitor present)**

Give daily until patient is pain free and has movement of the joint/limb.

***Minor bleeds***

- factor IX, IV, 15–20 units/kg

***Major bleeds***

- factor IX, IV, 40 units/kg

**Haemophilia with inhibitors**

Refer for assessment and planning with a haematologist.

**Haemophilia A**

- factor VIII, IV, 40 units/kg, immediately before extraction

**Haemophilia B**

- factor IX, IV, 40 units/kg AND
- Tranexamic acid 40 mg/kg/day in 3 divided doses for 5 days

***For mucous membrane bleeds***

- Tranexamic acid, IV/oral, 25 mg/kg/dose 6 hourly. Contraindicated in haematuria, factor IX deficiency and with prothrombin complex concentrate.
- Mild von Willebrand's disease or established responders of mild factor VIII deficiency
- desmopressin, IV, 0.3 mcg/kg in at least 30 ml sodium chloride 0.9% over 30 minutes

## REFERRAL

- All cases with suspected haemophilia (prolonged PTT and normal INR), for assessment, genetic counselling and planning of management to a haemophilia treatment centre.

# Haemolytic Anaemia

## DESCRIPTION

Anaemia caused by destruction of red blood cells.

Destruction may be due to:

- abnormalities of the cell membrane (e.g. hereditary spherocytosis)
- enzyme abnormalities (e.g. G6PD deficiency)

- abnormal haemoglobin (e.g. sickle cell anaemia, thalassaemia)
- extracellular factors such as auto-immune antibodies or mechanical factors (e.g. Disseminated Intravascular Coagulation (DIC), hypersplenism, haemolytic uraemic syndrome).

## DIAGNOSTIC CRITERIA

### Clinical

- pallor, jaundice, fatigue
- spleen may be palpable

## INVESTIGATIONS

- haemoglobin below normal for age
- evidence of haemolysis:
  - anaemia
  - decreased haptoglobin
  - reticulocytosis
  - unconjugated hyperbilirubinaemia
  - increased lactate dehydrogenase (LDH)
- Coomb's test (direct antiglobin) is usually positive with autoimmune haemolysis
- renal function is abnormal in haemolytic uraemic syndrome

### Non–drug treatment

- Do not transfuse prior to appropriate investigations, unless life-threatening.
- Coomb's-positive haemolytic anaemia may require expert blood cross-matching
- In G6PD deficiency, avoid medicines known to cause haemolysis e.g. aspirin, sulphonamides and primaquine

### Drug treatment

#### Autoimmune haemolytic anaemia

Under specialist supervision:

- prednisone, oral, 2 mg/kg/24 hours until a satisfactory response is obtained and then taper to stop over 14 days AND/OR

In patients not responding to steroids;

- gamma globulin, IV, 400 mg/kg/24 hours for 5 days AND/OR

To suppress the haemolytic process;

- azathioprine, oral, 1–5 mg/kg/24 hours as a single daily dose, may be needed for a variable time

#### Sickle-cell disease

#### Prophylaxis

Pre-splenectomy

- pneumococcal vaccine (polysaccharide), IM, children > 2 years, 0.5 mL (single dose)

If not fully immunised,

- Influenza vaccine

Post splenectomy

Give indefinitely.

- benzathine benzylpenicillin (depot formulation), IM, 1.2 million units every 28 days OR phenoxymethylpenicillin, oral,<5 years 125 mg twice daily; >5 years 250 mg twice daily

## CHRONIC HAEMOLYTIC ANAEMIA

Give all patients indefinitely.

- folic acid, oral, 5 mg daily

**Surgical treatment**

Not indicated for patients under 5 years.
- splenectomy for those, e.g. with spherocytosis, who are likely to respond

**Referral**
- all cases with anaemia that is developing rapidly or is associated with evidence of haemolysis as above.
- all cases to be managed in consultation with a paediatrician or paediatric haematologist

## Megaloblastic Anaemia

### DESCRIPTION

Anaemia caused by a deficiency of folate and/or vitamin B12.

### DIAGNOSTIC CRITERIA

**Clinical**
- pallor and fatigue
- chronic diarrhoea

### INVESTIGATIONS
- megaloblastic anaemia: elevated MCV (mean corpuscular volume) and MCH (mean corpuscular haemoglobin)
- macro-ovalocytes on blood smear, polysegmentation of neutrophils
- decreased serum vitamin B12 or red blood cell folate
- investigations to identify reason for folate or B12 deficiency, e.g. malabsorption
- pancytopaenia in severe cases
- actively exclude leukaemia and aplastic anaemia which may cause macrocytosis

## Aplastic Anaemia

### DESCRIPTION

Anaemia caused by bone marrow failure.
Fanconi anaemia has specific associated clinical features and chromosome abnormalities.

### DIAGNOSTIC CRITERIA

**Clinical**
- pallor, petechiae, purpura, bleeding, with frequent or severe infections

### INVESTIGATIONS
- pancytopaenia, with anaemia (may be macrocytic), leucopaenia and thrombocytopenia
- hypoplastic bone marrow on trephine biopsy

**Non–drug treatment**

Blood products (washed/filtered packed red cells and/or single donor platelets) as needed.
Limit the use of blood and blood products as the patient may be sensitised for future bone marrow transplant.

**Drug treatment**

**Any fever 37.5°C twice or 38°C once**

Take blood cultures first.

Broad spectrum antibiotics

- ceftriaxone, IV, 50–75 mg/kg once daily AND
- amikacin, IV, 15–20 mg/kg once daily

**Surgical treatment**

Bone marrow transplant (specialised centres only).

### REFERRAL

- all cases of suspected aplastic anaemia

Stabilise patient before transport (blood, platelets, if necessary, after consultation with an expert).

## CARDIOVASCULAR SYSTEM

# Acute Rheumatic Fever

### DESCRIPTION

Rheumatic fever is a common cause of acquired heart disease with significant morbidity and mortality rates, both in the acute phase of the disease and as result of chronic valvular sequelae.

### DIAGNOSTIC CRITERIA

- Revised Jones criteria: Evidence of recent streptococcal infection:
  - Elevated Anti-Streptolycin O (ASO) titre or other streptococcal antibody titres
  - Positive throat culture for *group A beta haemolytic streptococcus* PLUS
  - Two major manifestations plus supporting evidence of a recent streptococcal infection OR
  - One major and two minor manifestations plus supporting evidence of a recent streptococcal infection, justifies the presumptive diagnosis of acute rheumatic fever
  - rheumatic fever can be diagnosed without supporting evidence of a recent streptococcal infection if Sydenham's chorea is the only manifestation of rheumatic fever
  - must differentiate acute rheumatic carditis with fever and heart involvement from infective endocarditis

| Major manifestations | Minor manifestations |
|---|---|
| – polyarthritis<br>– carditis<br>– erythema marginatum<br>– subcutaneous nodules<br>– Sydenham's chorea | – Polyarthralgia<br>– Fever<br>– acute phase reactants: increased ESR or C-reactive protein (CRP)<br>– ECG: prolonged PR-interval, ≥ 0.18 seconds in the absence of carditis |

**Non-drug treatment**

- hospitalise with bed rest until sleeping pulse is normal and signs of rheumatic activity have resolved.
- restrict physical activity for at least 2 weeks after the evidence of rheumatic activity has resolved.

**Antibiotic therapy**

- benzathine benzylpenicillin (depot formulation), IM, as a single dose < 30 kg 600 000 IU; > 30 kg 1.2 MU OR phenoxymethylpenicillin, oral, 250–500 mg 6 hourly for 10 days

If Penicillin allergy

- erythromycin, oral, 6.25–12.5 mg/kg/dose, 6 hourly for 10 days

**Anti-inflammatory therapy**

Do not start until a definite diagnosis is made.
Severe arthritis

- aspirin soluble, oral, 75 mg/kg/24 hours in 4 divided doses for 2–6 weeks OR ibuprofen, oral, 5–10 mg/kg/dose, 6 hourly

**Prevention of repeated attacks**

Any patient with documented rheumatic fever must receive prophylaxis up to 35 years age. Intramuscular penicillin is superior to other forms of prophylaxis.

- Benzathine benzylpenicillin IM, every 21–28 days (3–4 weeks) < 30 kg 600 000 IU; > 30 kg 1.2 MU OR
- Phenoxymethylpenicillin, oral, 250 mg twice daily. If Penicillin allergy
- Erythromycin, oral, 250 mg bd daily

### REFERRAL

Rheumatic fever:

- with residual valvular damage electively for planning of care
- with symptomatic valvular damage
- unresponsive to treatment with Chorea

## Infective Endocarditis

### DESCRIPTION

Infection of the endothelial surface of the heart. Suspect infective endocarditis in all children with persistent fever and underlying heart disease.

### DIAGNOSTIC CRITERIA

**Clinical**

- an underlying heart defect and a persistent low grade fever without an obvious underlying cause
- associated other findings include: fatigue, joint pain, new murmurs, clubbing, splenomegaly and haematuria
- must be differentiated from acute carditis due to rheumatic fever

**Non-drug treatment**

- bed rest/limit physical activity
- ensure adequate nutrition
- maintain haemoglobin > 10 g/dL
- measures to reduce fever

**Drug treatment**

Heart failure: See Heart failure treatment
For pyrexia: Paracetamol, oral, 20 mg/kg at once, then 10–15 mg/kg/dose, 6 hourly as required

**Antibiotic therapy**

Antibiotics are always given IV, according to culture and sensitivity.
If culture is available treat according to sensitivities.

**Empiric treatment**

- Benzylpenicillin (Penicillin G), IV, 50 000 units/kg/dose, 6 hourly for 4 weeks PLUS
- Cloxacillin, IV, 12.5–25 mg/kg/dose 6 hourly for 4 weeks PLUS
- Gentamicin, IV, 1 mg/kg/dose 8 hourly for 4 weeks. Daily Gentamicin has not been proven to be equivalent to 8 hourly dosages in infective endocarditis.

### REFERRAL

- all patients with suspected and confirmed infective endocarditis within a few days.

## Heart Failure

### DESCRIPTION

Clinical syndrome reflecting the inability of the myocardium to meet the oxygen and nutritional/metabolic requirements of the body. There are many causes to develop heart failure. Anaemia, congenital heart disease, fluid overload, septicaemia and rheumatic fever are common causes.

### DIAGNOSTIC CRITERIA

**Clinical**

- Tachypnoea
- Breathlessness
- Increased JVP
- Liver enlargement
- Pedal oedema
- Cardiac enlargement
- Orthopnoea

### INVESTIGATIONS

- chest X-ray: cardiomegaly is almost always present
- electrocardiogram

**Non-drug treatment**

- Treat the underlying condition, e.g. infection, hypertension, cardiac tamponade, fluid overload
- Oxygen via face mask, nasal cannula or head box to prevent hypoxia
- Fluid restriction (75% of daily requirements)
- Ensure adequate nutrition, tube-feeding may be necessary

**Drug treatment**

Start with diuretic. Furosemide 20-40 mg po or Hydrochlorthiazide 25 mg PO. If on Furosemide should be add Potassium Chloride to replace Potassium.

## Acute Severe Heart Failure (Acute Pulmonary Oedema)

### DESCRIPTION

It is a life threatening condition and must treat as an urgent.

**Non-drug treatment**

Treat the underlying disorder/condition. Where the primary cause of acute pulmonary oedema is renal failure treat as under renal failure.

- restrict fluids – beware of IV fluids
- upright or semi-upright sitting position
- administer 100% oxygen via face mask or nasal cannula 3-4 L/min

**Drug treatment**

- Furosemide, IV, 1–3 mg/kg immediately; For patients not responding to furosemide, morphine, IV, 0.1 mg/kg

### REFERRAL

All cases should be referred as early as possible after Furosemide.

## Congenital Heart Disease

### DESCRIPTION

It is due to anatomical defect in the heart (i.e hole between heart chambers) and develop heart failure if no proper management) since birth. It is essential to routine check up heart sound in newborn.

### DIAGNOSTIC CRITERIA

If listen heard "mur-mur" in the heart.

- Shortness of breath
- Cyanosis
- Signs / symptoms of heart failure

### REFERRAL

All suspected cases should be referred.

# GENITO-URINARY SYSTEM

## Post Streptococcal Glomerulonephritis

### DESCRIPTION

Acute post-streptococcal glomerulonephritis is an immune mediated inflammatory condition caused by the deposition of immune complexes in the kidneys.

### DIAGNOSTIC CRITERIA

**Clinical features**

- predominantly occurs in children 3–12 years old
- manifests 1–3 weeks after preceding pharyngitis or impetigo
- characteristic features include:
  - facial or generalised oedema
  - painless macroscopic haematuria (smoky or tea coloured urine)
  - oliguria and
  - hypertension
- Urine dipstick shows: haematuira; proeinuria

**Non-drug treatment**

Bed rest is necessary with:

- severe hypertension
- left heart failure
- pulmonary oedema.

– monitor fluid balance:
  - no fluids while pulmonary oedema is present
  - restrict fluid intake to 300–400 mL/m2/24 hours (25 mL/kg/24 hours) while oliguric, i.e. urine flow < 1 mL/kg/hour
  - fluid should only be given orally or via nasogastric tube
  - only if anuric and enteral feeds are impossible, give IV fluids, i.e. 5–10% dextrose water, with a volumetric controller
– weigh daily and record intake and output strictly. In small children fluid balance is best monitored with regular weighing.
– dietary measures:
  - Restrict sodium while oedema and/or hypertension is present
  - Protein restriction

**Drug treatment**

Eradication of *streptococci*

– Phenoxymethylpenicillin, oral, 12.5 mg/kg/dose 6 hourly for 10 days OR

If unable to take oral medication

– Benzathine benzylpenicillin (depot formulation), IM, 600 000–1.2 million units, two doses given 5 days apart

Penicillin allergy

– Erythromycin, oral, 10 mg/kg/dose, 6 hourly for 10 days

## REFERRAL

Urgent

– anuric patient or less urine output
– hypertension
– cardiac failure or pulmonary oedema not responding to treatment

# Urinary Tract Infection

## DESCRIPTION

Bacterial infection of the urinary tract. It is common problem in girl. It can be complicated infection spread to kidneys. In any child with fever of unknown origin, the urine must be examined.

## DIAGNOSTIC CRITERIA

**Clinical**

Signs and symptoms are related to the age of the child and are often non-specific. Uncomplicated urinary tract infections may cause very few signs and symptoms. Complicated infections may present with a wide range of signs and symptoms.

Neonates may present with:

– fever
– vomiting
– hypothermia
– prolonged jaundice
– poor feeding
– failure to thrive
– sepsis
– renal failure

Infants and children may present with:

- failure to thrive
- frequency
- persisting fever
- dysuria (burning sensation)
- abdominal pain
- enuresis or urgency

## INVESTIGATIONS

- Urine dipstick: leucocytes and/or nitrates
- Urine culture and sensitivity if symptoms not better

**Non-drug treatment**

- exclude complications of urinary tract infection
- ensure adequate nutrition and hydration. Maintain hydration with oral and/or IV fluids if necessary.
- for recurring infections:
  - avoid irritant soaps
  - prevent constipation
  - treat pinworm
  - perineal hygiene
  - regular complete emptying of the bladder and/or double voiding, i.e. making an additional attempt at voiding after the initial flow of urine has ceased.

**Drug treatment**

**Antibiotic therapy**

All acutely ill babies must be treated parenterally for the first few days until clinically well and able to tolerate feeds.

Children > 3 months old, who are unwell but not acutely ill and who are not vomiting may be treated with oral antibiotics.

Duration of oral antibiotic therapy is for a minimum of 7–10 days.

- Cefuroxime, IV, 25 mg/kg/dose 8 hourly for 7days OR
- Amoxicillin/clavulanic acid, IV, 30 mg/kg/dose 8 hourly OR
- Cefuroxime, oral, 15 mg/kg/dose 12 hourly for 7 days

## REFERRAL

- Poor response to adequate therapy

# Nephrotic Syndrome

## DESCRIPTION

Nephrotic syndrome is a clinical syndrome associated with massive proteinuria. In children it is mostly causes unknown.

**Clinical**

Features of nephrotic syndrome are:

- massive proteinuria
- hypo-albuminaemia
- oedema
- hyperlipidaemia (hypercholesterolaemia)
- haematuria or hypertension may be present.

## DIAGNOSTIC CRITERIA

- Clinical features

- Urine dipstick
- Laboratory investigations

**Non-drug treatment**

- Assess hydration status
- Restrict salt intake
- No fluid restriction
- Weigh daily (1 kg = 1 L of fluid)
- Adequate protein diet

## REFERRAL

As nephrotic syndrome is a complicated disease, if suspected referral should be made.

# Acute Renal Failure

## DESCRIPTION

It is a medical emergency.
Acute renal failure is a syndrome characterised by a rapid decline in glomerular filtration rate and retention of nitrogenous waste products. It is important to differentiate prerenal, renal and postrenal failure.

## DIAGNOSTIC CRITERIA

**Clinical features**

- oliguria is the most common manifestation, i.e. neonates output < 1 mL/kg/hour; older children output ≤ 0.3 mL/kg/hour
- prerenal – due to dshock and dehydration
- postrenal – due to obstructive uropathy
- renal – due to oedema and volume overload

## INVESTIGATIONS

- Urea, Creatinine and electrolytes

**Non-drug treatment**

- treat the underlying cause
- monitor fluid intake and output, blood pressure
- weigh daily
- restrict Sodium and Potassium intake
- restrict protein intake

**Drug treatment**

Avoid nephrotoxic or renally excreted medications, e.g. NSAIDs, aminoglycosides, vancomycin, cough and cold mixtures.
Fluid management as follows;
For a well-hydrated patient without abnormal fluid losses, give maintenance fluid only. For an anuric patient use an electrolyte free solution only to replace insensible losses, i.e. dextrose 5% or 10 %.
Insensible water loss: neonate and young baby 30–40 mL/kg/day; older children 25 mL/kg/day (400 mL/m2/day). Replace fluid losses with an appropriate solution, e.g. of diarrhoea or naso-gastric drainage.

## ENDOCRINE SYSTEM

# Hypoglycaemia in Older Children

### DESCRIPTION

Infants and small children are more common to develop hypoglycaemia because of relatively limited glycogen stores in liver. It is medical emergency

***Causes in older children***

- Severe illness with poor intake
- Malaria
- Drugs: quinine, alcohol, aspirin
- Sepsis
- Malnutrition
- Others: Liver dysfunction, adrenal insufficiency, growth hormone deficiency, hypothyroidism, etc

### DIAGNOSTIC CRITERIA

- Clinical symptoms:
  - Acute autonomic symptoms: sweating, pallor, tachycardia (increase heart rate)
  - Abdominal pain and headache
  - Neurological symptoms: dizziness, confusion, convulsion
- Blood glucose < 4 mmol/L with symptoms

**Drug treatment**

- Inj: 10% Dextrose 2-4 ml/kg IV over 5 minutes followed by an infusion 10% Dextrose at 6ml/kg/hr. If 50% Dextrose use, dilute first. ( 1ml of 50% glucose + 4 ml of water for injection = 10% glucose 5 ml)
- If no improvement in next 15 minutes, repeat again.
- If there is no sign of improvement, Inj: Hydrocortisone 2-3 mg/kg IV immediately.
- Consider for oral or nasogastric tube glucose solution oral glucose/sugar 5-15 gm if delay for IV treatment.
- Check blood glucose every 30 minutes if not stable. If stable reduce frequency 2 hourly, 4 hourly, 6 hourly.

### REFERRAL

- All children with confirmed hypoglycaemia not explained by causes.
- Persising or recurrent hypoglycaemia

# Type 1 Diabetes Mellitus (Insulin Dependent)

### DESCRIPTION

A syndrome of abnormal carbohydrate metabolism, associated with a relative or absolute impairment of insulin secretion with varying degrees of resistance to the action of insulin.

Most diabetic children have type 1 diabetes, and:

- have auto-immune destruction of the pancreatic beta cells as the underlying cause
- have an absolute requirement for insulin therapy
- will develop diabetic ketoacidosis (DKA) if not given insulin.

### DIAGNOSTIC CRITERIA

- polydipsia

- polyphagia
- heavy glycosuria
- random blood glucose of ≥ 11.1 mmol/L
- weight loss or failure to gain weight
- weakness or tiredness
- recurrent protracted infections
- polyuria – this can present as 2º enuresis in young children
- fasting blood glucose of ≥ 7.0 mmol/L – fasting is not usually needed for the diagnosis
- an oral glucose tolerance test is not needed

**Non-drug treatment**

**general measures**

- educate child and caregiver about all aspects of the disease
- medical alert bracelet should be worn at all times
- follow-up by medical practitioner or at clinic/hospital at least every 3 months

**Diet: healthy lifelong eating habits**

A newly diagnosed patient and family must be referred to a dietician.

Principles of the prudent diet:

- children should be encouraged to reduce the intake of fats and salt and to increase dietary fibre content.
- All diabetics should be given a meal plan, e.g. "constant carbohydrate meal plan" or "carbohydrates counting meal plan". There is no one 'diabetic' diet. The diet should be individualised with consideration given to usual eating habits and other lifestyle changes.
- Six main nutrition factors contribute to better sugar control, i.e. lower HbA1c levels.

These are:

1. following a meal plan. Keep day to day intake consistent
2. avoiding extra snacks that are not part of the meal plan
3. avoiding over-treatment of low blood sugars (hypoglycaemia)
4. prompt correction of high blood sugars
5. adjusting insulin levels for meals in patients using the "carbohydrates counting meal plan"
6. consistency of night snacks

The aim is to maintain HbA1C as close as possible to the normal range.

**Desired Ranges of HbA1c For Diabetic Children**

| Age | HbA1C |
|---|---|
| < 5 yrs | 7.5 – 9.5% |
| 5 – 11 yrs | < 8.5 % |
| 12 – 21 yrs | < 7.8% |

**Urine ketone testing**

The presence of hyperglycaemia and substantial ketones (+++) indicates that DKA is present.

Urine should be tested for ketones in the following circumstances;

- if vomiting occurs
- any time the blood glucose is above 15 mmol/L, especially if the child is unwell and particularly if the blood glucose has been high for more than 24 hours
- if unusual drowsiness is present
- in the presence of high temperature, vomiting or diarrhoea, even when the glucose is< 15 mmol/L

- if abdominal pain occur
- if the breathing is deep and rapid or smells of acetone

**Drug treatment**

**Insulin therapy**

Principles of insulin therapy

- to provide sufficient insulin throughout the 24 hour period to cover basal requirements
- to deliver higher boluses of insulin in an attempt to match the glycaemic effect of meals the most suitable areas for insulin injection are:
  - the upper, outer area of the arms
  - the front and side of the thigh
  - the upper, outer surface of the buttocks and
  - the abdomen, except the area close to the navel

Establish a pattern for injecting, i.e. horizontally or vertically. Vary the site of injection according to this pattern. When the area has been fully covered move to another area. Patients doing strenuous exercise should not inject into their legs.

## REFERRAL

All suspected children who have Type 1 diabetes should be referred. Management of all children with diabetes should be supervised by doctor, dietician.

**Prevention for complications**

periodic screening of eyes by an ophthalmologist:

- prepubertal onset of diabetes: 5 years after onset or at age 11 years, or at puberty (whichever is earlier), and annually thereafter
- pubertal onset of diabetes: 2 years after onset and annually thereafter

## ACUTE COMPLICATIONS OF INSULIN DEPENDENT DIABETES MELLITUS

### 1. Cerebral oedema in diabetic coma

A condition of brain swelling during the course of treatment of hyperglycaemic coma. It causes significant neurological morbidity and end up with 80% mortality.

***Causes***: unknown. Likely due to too rapid reduction in intravascular concentration of glucose level may aggravate the process.

**Diagnostic criteria**

- headache
- small pupils
- irritability
- slowing pulse
- confusion
- respiratory impairment

**Non-drug treatment**

- Restrict intravenous fluids to 2/3 maintenance and replace deficit over 72 hours.
- Check for hypoglycaemia
- Check sign of infection
- Refer to appropriate centre

**Drug treatment**

- Inj: Mannitol 20% IV 2.5ml/kg immediately over 15 minutes

### 2. Hyperglycaemic Ketoacidosis

A condition of very high glucose level in the blood together with increase ketones and becomes acidosis in the blood.

**Diagnostic criteria**

- Heavy glycosuria
- Hyperglycaemia usually > 15 mmol/l (in rare cases blood glucose is not high)
- Ketouria pH < 7.3
- Clinical features: vomiting, dehydration, abdominal pain, drowsiness

**Non-drug treatment**

- Admission and need high care
- Check conscious level and treat appropriately
- Oxygen via mask

**Drug treatment**

The main objectives of treatment are

- Restoration of circulating fluid volume
- Replacement of sodium, extracellular fluid and intrlacellular fluid
- To increase urine output to enhance clearance of glucose / ketones from the blood
- To reduce the risk of cerebral oedema

*i.* Fluids

Requirement = Resuscitation + deficit + maintenance

***Resuscitation***

Indication: in 10% dehydration, in shock, BP decrease

- Sodium chloride 0.9% 10-20ml/kg IV over 20-30 minutes.
- Repeat if pulses remain poor

***Deficit***

Calculation: estimated of % dehydration + body weight (kg)

***Maintenance***

Calculation:

- ≤ 1 year – 120 ml/kg/24 hrs
- > 1 year: 1st 10 kg – 100 ml/kg/24 hrs; > 10 kg – 50 ml/kg/24 hrs; additional wt > 20 kg – 20 ml/kg/24 hrs
- Combined deficit + maintenance fluid volume and replace over 24 hours. Start with sodium chloride and later if blood glucose decrease change to dextrose with sodium chloride 0.45% or 0.9% child
- IV fluid should be continued until the child is drinking well and able to tolerate solid food.
- Assess hydration status every 4-6 hourly
- Assess blood glucose 2 hourly, 4 hrly, 6 hrly
- When blood glucose falls to < 15 mmol/L drip should be changed to 5% dextrose with 0.45% or 0.9% sodium chloride
- Bicarbonate should NEVER give to patient. (risk of cerebral oedema)
- Potassium replacement should be commenced unless anuria is present. If Potassium level can't measure should be add 20 mmol/L in 1L of fluid.

*ii.* Insulin

- Short-acting insulin 0.1 unit/kg IM hourly not in shock; if shock IV
- Subcutaneous insulin can be started once the child is well hydrated and able to drink.
- The best time to change SC insulin is just before a meal time.
- If the blood glucose exceeds 11 mmol/L, supplementary SC short-acting insulin should be given before meals.

| Blood glucose mmol/L | Short-acting insulin units/kg/dose |
|---|---|
| 11-12 | 0.06 |
| 13-16 | 0.09 |
| > 16 | 0.12 |

## REFERRAL

- No improvement
- Age < 5 years
- Rising blood sugar

### 3. Hypoglycaemia in diabetics

**Causes**

- Alcohol
- Exercise / body activity
- Overdose of insulin
- Missed snack or missed meal
- Gastroenteritis

**Diagnostic criteria**

- Blood glucose < 3.5-4 mmol/L with symptoms in known diabetic child.
- Clinical symptoms: dizziness, headache, tiredness, confusion, change of mood, irritability

**Non-drug treatment**

- Give sugar-containing soft drink and/or snack (carbohydrate)
- Monitor blood glucose every 15 minutes until blood glucose is 6-8 mmol/L
- Determine underlying cause
- Patient education on diabetes and its complications

**Drug Treatment**

***Mild or moderate hypoglycaemia***

- Immediate oral rapid absorbed carbohydrate; oral glucose/sugar 5-15 gm. Wait for 15 minutes. If no response, repeat glucose.
- If improve, the next meal should be ingested i.e milk, fruit

***Severe hypoglycaemia***

- Outside the hospital: Inj: Glucagon 0.1-0.2 mg/10 kg IM or SC or < 12 yrs – 0.5 mg
- 12 yrs – 1.0 mg
- In hospital: Inj: Dextrose 10% 2-5 ml/kg or Dextrose 50% 0.5 ml/kg (dilute to 10%)
- Monitor blood glucose every 15 minutes until stable, then repeat blood glucose 1-2 hourly. Keep blood glucose between 6 – 8 mmol/L

### 4. Diabetic Nephropathy

Damage to kidney gradually due to vascular changes.

**Diagnostic criteria**

- Check for albumin/creatinine ratio in the first morning urine sample. Upper limit of the normal range is 1.5 mg. If more than that value, refer.

- If ratio is > 3.5 mmol, give Enalapril 0.5 mg/kg/dose po single dose.
- If urine sample shows significant proteinuria, check for the ratio.

**Referral**

- If urine dipstick shows significant proteinuria persistently refer to hospital.

# NUTRITION

## DEFINITION

Nutrition is the study of foods and how our bodies use them. It is concerned with how food is produced/processed, prepared and eaten and with what happens to food in the body - how it is digested, absorbed and used.

## NUTRIENTS

Food is made of nutrients which the body uses:
- to build tissues
- to produce energy
- to keep healthy

**Types of Nutrients**

| NUTRIENTS | | FOOD | FUNCTIONS |
|---|---|---|---|
| 1. Carbohydrates | sugars<br>starches<br>fibre | sugar, sweet fruits, rice, wheat, maize, potato legumes | ⇒ provide energy<br>⇒ provide energy<br>⇒ keep gut healthy<br>⇒ help digestion |
| 2. Fats | | oils, fatty animal foods, milk, fatty vegetable foods | ⇒ provide energy<br>⇒ store energy<br>⇒ build new cells |
| 3. Proteins | | meat, chicken, eggs, fish, beans, groundnuts, milk | ⇒ build new cells<br>⇒ provide energy<br>⇒ protect body from disease make fluids<br>⇒ for chemical processes |
| 4. Micronutrients (needed in very small amounts) | vitamins<br>minerals | vegetables, fruits milk, seafood, vegetables, fruits | ⇒ protect body from disease<br>⇒ for chemical processes<br>⇒ build new cells<br>⇒ make fluids<br>⇒ for chemical processes |
| 5. Water | | | ⇒ build new cells<br>⇒ for chemical processes<br>⇒ make fluids |

**How does the body use nutrients?**
- To produce energy so that the body can keep alive and warm and so that it can move & grow
- To help chemical processes digest food, 'burn' nutrients for energy, use energy to move muscles, build new cells, secrete fluids
- To protect the body from disease

**What are our energy needs?**

The amount of energy that people need to get from their food in order to keep healthy and active varies. It varies with weight, age, sex and physical activity. Energy needs increase during pregnancy, lacta-

tion, infections, recovery from illness, etc. On an average, individual needs somewhere around 2,500 kcal per day (may vary between 1,600-3,500). Carbohydrate should be 60-65%; protein 10-15% and fat should not be more than 30% of total calories.

**Minerals**

| NUTRIENTS | FUNCTIONS | SOURCE |
|---|---|---|
| Iron (absorption depends on other food/drink taken together) | to make Hb for red cells | • liver, kidney, spleen, heart, blood, meat, chicken, fish<br>• dark green leaves |
| Iodine | [essential for thyroid hormone production] →<br>– development & function of brain & nervous system;<br>– the way the body uses energy & keeps warm<br>– growth of children. | • fish & other food from the sea<br>• iodized salt |
| Calcium [bones & teeth are made mainly from calcium & protein] | – replaces dead bone cells<br>– prevents osteoporosis | • milk of all types<br>• small fish containing bones that you eat<br>• beans & peas<br>• dark green leaves. |

**Vitamins**

| NUTRIENTS | FUNCTIONS | SOURCE |
|---|---|---|
| Vitamin A | – prevent infections<br>– keep eye healthy<br>– help children to grow properly<br>– destroys free radicals (highly reactive molecules produced during infections & damage body tissues) | • orange/yellow fruits,<br>• orange/yellow vegetables,<br>• dark/medium-green leaves,<br>• breastmilk, animal milk,<br>• liver |
| Vitamin D (Sun vitamin) | – helps the body to absorb and use calcium & phosphorous to build healthy bones & teeth | • milk, fatty fish, egges, liver<br>• sunshine (10 minutes/day) |
| Vitamin E | | *[deficiency hardly occurs]* |
| Vitamin K | | *[deficiency hardly occurs]* |
| Vitamin C | – helps body to use calcium & other nutrients to build bones and blood vessels<br>– destroys free radicals, so helps to prevent tissue damage during infection | • green leafy vegetables<br>• peppers, tomatoes, pumpkin<br>• fresh fruits, particularly citrus fruits (e.g., orange) |

| | | |
|---|---|---|
| Vitamin B group<br>– B1 or thiamine | – helps body 'burn' nutrients to release energy -prevents beriberi | • meat, poultry, fish<br>• liver, whole grain cereals<br>• legumes, oil seeds<br>• milk, eggs |
| – B2 or riboflavine | – helps body 'burn' nutrients to release energy<br>– prevents cracked lips, sores at the corners of mouth, rough skin | • milk, eggs<br>• liver, meat, fish |
| – Niacin | – helps body 'burn' nutrients to release energy<br>– prevents pellagra | • liver, meat, fish<br>• groundnuts<br>• milk, wholemeal wheat |
| – Folic acid | – helps body to grow -helps make health red cells | • liver, kidney, fish<br>• fresh vegetables (particularly dark green leaves)<br>• beans & groundnuts |
| – B6 or pyridoxine<br>– B12 or cyanocobalmin<br>– Pantothenic acid<br>– Biotin | | *[deficiency hardly occurs]* |

## WATER

Almost every part of the body contains large amounts of water. We can live without food for a few weeks, but we cannot live without water for more than a few days.

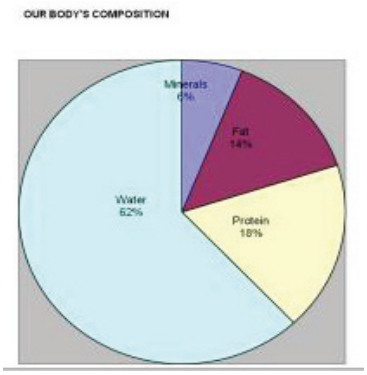
We need water:

- to make body fluids- blood, digestive juices, tears
- for body processes- digestion, which take place in water
- to keep the lining of the mouth, gut, lungs and other parts of the body moist and healthy
- for urine which carries away body waste
- for sweat to cool the body

**How much to drink per day?**

On an average, an adult will require 40 ml/kg/day (or 2 - 3 liter/day) usually suffices but more may be required when insensible loss or urinary losses are great. A child weighing 30kg requires 1,700 ml of fluid per day.

## OUR BODY'S COMPOSITION

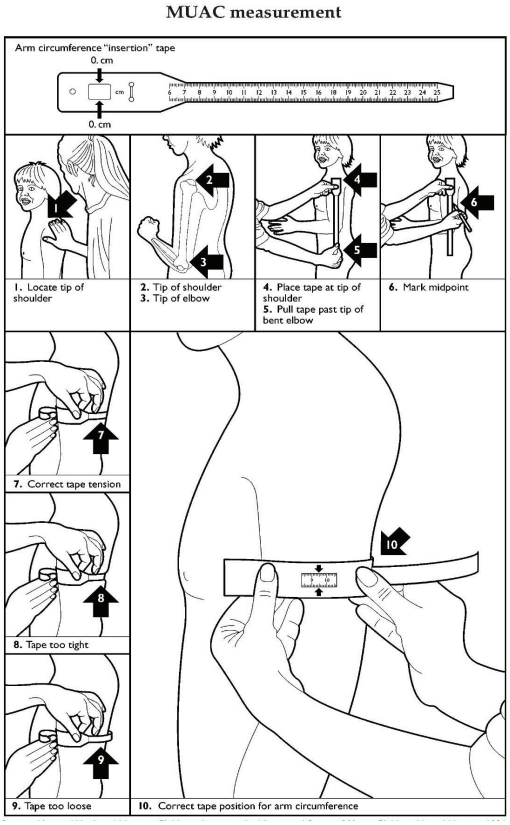



**Assessing Nutritional Status**

**Weight-for-height**

- Body weight and height are the best measures of nutritional status
- They must be measured accurately
- Measure weight & height
- Plot the results in the W/H chart

## MUAC




MUAC is measured by a fiber tape, placed around the middle of the relaxed upper arm. The tape can be colored green, yellow and red to indicate the above 3 lengths. After one year of age, any child whose middle upper arm measures less than 13.5 cm around is malnourished-no matter how 'fat' his feet, hands and face may look. If the arm measures less than 12.5 cm he is severely malnourished.

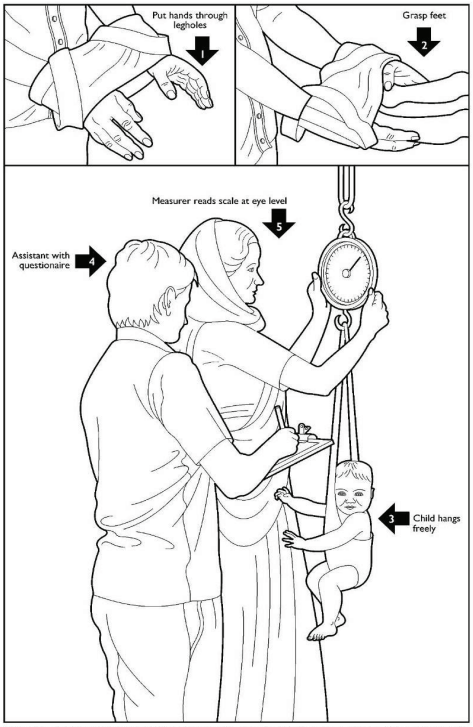
| MUAC | Indicates |
|---|---|
| **Over 13.5cm** | **Most children normal.** |
| **12.5 - 13.5cm** | **Some children have mild malnutrition but no child with severe malnutrition.** |
| **Under 12.5cm** | **Severe malnutrition.** |

All children < 5 years coming to IPD or OPD should have their "Weight for Height" Score checked. Take child's weight with a scale and measure the height. Compare with the previous weight registered on their immunization (road to health) card. Calculate the "Weight for Height" Score (W/H %) using the "Weight for Height" Table. (Refer to BBG)

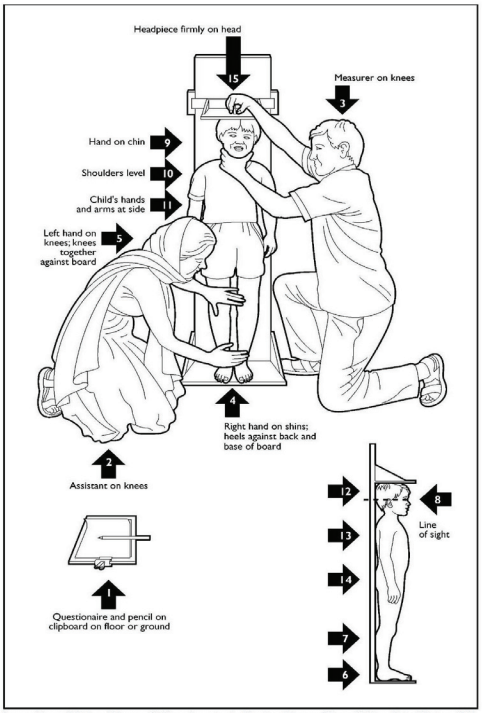
## W/H

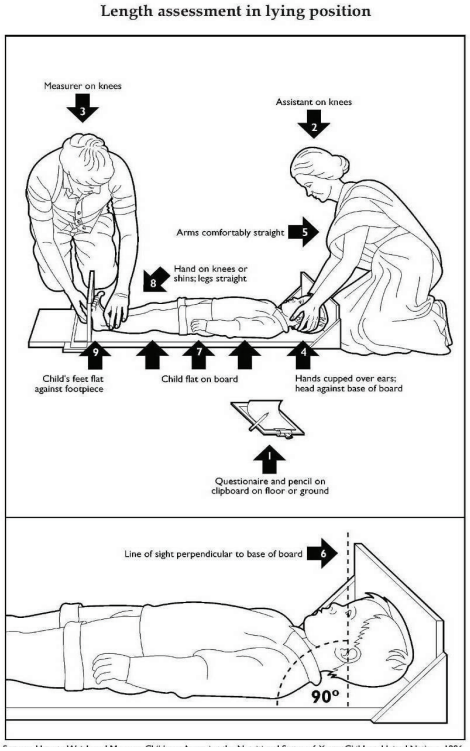
W/H > 85% ⇒ Normal nutrition
W/H - 70-80% ⇒ Moderate malnutrition
W/H < 70% ⇒ Severe malnutrition

**Weight assessment in children**




**Height assessment in standing position**






**Practice weighing, measuring length and plotting**

- It is very important to practice these procedures
- You must be able to plot the weight for height
- You must be able to recognize a problem

## Malnutrition

Malnutrition results from not eating enough food or not enough of the right kinds of food, or from infections that cause a loss of appetite, or changes in how the body uses nutrients. If a child does not eat the right kind of food in the right amounts, growth slows or stops.

Malnourished children are more likely to become ill and to die from illness than other children. Children under the age of 5 can easily become malnourished if not given small, frequent meals with a variety of nutritious foods, especially when they start eating solid foods and stop breastfeeding.

This age-group is most vulnerable to malnutrition and most at risk from illness and death resulting from illness. It is important to find and treat children who are malnourished.
All children < 5 need to have Weight for Height Z Score routinely checked.

- Take the child's weight using a baby scale (Salter Scale) and measure their height
- Compare with the previous weight registered on their immunisation card
- Calculate the Weight for Height Z-score (W/H Z score) using the Weight for Height Z score Table (see annex at end of BBG)

## SEVERE MALNUTRITION

**Marasmus malnutrition**

- 'Skin and bones', looks very thin, little fat or muscle
- Child looks like an old man
- Does not want to eat, apathetic
- W/H is less than - 2 z scores

**Kwashiorkor malnutrition**

- Oedema of the legs, thin upper arms
- Skin is dry and scaly, skin disease
- Child has a round 'moon' face
- Does not want to eat, apathetic
- W/H may be less or more than – 2 z scores (may be more due to oedema)

**Marasmic Kwashiorkor**

- A 'mixed' type, with a mixture of SIGNS AND SYMPTOMS

**Management**

- Moderately malnourished children will be followed in OPD on a Supplementary Feeding Programme (SFP).
- Severely malnourished children will be admitted to IPD on a Therapeutic Feeding Programme (TFP).
- Be sure to follow the treatment protocol exactly.
- The outcome depends mostly on the motivation and effort of the person feeding the child.

**On Admission/When to discharge:**

Record the child's weight, height and the W/H Z score. Mark on the chart the target weight at which you want to discharge the child from the programme:

- **Moderate malnourished children Supplementary Feeding Programme (SFP)**:
  - Discharge when weight is >-1.5 Z scores W/H for 2 weeks in a row
- **Severe malnourished children Therapeutic Feeding Programme (TFP)**:
  - Discharge when weight is >-2 Z scores W/H for 2 weeks in a row – refer to SFP

Be sure to re-measure the child's height every month and recalculate the child's target weight.

**Management on Malnutrition in children**

## MODERATE MALNUTRITION

- (-3 to <-2 z scores w/h)

Refer to the SFP.

- Refer the child to the Supplementary Feeding Program (SFP). The child can be treated at home.
- When you see the child for the first time in OPD, take the following steps:

**Important steps – See BBG**

- Evaluate the Child
- Start systemic treatment and treat any other diseases – look for diarrhoea, anaemia, other chronic infections
- Encourage a normal diet
- Ask the mother to return every week to receive food distribution
- Weigh the child weekly and mark it on the chart
- Explain to the mother
- Ensure follow-up health and nutrition education in the household by home visitors

**Systematic Treatment**

- Deworming
- Vitamin A
- Vitamin B1
- Folic Acid
- Ferrous Sulphate <5 kg
- Zinc supplements and minerals

## SEVERE MALNUTRITION

- (< -3 z score with or without bilateral pitting oedema )

**Medical Emergency admit to IPD**

- Patients need constant monitoring.
- The treatment is divided into two phases -
- Phase 1 is mostly medical treatment
  - The patient is started on special feeding, but is not expected to gain weight.
- Phase 2 is the nutritional part of the treatment of the patient (rehabilitation)

## PHASE 1

In general: It takes a lot of time to feed these children, because they are very weak (lethargic) and have a poor appetite. Be sure to explain this to the family, because they will have to invest a lot of time feeding the child regularly under the supervision of a medic or nurse.

- Prevent hypoglycaemia
- Prevent the child from becoming cold
- Manage dehydration
- Give systematic treatment

- Check Malaria Smear
- Monitor the vital signs and urine output regularly
- Weigh the child daily and record the weight on the chart

**HIGH ENERGY MILK (HEM)**

- Number of meals 8-12 meals per 24 hours
- Time of meals 8 meals = every 3 hours
  12 meals = every 2 hours
- Volume per meal= $\frac{135 \text{ cc x body weight (kg)}}{\text{number of meals per 24 hours}}$

**Systematic Treatment**

- Antibiotics
- Vitamin A
- Vitamin B1
- Folic Acid
- Zinc supplements and minerals
- DO NOT GIVE IRON OR ANTIWORM MEDICATION UNTIL PHASE 2
- Check if vaccinations are up-to-date. If not, vaccinate

## PHASE 2

A child enters this rehabilitation phase when a good appetite returns. A child with a naso-gastric tube cannot enter phase 2. The child must be able to eat.

Start with the same quantity (cc) of HEM as in Phase 1, but use PHASE 2 – HEM (this solution contains more calories than the PHASE 1 HEM). If the child finishes the meal, increase the size of the next meal by 10 ml. Slowly add other food .

The child should still be fed day and night. The child should gain 10-20 g body weight / day. If the child has already improved from phase 1 to phase 2 and then does not gain more weight over a period of 3 days (secondary failure) and feeding is supervised consider infection and chronic illness.

- Check for chronic diseases, such as TB, AIDS, thalassaemia, cardiac disease, hepatitis B
- Check for infections, such as diarrhoea, pneumonia, UTI, parasitic infection
- Continue medicine treatment started in Phase 1, deworm and start iron

When the child reaches -2 Z scores W/H and stays at least -2 Z scores for 2 consecutive weeks, no longer has oedema, and is free from infection: refer to OPD for the Supplementary Feeding Programme (SFP).

**Management Malnutrition in Adults and Adolescents**

Moderately malnourished adolescents and adults are not normally admitted to feeding programs unless they are severely malnourished and in poor clinical condition. Adolescents and adults may present with severe malnutrition, indicated by low weight for height.

## DIAGNOSIS

Adolescents: <70% median weight for height (see appendix) or are in a poor clinical condition (for example):

- Bi-lateral oedema not attributable to other causes
- Clinical marasmus – extreme thinness
- Night blindness

- Extreme pallor (paleness) – severe anaemia
- Vitamin and mineral deficiencies

Adults: BMI is less than 16 (see appendix or calculate):
- weight (kg) / height2 (m))
- The person is thin and has bi-lateral pitting oedema

Pregnant and Lactating Women- MUAC <170 mm

## PHASE 1 FEEDING

The feeding supplements used are the same as that of therapeutic feeding for children in Phase 2, but the amounts are different. Feedings should be frequent (at least 6 meals per day). Vitamins and antibiotics should be given to all malnourished people. For systematic treatment see below and BBG.

### Meals

Number of meals 6 to 8 meals per 24 hours
Time of meals 6 meals = every 4 hours
8 meals = every 3 hours

Volume per meal depends on the age of the patient:

| | | |
|---|---|---|
| 7-10 year | 35 cc x total bodyweight/number of meals | per 24 hours |
| 11-18 year | 65 cc x total bodyweight/number of meals | per 24 hours |
| 18-75 year | 55cc x total bodyweight/number of meals | per 24 hours |
| >75 year | 45 cc x total bodyweight/number of meals | per 24 hours |

### Systematic Treatment

- The same as for severely malnourished children
- Broad-spectrum antibiotics
- Vitamin A as single dose (for children >1 year 200 000 IU)
- Vitamins as for malnourished children
- WHO has no recommendation for de-worming in adolescents or adults

## PHASE 2

Start Phase 2 when appetite returns. Patients may feel very hungry, so offer plenty of local foods in addition to the HEM. Be sure that they eat a variety of foods other than rice (rice fills the stomach quickly, but it is not very nutritious), and small amounts of rice or noodles. For a schedule of meals spread over 24 hours.

### Discharge

Adolescents and adults can be discharged when they are eating well, are gaining weight, are free of infection and when:
- Adolescent: >80% median for 2 weeks and good clinical condition
- Adult: BMI >16 and good clinical condition
- Pregnant and Lactating Women:MUAC >16 and good clinical condition

# Vitamin Deficiencies

## VITAMIN A DEFICIENCY

### Definition

Vitamin A deficiency is major cause of blindness, and is a significant factor in many childhood illnesses, especially diarrhoea and pneumonia. Vitamin A deficiency mostly affects small children but can also affect adults, especially women of reproductive age.

### Signs and Symptoms

The signs and symptoms of vitamin A deficiency are found in the eyes. These include night blindness ('chicken blindness'), Bitot's spots (grey-white spots on conjunctiva), dry cornea and some types of cornea damage.

### Treatment

- Vitamin A capsules come in two sizes 200,000 IU (International Units) and 25,000 IU capsules
- Read the bottle for the strength of the capsules
- Write down carefully on the health record the date and dose of treatment
- See BBG for correct dosages

### Prevention

The cause of vitamin A deficiency is a lack of food containing vitamin A. This is found in leafy green vegetables, eggs, many kinds of meat, mango, papaya, pumpkin and many fruits. The mother's breast milk is a very important source of Vitamin A. Rice, bananas and oranges contain little or no vitamin A. As many people cannot afford meat, eggs and other foods with vitamin A, capsules need to be distributed to children to prevent deficiency. A single dose of 200,000 IU will provide one child with enough vitamin A to last for four to six months.

## VITAMIN B 1

Vitamin B1 deficiency occurs when there is not enough vitamin B1 in the body due to an insufficient diet. This disease is prevalent on the Thailand/ Burma border, especially in pregnant and lactating women and their babies. The disease may present in different ways, known as 'Dry Beriberi,' and 'Wet Beriberi,' or in combination. Most vitamin B1 deficiency seen on the border is mild.

### Vitamin B1 Deficiency in Adults

#### Dry Beriberi

***Mild***

- Numbness
- Burning sensation or tingling in lower legs or hands

***Severe***

- Weakness- the person cannot walk alone or stand up from squatting position
- Reduced tendon reflexes

#### Wet Beriberi

- Oedema (legs, trunk, face), hepatomegaly
- Difficulty breathing
- A rapid pulse that can lead to heart failure

**Treatment**

***For mild deficiency (Mild dry Beriberi)***

- Vitamin B1 PO 100 mg OD x 7 days
- then 10 mg OD x 6 weeks

***For severe deficiency***

(Wet Beriberi and Dry Beriberi with severe signs)

- Admit to IPD
- Vitamin B1 IM 100 mg TID for 1 day, then
- Vitamin B1 PO 100 mg OD x 7 days
- then PO 10 mg OD x 6 weeks

Consider giving B-Complex or multivitamins, as other B vitamins may be deficient in the patient as well. Advise patients not chew betel-nut or lepetho when taking vitamin B supplements. Betel-nut destroys the vitamin B.

Note- take vitamin B1 tablets 1 hour before meals.

**Prevention**

- Patients should be advised to do the following to prevent vitamin B1 deficiency:
  - Eat a variety of foods (for example yellow beans, meat, fruits and vegetables)

# TRAUMATOLOGY

## Aseptic Techniques

### INTRODUCTION

Aseptic technique is a general term involving practices that minimize the introduction of microorganisms to patients during patient care. There are two categories of asepsis; general asepsis which applies to patient care procedures outside the operating theatre and surgical asepsis relating to procedures/processes designed to prevent surgical site infection. This chapter will focus primarily on general aseptic procedures as insertion of intravenous catheters or urinary catheters and examples of "no-touch" technique.

Aseptic techniques are used to reduce the risk of post-procedure infections and to minimize the exposure of health care providers to potentially infectious microorganisms.

Aseptic techniques include practices performed just before, during, or after any invasive procedures. Poor adherence to aseptic techniques results in considerable morbidity and mortality. Even in countries with well-established infection control programs, hospital-acquired infections (HAI) related to poor compliance with aseptic techniques is an important public health problem. For example, in the United States surgical site infections are the third most frequently reported infection accounting for 14% to16% of all hospital-acquired infections. Data on surgical site infections is not available in Egypt; however, other sources of data suggest that there is poor compliance in aseptic techniques during critical procedures. For example, extrinsic contamination of intravenous fluids has been observed in intensive care units, in obstetric wards, and in dialysis centers. These studies suggest that breakdowns in aseptic techniques occur both in the preparation and in the maintenance of IV fluids. Poor adherence to aseptic techniques, such as the reuse of needles and syringes between patients has also been implicated in transmission of blood-borne pathogens (e.g., HIV and HCV).

It is important that all health care facilities establish policies regarding procedures that require aseptic techniques. Health care personnel who perform these procedures should be trained in aseptic technique and should demonstrate competency. It is particularly important for staff to understand why aseptic techniques are needed and for the hospital director to ensure that adequate equipment and supplies are available. Supervision and monitoring of infection control activities is a critical element of infection control.

### DEFINITION

Aseptic technique is a set of specific practices and procedures performed under carefully controlled conditions with the goal of minimizing contamination by pathogens.

## GOALS OF ASEPTIC TECHNIQUES

- Aseptic technique is employed to maximize and maintain asepsis, the absence of pathogenic organisms, in the clinical setting.
- The goals of aseptic technique are to protect the patient from infection and to prevent the spread of pathogens.
- Often, practices that clean (remove dirt and other impurities), sanitize (reduce the number of microorganisms to safe levels), or disinfect (remove most microorganisms but not highly resistant ones) are not sufficient to prevent infection.

## WHERE AND WHY

Aseptic technique can be applied in any clinical setting. Pathogens may introduce infection to the patient through contact with the environment, personnel, or equipment. All patients are potentially vulnerable to infection, although certain situations further increase vulnerability, such as extensive burns or immune disorders that disturb the body's natural defenses.

Typical situations that call for aseptic measures include surgery , wound dressings and the insertion of intravenous lines, urinary catheters, and drains.
General habits that help to preserve a clean medical environment include:

- safe removal of hazardous waste, i.e., prompt disposal of contaminated needles or blood-soaked bandages to containers reserved for such purposes
- prompt removal of wet or soiled dressings
- prevention of accumulation of bodily fluid drainage, i.e., regular checks and emptying of receptacles such as surgical drains or nasogastric suction containers
- avoidance of backward drainage flow toward patient, i.e., keeping drainage tubing below patient level at all times
- immediate clean-up of soiled or moist areas
- labeling of all fluid containers with date, time, and timely disposal per institutional policy
- maintaining seals on all fluids when not in use

## PRINCIPLES OF ASEPSIS

Numerous non-surgical procedures require aseptic techniques in order to prevent transmission of infectious agents.

***Procedures with the highest risk for causing infections include***

- The placement of medications or devices into sterile body spaces such as:
  - The placement of intravenous lines.
  - The placement of indwelling urinary catheters.
- Wound care
- During the preparation and administration of intravenous fluids
- During insertion of intravenous and intramuscular injections of medication, especially from multidose vials.

***Key Processes for performing medical (non-surgical) procedures with aseptic technique include:***

- Hand antisepsis and the appropriate use of gloves.
- Skin antisepsis of the site of insertion of invasive devices, e.g., IVs
- Using and maintaining sterile patient care equipment, e.g., multidose medication vials, IV fluids and devices, by minimizing contact with non-sterile surfaces or reuse of equipment and devices intended for single patient use.
- The introduction of a sterile item into a patient should always be performed with a no-touch-technique. This means that the skin in the area of insertion should not be touched after skin antisepsis. Similarly, IV administration tubing should be kept sterile and tops of vials of medication should be disinfected prior to entry.

Aseptic techniques are practiced for all invasive medical procedures. Types of handwashing and gloves are different according to the procedure. Most disease transmission occurs due to actions of health care personnel (HCP) that ignore basic concepts of aseptic techniques such as the reuse of syringes/needles, the touching of a sterile device onto a non-sterile surface, and the entering of a sterile solution without adequate decontamination of the port of entry.

Hands of health care workers are the most common source of cross-infection. A clear policy on hand hygiene is therefore essential and should be followed by all personnel. Although the use of gloves reduces the transmission of bacteria, hand washing is still essential after the gloves have been taken off in order to remove any contamination that might have occurred via small punctures, and the multiplication of organisms that occurred in the warm, moist environment caused by glove wearing.

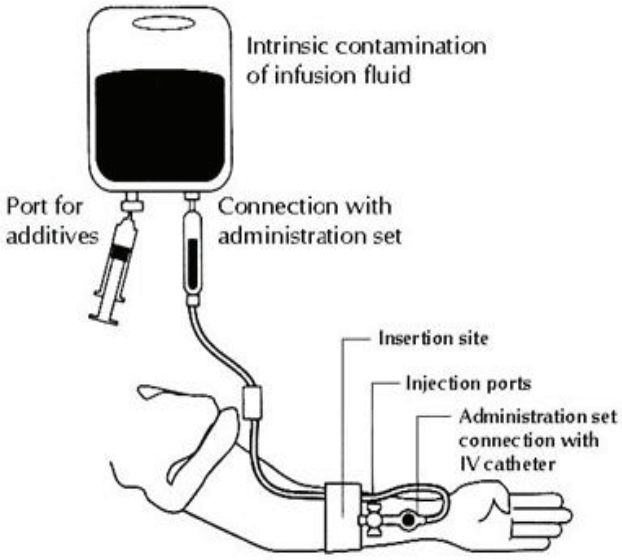
## Intravenous Therapy

At any given time 25% of in-patients may have a peripheral cannula in situ. This is one of the most common invasive procedures performed in the hospital and yet application of aseptic technique during this procedure is often neglected.

### DEFINITION

An intravenous catheter is a catheter with a lumen that is inserted into a vein to provide intravenous therapy. Since this is a foreign body, which produces a reaction in the host, it can cause production of a film of a fibrinous material on the inner and outer surfaces of the catheter. This biofilm may become colonized by microorganisms and will protect them from host defense mechanisms. Microbial contamination may cause local sepsis or septic thrombophlebitis or bacteremia / septicemia. Infection control measures are designed to prevent the microorganisms from entering the equipment, the catheter insertion site, or the bloodstream.

**Intravenous Infusion – Sites of Possible Contamination**



## SOURCES AND ROUTES OF TRANSMISSION

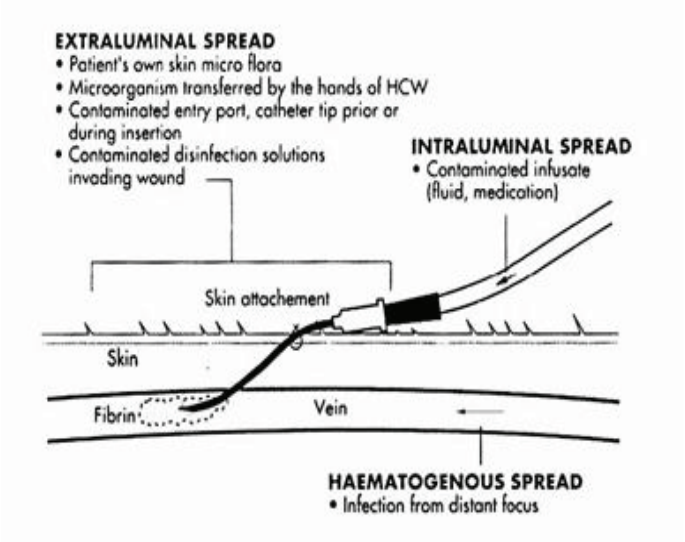
**Sources of infection may be:**

**Intrinsic:**

This is usually due to contamination or faulty sterilization of fluids during manufacture. Examples of organisms growing in the infusate are *Klebsiella*, *Enterobacter* or *Pseudomonas* spp. Infection will arise only rarely from intrinsic contamination; however, if the infusate is contaminated during preparation it can result in widespread infection among recipients of this product.

**Extrinsic:**

This is due to contamination of the IV catheter during the insertion, the administration of the fluid, or from the hands of the HCP inserting or caring for the IV device. However, the most important reservoirs of pathogens causing catheter-related infection are the skin flora at the insertion site and at the hub. Infection is caused mainly by microorganisms residing on the patient's skin, e.g., S*taphylococcus epidermidis*, *Staphylococcus. aureus*, and *diphteroids*. Microorganisms almost universally grow in a biofilm on the catheter surfaces (initially on the external surface but with longer duration, also the inner surface) and may be released into the bloodstream.




## PROCEDURE FOR INSERTING PERIPHERAL IV CANNULAE

1. Ensure that the patient is comfortable and is aware of the procedure – this reduces anxiety.
2. Collect all equipment necessary to set up an IV infusion.
3. Select a cannula that will fit easily into the vein – size 18 or 20 gauge is usually appropriate. The correct sized cannula reduces trauma and congestion of the vein.
4. Place the patient's arm on a clean towel.
5. Avoid shaving the skin insertion site. Instead, clip hair if necessary.
6. Wash hands routinely & wear clean gloves. If the patient is in high risk ward or immunocompromised, use antiseptic hand wash or antiseptic handrub & sterile gloves.
7. Apply a tourniquet to the patient's non-dominant forearm.
8. Apply skin antiseptic to the IV insertion site with 70% isopropyl alcohol for at least 30 seconds and allow drying before inserting the cannula.

9. The IV site should not be touched after disinfection. If the tourniquet has been in place for a sufficient length of time, touching should not be necessary.
10. Insert the cannula into a vein, preferably of an upper limb, using the no touch technique. Do not attempt repeated insertions with the same cannula. If the first insertion is not successful, then the procedure should be repeated with a new cannula.
11. Look out for flash-back and advance the cannula slowly.
12. Release the tourniquet and apply a sterile dressing.
13. Connect up the administration set.
14. Clean site with a 70% isopropyl alcohol swab.
15. Anchor the cannula with clean tape and label the tape with insertion date.
16. Leave the site visible and dry.
17. Discard all sharps carefully in the container provided.
18. Wash and dry hands.

## POSSIBLE SOURCES OF INFECTION FOR AN IV LINE

**1. Factors related to equipment and to fluids:**

- Cannula-material that is itself thrombogenic. For example, polyethylene and polypropylene are more reactive than Teflon, which is in turn more reactive than steel or silicone-coated Teflon.
- Contaminated administration sets.
- Needles puncturing IV fluid bottles used as air inlets or for other reasons.
- Three-way taps and stopcocks.
- Infusion fluids.
- Contaminated or loose dressings, adhesive tapes, or film.
- Contaminated splints used to stabilize joints.
- Large bandages used to cover the insertion site (these can be contaminated by the patient's blood and body fluids).

**2. Factors related to insertion and to duration:**

- Patient's skin flora if skin antisepsis is inadequate.
- Hands of staff, other patients, or visitors.
- Contaminated skin antiseptics.
- Unstable cannulae – movement increases the risk of bacterial contamination.
- Cannulae left in for over 96 hours.
- Insertion of cannula into a previously infected vein. Alternate arms should be used for IV therapy that lasts longer than 96 hours.
- Septicaemia (endogenous infection).

## MAINTENANCE OF IV LINES

- Inspect regularly for swelling or for signs of infection.
- Keep the insertion site clean and dry.
- Assess the need for continuing catheterization every 24 hours.
- Remove the catheter at first sign of infection or at 72-96 hours.
- The change of IV administration set:
  - The closed circuit system should always be maintained and it is not allowed to disconnect the IV set from the cannula unless for changing it.
  - When changing solutions, this may require a change of IV line if solutions are known to have expected interactions. If not, we may use the same IV administration line, if the iv line is removed from the port of the completed solution and reinserted at the new one immediately and the port sterilization and disinfection is guaranteed.
  - If closed circuit system is maintained, iv administration line could be changed after 72 hours or within 24 hours if initiation of an infusion of lipid emulsions and change it immediately if initiation of an infusion of blood,or blood products.
- Avoid cut downs especially in legs.

- Wipe the hub of the cannula with an alcohol-impregnated swab before attaching the administration set. The Luer lock should be kept as clean and dry as possible.
- Thorough hand washing /hand rub by the HCP before the insertion of the catheter and during maintenance procedures.
- Thorough antisepsis of skin at insertion site.
- No touch technique during insertion, maintenance, and removal of catheter.
- Secure the IV line to prevent movement of catheter.
- Maintain the closed system.
- Protect the insertion site with a sterile dressing.
- Inspect the insertion site daily and remove catheter as early as possible and if there are any signs of infection.

Only well trained staff should set up and maintain infusions.

### MANAGEMENT OF THE FEBRILE PATIENT RECEIVING IV THERAPY

Patients with IV devices can become febrile. All such cases require further investigation:

- **Redness and swelling:**

The insertion site should be inspected for redness or swelling – if it appears infected, the tip of the intravenous catheter should be removed and sent (in a sterile container) for semi-quantitative culture.

- **Peripheral IV site:**

Peripheral blood cultures should be taken from a peripheral site, preferably the opposite arm.

- **CVC site:**

Cultures of blood obtained through a CVC are frequently contaminated by microorganisms in the hub. Unless the laboratory has techniques to quantify microbes from these cultures, the information obtained may be misleading and, therefore, this should be avoided.

- **Chemotherapy:**

A patient showing signs of infection during a course of chemotherapy, when the central line cannot be removed, should be given appropriate antibiotics (e.g. a glycopeptide alone or with an aminoglycoside) until the end of therapy. The line should be removed and sent for culture.

- **Hyperalimentation:**

There seems to be no advantage in covering the feeding period with antibiotics and it is best to replace the line as soon as possible, under antibiotic cover (to reduce the risk of septicemia), and then maintain therapy for 5-7 days if clinically indicated.

**Catheter care:**

The after-care of IV catheters is crucial. The site should be inspected daily and dressed aseptically when any moisture around the insertion site is noted.

## Injection Safety and Proper Use of Multidose Vials

WHO estimates that at least 50% of the world's 12 billion injections administered each year are unsafe. Among adverse events associated with injections, infections with the blood-borne pathogens hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) contribute to the heaviest disease burden. WHO estimates that unsafe injections result in 80,000 – 160,000 new HIV infections, 8 – 16 million new HBV infections, and 2.3 – 4.7 million new HCV infections each year and result in 1.3 million deaths. Unsafe injections also transmit parasitic (malaria), bacterial, and other viral infections. Some adverse events associated with injections, such as abscesses, appear relatively quickly, whereas other infections may not be obvious for years or decades, e.g. HIV, and HCV.

In Egypt a high percentage of injections occur outside the formal health care setting. It is estimated that 20-40% of injections are provided by persons who have no formal training in the provision of

medical care. Injection-associated transmission of blood-borne pathogens can be prevented through a strategy to reduce injection overuse and to achieve injection safety.

## INSTRUCTION FOR GIVING A SAFE INJECTION

**Definition**

A safe injection does not harm the recipient, does not expose the provider to any avoidable risks, and does not result in any waste that is dangerous for other people.

The best infection control practice for safe injections is to eliminate unnecessary injections. Besides decreasing the risk of infection transmission, this also saves resources. If an injection is unavoidable, providers should follow the following guidelines:

**1. Use sterile injection equipment.**

Use a sterile syringe and needle for each injection and to reconstitute each unit of medication. Inspect the packaging for breaks in the package. Discard needle and/or syringe if the package has been punctured, torn, damaged by exposure to moisture, or if it has expired.

**2. Prevent contamination of injection equipment.**

Prepare each injection in a clean designated area where blood or body fluid contamination is unlikely. Discard any needle that has been touched or contaminated in a safety box.

**3. Prevent needle stick injuries to the provider.**

Anticipate and take measures to prevent sudden patient movement during injection. Avoid recapping and other hand manipulations of needles. If recapping is necessary, use a single-handed scoop technique. Do not bend, break, or cut needles prior to disposal. Collect used syringes and needles at the point of use in a safety box that is puncture-proof and leak-proof and that can be sealed before becoming completely full.

**4. Prevent access to used needles**

Close and seal safety boxes when they are three quarters full for transport to a secure area for disposal. After closing and sealing safety boxes, do not open, empty, re-use, or sell them. Manage sharps waste in an efficient, safe, and environment-friendly way in order to protect people from voluntary and accidental exposure to used injection equipment.

**5. Other practice issues**

**Provider's hand hygiene and skin integrity** - Perform hand hygiene (i.e., wash or antiseptic hand wash/hand rub) prior to preparing injection material and before giving injections. Avoid giving injections if skin integrity is compromised by local infection or other skin condition (e.g., weeping dermatitis, skin lesions, cuts).

**Swabbing of vial tops or ampoules** - Swabbing of ports of multi-dose vials with disinfectant before re-entering with a new needle is recommended. For swabbing use an appropriate disinfectant (e.g., alcohol 70-90%) and a clean disposable swab and maintain appropriate contact time. Do not use cotton balls that have been stored wet.

**Skin preparation prior to injection** - Wash skin that is visibly dirty. Swab the skin with an appropriate antiseptic (e.g., alcohol 70-90%) prior to giving an injection. Use a clean disposable swab and maintain appropriate contact time. Do not use cotton balls that have been stored wet.

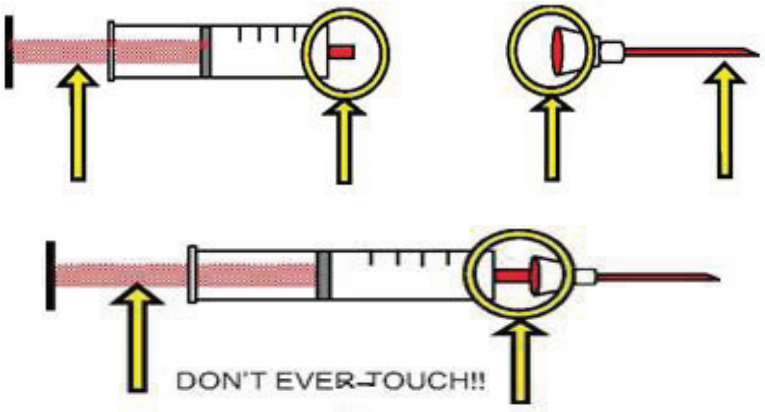
## ASEPTIC INJECTION PRACTICES

Keep the needle and syringe sterile. Because any part of the syringe that you touch becomes contaminated, you should not touch parts that come into contact with the injectable medication. If you touch any of these parts by accident, the syringe and needle are no longer sterile. Discard them immediately and replace them with a sterile syringe and needle.

**Areas of a sterile syringe and needle that should not be touched**

Don't touch the needle with your fingers. Health workers sometimes place their fingers on the needle to help guide it in when pushing through the skin. Touching the needle with your fingers contaminates the needle.

**Don't touch the injection site with your fingers**




After an injection health workers sometimes apply pressure to the injection site with their fingers or with a piece of cotton wool to reduce bleeding. It is a better practice to ask the patient or the adult accompanying small children to hold the cotton on the injection site. If the nurse contaminates his or her fingers with blood, he or she can transmit pathogens from a patient's injection site to another patient.

***Tips for injection safety***

- Changing the needle but reusing the syringe.
- Loading the syringe with multiple doses and injecting multiple doses.

***Practices that can harm receipients and should be avoided.***

- Applying pressure to the bleeding sites using a finger.
- Leaving the needle in the vial to withdraw additional doses.
- Touching the needle.
- Reusing a syringe or needle.

***Practices that can harm the health care worker and should be avoided.***

- Recapping, bending, breaking, and cutting needles.
- Placing needles on a surface or carrying them any distance prior to disposal.

***Practices that can harm the community and should be avoided.***

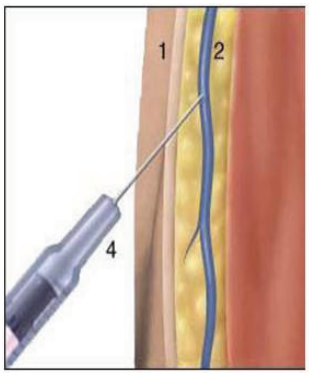
- Leaving used syringes in areas with public access.
- Giving or selling used syringes to vendors who resell them.
- Providing used syringes to patients for personal reuse.

## PROCEDURE FOR INJECTION ADMINISTRATION

1. Gather all items needed for the injection, e.g: -Sterile needle and syringe
   - Medication
   - 70-90% alcohol
   - Cotton pads -Gloves, if necessary
   - Band aid, if necessary
   - Tourniquet, if necessary
2. Prepare patient (position)
3. Wash hands (routine hand-wash), and
4. Put on gloves when indicated

**Ten steps to administer an intravenous injection (IV) or taking blood sample**

1. Apply tourniquet.
2. Search for an appropriate vein.
3. Wash your hands and wear gloves.
4. Apply skin antiseptic (e.g., alcohol) to insertion site.
5. Insert the IV injection using a new sterile syringe.
6. Remove tourniquet
7. Inject medication slowly under strict aseptic conditions (observe patient's reaction carefully).
8. Remove needle while pressing cotton pad onto the injection site.
9. Discard needle/syringe immediately in a puncture resistant safety box - do not recap needle.
10. Cover the site with an adhesive bandage if necessary.




**Seven steps to administer an intramuscular injection (IM)**

1. Define injection area.
2. Wash hands if possible.
3. Apply antiseptic to injection site.
4. Inject medication under strict aseptic conditions using a new sterile syringe.
5. Remove needle while pressing cotton pad onto injection site.
6. Discard needle/syringe immediately in a puncture resistant safety box - do not recap needle.
7. Cover the site with an adhesive bandage if necessary.

Observe the patient when beginning an IV infusion.
If fever or shivering develops during infusion of an IV fluid, stop using the IV fluid even if the fluid is clear and change to a new sterile fluid since pyrogens or bacteria which are not visible could be responsible.

## PROPER USE OF MULTI-DOSE VIALS

Multi dose-vials of medication or of other fluids can become vehicles for transmitting infections between patients.

**Before filling a syringe from a multi-dose vial:**

- Inspect for and discard medications with visible contamination or breaches of integrity (e.g., cracks, leaks).
- Check the safety of the product (e.g. not expired, read the label of vial, no particulate matter in the vial, and not turbid).
- Wipe the top of the vial with a fresh cotton swab soaked with 70-90% alcohol and allow it to dry.

To reduce the risk of transmitting infections between patients:

- Use single dose-vials rather than multi-dose vials.

- If multi-dose vials must be used, always pierce the stopper with a sterile needle and syringe every time fluid is withdrawn from a multi-dose vial. Reusing the same syringe to give injections to multiple patients – even if the needle is changed – is not a safe practice, because infections contaminate the multi-dose vial and can be transmitted from patient to patient.
- Avoid leaving a needle in place in the stopper of the vial. This provides a direct route for microorganisms to enter the vial and to contaminate the fluid between each use.
- If multi-dose vials are used that need to be reconstituted, the needle and syringe that was used to reconstitute must be discarded, and for each draw from the vial a new sterile needle and syringe must be used.
- Follow product-specific recommendations for reconstitution, storage, handling, and discarding unused doses.
- Discard needles that have touched an unsterile surface.

## Insertion of a Nasogastric Tube

### INDICATIONS:

Use of a nasogastric (NG) tube is indicated to:

1. Decompress the stomach by aspiration of gastric contents (fluid, air, blood).
2. Introduce fluids (lavage fluid, tube feedings, activated charcoal into the stomach.
3. Assist in the clinical diagnosis through analysis of substances found in gastric contents.

### CONTRAINDICATIONS:

Nasogastric tubes are contraindicated or used with extreme caution in people with particular predispositions to injury from tube placement. These may include:

- Patients with sustained head trauma, maxillofacial injury, or anterior fossa skull fracture. Inserting a NG tube blindly through the nose has potential of passing through the criboform plate, thus causing intracranial penetration of the brain.
- Patients with a history of esophageal stricture, esophageal varices, alkali ingestion at risk for esophageal penetration.
- Comatose patients have the potential of vomiting during a NG insertion procedure, thus require protection of the airway prior to placing a NG tube.

Caution should be utilized when passing a NG tube in a patient with suspected cervical spine injury.

- Excessive manipulation or movement by the patient during placement including coughing or gagging may potentiate cervical injury.
- Manual stabilization of the head is required during the procedure.

It is important for the clinician to be aware that several other complications can occur as a result of NG tube placement. These include:

1. Nasal irritation, sinusitis, epistaxis, rhinorrhea, skin erosion or esophagotracheal fistula secondary to NG placement.
2. Aspiration pneumonia secondary to vomiting and aspiration.
3. Hypoxia, cyanosis, or respiratory arrest due to accidental tracheal intubation.

### EQUIPMENT REQUIRED:

- Non-allergenic tape
- Protective pad or towel
- Rubber Band
- Gloves
- Curved Basin
- Safety pin
- Cup of water with straw
- Stethoscope
- 60 cc Irrigating syringe
- Water soluble lubricant
- NG tube (plastic or rubber) of appropriate size
- Suction

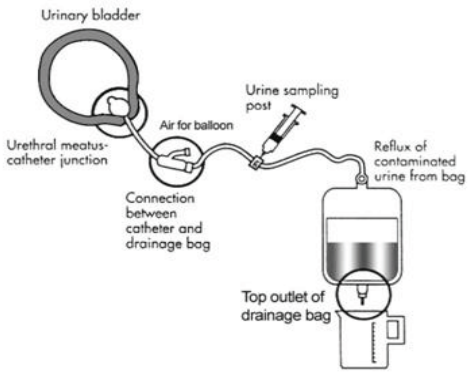
**PROCEDURE:**

1. If possible, explain the procedure to the patient.
2. Position the patient as follows: If the patient is awake and alert-in a sitting position in high-Fowlers'. If the patient is obtunded or unconscious-head down, preferably in a left side lying position.
3. Place a protective pad/towel on the patients chest as well as provide the patient with a basin to minimize contact with aspirated gastric contents.
4. Using the NG tube as a measuring device determine the length of the NG tube to be passed by measuring the length from a. nose to earlobe b. earlobe to xiphoid process
5. Add the measurements together and mark this total distance with a small piece of tape.
6. Inspect both of the patients nostrils for patency. Have the patient blow nose if able.
7. Lubricate the first 6 inches of the NG tube liberally with a water soluble lubricant. Choose the largest patent nostril and begin to pass the NG tube through the nostril to the nasopharynx; direct the tube through the nostril aiming down and back.
8. Once in the pharynx instruct the patient to swallow either mimicking the action or by sipping on small amounts of water. If awake and alert have the patient place chin to chest to facilitate easier passage of the tube. Introduce the tube until the selected mark (indicated by the tape) is reached.
9. Verify NG tube placement in the stomach by two of the following:
   - Chest X-ray
   - Aspirating gastric contents with the irrigation syringe.
   - While listening over the epigastrum with a stethoscope quickly instill a 30cc air bolus with the irrigation syringe. Air entering the stomach will produce a whooshing sound.
   - Ask the patient to hum or talk. Coughing, cyanosis or choking may indicate that the NG tube has passed through the larynx.
   - Place the open end of the NG tube in a cup of water. Persistent bubbling may indicate that the NG tube has passed through the larynx.
10. If unable to positively confirm that the NG tube has been placed is in the stomach the tube must be removed immediately and re-attempted.
11. Once confirmed for placement, secure the NG tube by placing one end of tape on from the bridge to the tip of the nose and the other end wrapped around the tube itself. If possible the nose should be clean and prepped prior to securing with tincture of benzoin.
12. Clamp or connect the NG tube as desired If a Salem sump tube is utilized it is important to remember that the blue pigtail must be kept at the level of the fluid in the patient's stomach. This will prevent gastric contents from leaking back through vent lumen.
13. To deter the NG tube from dangling and possible dislodgment:
   - Curve and tape the tube to the patient's cheek to prevent unnecessary tugging on the nostrils. Attach the tube to the patient's gown. (Do not tape to the patient's forehead as this will put pressure on the nares.
   - Wrap a small piece of tape around the tube near the connection creating a tab.
   - Loop a rubber band in a slip knot near the connection and pin to the patient's gown.

## Urinary Catheterization

Urinary catheterization is an aseptic procedure but is also the most common cause of hospital-acquired infections, which can occur during insertion or removal of the catheter. Repeated catheterization causes trauma and results in infection. Patients should be catheterized only if clinically indicated and certainly should not be catheterized only for the convenience of the nursing staff.

About 10% of hospitalized patients have an indwelling catheter. 20-25% of these patients develop urinary tract infections (UTI). It is estimated that hospital acquired UTI accounts for 40% of nosocomial infections. Most of these are associated with instrumentation, particularly indwelling catheterization.




The incidence of infection is directly related to the duration of catheterization; 50% of patients are infected by day 15 of catheterization and almost 100% by 1 month. This means that the first line of prevention is to avoid catheterization as much as possible and to remove the catheter as soon as possible (preferably within 5 days).

## PROCEDURE FOR INSERTION OF A URINARY CATHETER:

1. Inform the patient and explain the indication and the procedure of catheterization.
2. Lay all necessary equipment on a trolley.
3. Select a catheter that fits the urethra without traumatizing the patient
4. Wash hands thoroughly with an antiseptic hand wash preparation.
5. Put on sterile gloves and use a "no touch" technique.
6. If the patient is male, draw back the foreskin and clean the glans thoroughly with soap and water to remove secretions, followed by swabbing the area with antiseptic. If the patient is a woman, clean the periurethral area by separating the labia and cleanse the vulva, using front to back technique.
7. Insert 2-3 ml of the lubricant (e.g.anesthetic jelly into the urethra). Multiple-use tubes are not recommended because they become contaminated and increase cross-infection.
8. Insert the catheter gently – advance it by holding the inner sterile sleeve. A "no touch technique" should be used in which the operator has no contact with the sterile shaft of the catheter.
9. Collect the urine in a suitable container.
10. Inflate the balloon by instilling the manufacturer's recommended amount of sterile water.
11. Anchor the catheter to the patient's thigh.
12. Connect the catheter to the closed drainage bag and hang it below the level of the bed to stop reflux.
13. Wash and dry hands.

Note: It is important to use the correct urinary catheter for the condition. Foley catheters require no more than 5-10 ml water, while hemostasis catheters require 30 ml. The balloon can cause obstruction and stasis of the urine if it is too large, thus increasing the risk of infection.

## EMPTYING THE DRAINAGE BAG

This should be done wearing non-sterile gloves and via the drainage tap at the bottom of the bag. When the bag is empty, the tap should be closed securely and wiped with a tissue. If the bag does not have a tap, then replace it when full. Do not disconnect the bag to empty and then reconnect it.

Wash and dry hands thoroughly after touching the drainage bag. With proper handling, drainage bags with taps can be left in situ for long periods and are more cost-effective in the long run.

A separate urine bag-collecting receptacle must be used for each patient and each bag should be emptied separately as required. For purposes of measuring urinary output, an integral measuring device is necessary. The urine receptacle should be heat disinfected if possible and should be stored dry after each use. If heat labile, chemical disinfection could be used. Single-use disposable receptacles may be used. After emptying the receptacle, the gloves should be discarded and hands washed and dried thoroughly.

## COLLECTING URINE SAMPLES

Do not disconnect the drainage bag to obtain a urine sample as this causes an interruption in the closed drainage system and may pose a risk of infection to the patient. If a sample of urine is required for bacteriological examination, it should be obtained from a sampling port or sleeve. This must first be disinfected by wiping with a 70% isopropyl alcohol impregnated swab. The sample may then be aspirated using a sterile needle and syringe and transferred into a sterile container. Do not obtain a sample for bacteriological culture from the drainage bag. If there is no port or sleeve for collecting urine samples, antiseptic hand wash and wearing sterile gloves should be attempted, wipe the connection between the urinary bag and the catheter with alcohol, disconnect the drainage bag, collect a urine sample in a sterile container, wipe the port of the urinary bag and reconnect.

## IRRIGATE BLADDER

Routine irrigation of the bladder (bladder washout) with chlorhexidine or other antiseptics is not effective in prevention of infection and should not be performed. Irrigations rarely eradicate organisms but may introduce infection and can cause inflammation of the bladder wall, and, therefore, can increase the likelihood of systemic invasion. They may also cause damage to the catheter.

If the catheter becomes obstructed and can be kept open only by frequent irrigation, the catheter should be changed, as it is likely that the catheter itself is contributing to obstruction.

## PROPHYLAXIS AND TREATMENT WITH ANTIBIOTICS

Routine use of prophylactic antibiotic administration in catheterized patients is not recommended because of its tendency to encourage the emergence of resistant organisms. Treat patients with antibiotics only if there is evidence of clinical infection.

Patients with infected urine at the time of catheterization or of operation should be treated with appropriate antibiotics according to the antibiotic sensitivity of the organism. If antibiotic sensitivity testing is not available, empiric antibiotic treatment can be given according to the local antibiotic policy or to the advice of a medical microbiologist.

## OTHER PRECAUTIONS

- The spout from the tap should be completely emptied to prevent a build-up of organisms in stagnant urine.
- The bag should not be allowed to stand on the floor or to rise above waist level.

- Catheters should not be changed routinely as this exposes the patient to increased risk of bladder and urethral trauma. They can be changed if associated with urinary tract infection and antibiotic treatment started.If the catheter will not pass any part of the urethra with gentle pressure or if a trace of blood is seen on the catheter tip on withdrawal, do not preserve or push harder, as serious damage may ensue. In this case, seek help from a more experienced colleague.

### MINIMAL REQUIREMENTS

- Hand hygiene and cleaning of periurethral area before insertion of a sterile catheter.
- Maintenance of a closed drainage system.
- Hand hygiene before and after emptying bags.

# WOUND INSPECTION AND WOUND CARE

### SURGICAL WOUNDS

These should be sterile at operation and, in most cases, after operation. Infection can be introduced during the operation or post-operatively via hands and contaminated dressings. It is best not to interfere with surgical wounds unless indicated, e.g. if there are signs of infection and a change of dressing is required.

### TRAUMATIC WOUNDS

These are potentially contaminated with environmental and fecal bacteria and may become colonized with hospital pathogens, which may then be transferred to other patients via the hands of the staff.

### PROCEDURE FOR WOUND CARE

Wounds must not be touched with dirty hands and wound care should be an aseptic procedure:

1. Lay up a trolley with a sterile wound dressing pack.
2. Remove old dressing and inspect the wound.
3. Wash hands aseptically, dry hands and wear sterile gloves.
4. Clean the wound thoroughly using forceps and cotton wool or gauze soaked in a cleaning solution. Do not use hands.
5. Exude any fluids from an infected wound by pressing with two sterile gauze pieces held with two forceps.
6. Take specimens of pus or exudates for bacteriological examination.
7. Apply necessary medication.
8. Wipe the wound site as dry as possible.
9. Cover the wound if indicated.
10. Discard all dirty dressings in a clinical waste bag.
11. Wash and dry hands.

## World Wide Wounds

### INTRODUCTION

The term debridement comes from the French desbrider, meaning to unbridle. It was probably first used as a medical term by surgeons working several hundred years ago in war zones, who recognised that grossly contaminated soft tissue wounds had a better chance of healing (and the soldier surviving) if the affected tissue was surgically removed to reveal a healthy bleeding wound surface.

A modern definition for such sharp methods of debridement is the removal of dead or necrotic tissue or foreign material from and around a wound to expose healthy tissue using a sterile scalpel, scissors or both. It can be performed as a surgical procedure in the operating theatre, involving extensive and aggressive removal of tissue with or without general anaesthesia (surgical debridement), or be more conservative, involving repeated minor tissue sparing debridement that can be performed at the bedside or in a procedure room (sharp debridement).

Although surgical debridement is rapid and can involve the removal of large volumes of tissue at one time, sharp debridement should be considered as the gold standard as it can reduce the risk of wound complications and aid the healing process.

## WHY DEBRIDE?

An ulcer or open wound cannot be properly assessed until all the devitalised tissue is removed. Dead or foreign material in a wound also adds to the risk of infection and sepsis and inhibits wound healing. A number of mechanisms are involved:

Dead tissue acts as a medium for bacterial growth, particularly anaerobes such as Bacteroides species and gas gangrene caused by *Clostridium perfringens* in military surgical practice.

Excessive inflammatory response, which results from the presence of necrotic or foreign material, adds to the systemic release of cytokines such as tumour necrosis factor and interleukins which promote a septic response. Necrotic tissues retard wound contraction, the principle contribution to wound closure when wounds are left to heal by secondary intention.

It can sometimes be difficult to determine whether the tissue covering a wound is physiological, such as a scab, or a pathological eschar, which is having a negative impact on healing. Attempts to aid clinical recognition have included the injection of supravital dyes, tissue oximetry, Doppler techniques, and even biopsy. Gangrenous, necrotic, ischaemic and devitalised tissue all need to be removed by debridement.

## DEFINITION

It is the removal of dead or dying tissue, foreign bodies (metal or bone fragments), and other contaminants (pieces of wood, clothing, skin, hair or equipment) from the wound.
Incomplete debridement of damaged tissues increases the risk of infection and complications including gangrene and death. Incomplete debridement can slow the healing process.

## METHODS OF WOUND DEBRIDEMENT

**Surgical and sharp** - using scalpel and scissors. Highly selective with rapid results. Should only be undertaken by a skilled practitioner.

**Mechanical** - such as hydrotherapy and wound irrigation. Rehydration can ease removal of the surface eschar and removes surface debris. However, these are relatively slow techniques and there is little evidence to support their use. Potential for cross infection needs to be considered if using hydrotherapy. There is also a theoretical risk of fluid embolism and promotion of infection if irrigation is too vigorous.

**Autolytic** - using hydrocolloids and hydrogels. Rehydration of necrotic tissue through the use of a hydrogel or by keeping the wound moist, and removal of devitalised tissue using the body's own enzymes. This method is in common use but prolongs the time needed for debridement.

**Enzymatic**- using preparations such as streptokinase or streptodornase or bacterial-derived collagenases. Streptokinase and streptodornase aim to break down and rehydrate necrotic tissue, but despite being available for more than 30 years, there is little evidence to support their use over alternative methods. Also, the need to score the eschar before application may increase the risk of damage. Bacterial-derived collagenases show great potential and may promote healing.

**Biological** - such as maggot therapy. The larvae of Lucilia sericata (greenbottle fly) digest necrotic tissue and pathogens. This technique is rapid and selective, although much of the evidence to support its use is derived from anecdotal reports.

**Chemical** - such as hypochlorite. No longer widely used as application can be painful and underlying tissue is damaged.

The choice of debridement method will depend upon many factors, including the size, position, and type of wound, efficiency and selectivity of debridement method, pain management, exudate levels, risk of infection, and the cost of the procedure. In some cases, it may be appropriate to use more than one method of debridement.

**Four factors are important for a successful debridement:**

1. Good Anaesthesia
2. An Adequate Incision
3. Good Assistance
4. Good Lighting

Before debriding a wound ask:

- Are you capable of doing this?
- Should this be done in hospital ?
- Where on the body?
- Can you give the patient adequate analgesia?
- Do not attempt this if it is a major procedure requiring hospital or a surgeon.

## PREPARATION

The possible benefits of other methods of debridement should be considered alongside sharp or surgical debridement. Sharp techniques can often benefit from being implemented after preparation with non-sharp methods for the removal of devitalised tissue. For example enzymatic preparations such as collagenase can help free adherent necrotic tissue from a granulating wound bed and hydrocolloids soften dried eschar and can aid surgical removal, reducing the need for anaesthesia.

## PAIN CONTROL

Careful explanation of a debridement procedure together with an agreed place and time can reduce apprehension and promote confidence in the patient and the practitioner. If anaesthesia is required it is important that this is given appropriately. For local anaesthesia, a topical anaesthetic cream such as EMLA or injection of a local anaesthetic using ring block or regional techniques can be used. General anaesthesia is preferable for extensive debridement, particularly if another procedure is being considered such as closure with a skin flap. It is important that the general fitness of the patient is considered and some patients may elect to have general anaesthesia. Wide debridement may not require general anaesthesia and spinal or epidural anaesthesia can be considered.

No anaesthesia may be required if dead tissue is non-adherent, but excision of too much tissue or the opening of a joint may carry complications. The removal of a dead tendon usually requires anaesthesia. Patients with diabetes may have associated neuropathy which permits surprisingly extensive debride-

ment without causing pain. Paradoxically, however, there may be a heightened sensitivity to stimuli so pain relief should always be considered.

## PROCEDURE

Sharp/surgical debridement should involve a team approach. Before undertaking the procedure it is important to consider the following:

**1. Assessment**

- the nature of the necrotic tissue and the best method of debridement
- the risk of spreading infection and the possible use of antibiotics
- the possibility of underlying disease processes
- the extent of existing ischemia
- the location of the wound in relation to the surrounding anatomy.

**2. Consent and extent of procedure**

When taking consent it is important that the patient understands what is to be achieved. To try and undertake too much at once can diminish confidence between patient and professional.

**3. Possible complications**

The patient should be assessed for the risk of possible complications. Sharp debridement is a surgical procedure and will involve some bleeding, although local pressure with a finger is usually enough to stop this. The application of successive layers of gauze can hide considerable haemorrhage and is ineffective. Tourniquets are dangerous and should be avoided.

**4. Location**

Sharp debridement should take place in a controlled environment with adequate lighting and equipment. Help should be at hand in case of complications.

Once the extent of debridement has been decided and agreed with the patient, this should not be exceeded. The procedure should also be stopped when:

- The anatomy of the wound and surrounding area is unclear or a structure cannot be identified
- Bleeding is excessive or the source is unclear.

## INCISIONS

Normally, skin incisions for debridement in the arms and legs are made longitudinally (parallel to the long bones). Starting at the wound, use a scalpel to incise the skin , extending it far enough to obtain good exposure of the injured tissues. Then make another skin incision, in the opposite direction, again obtaining good exposure. Try not to incise any deeper than the skin to avoid injuring healthy tissue underneath the incision. Skin is normally very well vascularized and little, if any skin will need to be removed. Shreds of skin can be excised, as well as any crushed, obviously necrotic skin.

Devitalized muscle is characterized by:

- Poor color (dark like liver, rather than beefy red)
- Poor consistency (mushy, like jelly, rather than firm normal muscle has an inherent tone.)
- Poor contractility (when you pinch it with forceps, nothing happens -normal muscle contracts when you pinch it)
- Poor circulation (it doesn't bleed when cut)
- These are sometimes described as the "Four C's".
  - Colour
  - Consistency
  - Contractility
  - Circulation

The goal is to remove all dead muscle without taking out very much healthy muscle. After completing the superficial soft tissue debridement, then move to the deeper structures and continue.

### WOUND DRESSING AFTER DEBRIDEMENT

If at all possible, try not to disrupt nerves or large blood vessels. The goal is to not just to avoid infection in the traumatized limb, but to also end up with a functional limb. After all devitalized tissue is removed, the wound is loosely packed with gauze, and covered with a loose gauze dressing. The wound is almost never closed immediately, but left for re-exploration several days later. Closure may be done then, or even later via secondary closure, granulation or skin grafting. A wound that requires debridement is not likely to be a good candidate for primary closure.

### SHARP/SURGICAL DEBRIDEMENT IN PEOPLE WITH DIABETES MELLITUS

This is a complex undertaking and should involve a team approach including the diabetologist, vascular and general surgeon, specialist nurse, podiatrist, dietician and others. Diabetes is associated with small and large vessel disease, an increased risk of infection and poor healing. In foot ulcers there may be an underlying neuropathy (Charcot's joints). Patients need careful assessment with control of their diabetes and infection. Repeated appropriate debridement can avoid the need for proximal amputation with the attendant huge drain on resources for rehabilitation.

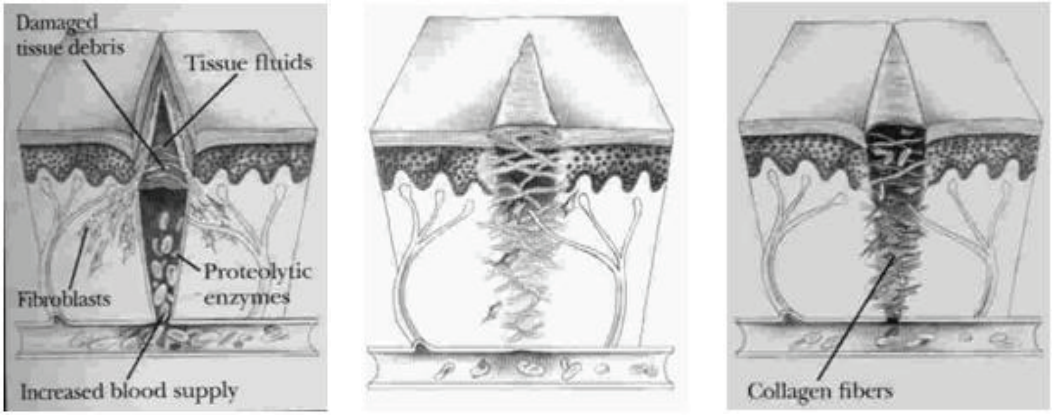
## Wound Healing

**1. Skin Structure**

The skin is the largest organ of the human body. It is composed of three layers, epidermis, dermis, and fat. The epidermis is the most superficial layer, made up of protective tissues. The dermis is the layer immediately under the epidermis. It is about 2-3 mm thick, and is composed of blood vessels, nerve, hair follicles, sweat glands. Fatty layer is made up of fat tissue and has an important function of heat insulation and shock absorption. Wound healing can be achieved either naturally or by suturing.

**2. Wound healing naturally**

There are 3 phases of the body in response to injury. They are:
**Phase 1**. Outpouring of tissue fluids and cells and increased blood supply to the wound. White blood cells (WBC) and other cells produce enzymes, which dissolve and remove damaged and death tissue.
**Phase 2**. Formation of fibers, which is the chief constituent of scar tissue.
**Phase 3**. Laying down of sufficient fibers across the wound so that it can withstand normal stress or beginning of scar formation.



### 3. Indications and contraindications for suturing

It is better to suture a wound for proper healing and for prevention of infection as soon as possible except in the following situations:

- Infected wound
- Wound left opened for more than 24 hours on the face and more than 12 hours in the rest of the body
- War injuries including gunshot wounds, puncture wounds, and land mine injuries
- Any kind of bite wound
- Open fracture and wound involving the joint
- Highly contaminated wound especially with human or animal excreta.

### 4. Factors affecting wound healing

- The site of the wound: some area such as shin takes longer to heal than other places.
- The blood supply: the face and scalp heals faster and better than the extremities.
- Movement in the scar tissue: a wound over joint takes longer to heal.
- The wound configuration: tidy wound heals faster and better.
- The cause of the wound: incised wound heals better than the crushed wound.
- Delay in management: this is the most important cause of wound infection causing delayed wound healing.
- General health status: malnutrition, vitamin deficiency, extreme age, diabetes, and patients taking steroid medications heals inadequately.

### 5. Indication for prophylactic antibiotics

- With adequate wound preparation and proper suturing technique, prophylactic antibiotics are rarely needed in most wounds.
- Wounds requiring prophylactic antibiotics include open fracture, tendon laceration, open joint, human or animal bites, and highly contaminated wounds (eg; through and through lip lacerations, wound contaminated with excreta).

### 6. Tetanus prophylaxis

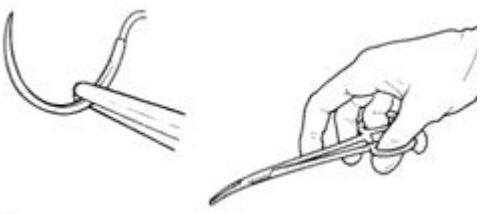
- If patient has had Tetanus vaccine in the last 10 years and the wound is relatively clean, there is no need for another injection.
- If patient has never had Tetanus vaccine or if the last injection is more than 5 years ago and the wound is highly contaminated, then patient should receive a Tetanus vaccine.

### 7. Basic points in surgical techniques in suturing

- Find the best possible operating condition and light source.
- Use adequate anesthesia.
- Wound cleaning is the MOST important part of wound care.
- Examine the wound carefully, remove all foreign materials, debris, and dead tissue as much as possible.
- Consider the best method of wound closure, either by suturing or by leaving it opened.
- Approximate the tissue without too much tension (approximation, not strangulation!).
- Don't hesitate to get help if there is any problems.

### 8. Materials needed for suturing

- Local anesthetics; 1% lidocaine for local infiltration, 2% lidocaine for regional block, syringe and needle for injection.
- Sterile gloves.
- Clean, boiled water and large syringe for wound irrigation.
- Needle holder.
- Scalpel or blade.
- Forceps.
- Scissors.
- Suture materials.
- Gauze.



**9. Wound preparation and debridement**

- Visualize the wound under good light.
- Use local anesthetics for proper anesthesia.
- Remove all foreign materials inside and around the wound as much as possible.
- Also remove the hair and devitalized tissue from the wound.
- Irrigate the wound with sterile water thoroughly.
- Debridement of contused and necrotic tissue should be done sparingly to avoid too much tension during closure.
- Use a pair of surgical scissors, instead of a scaple, to debride the wound.

**10. Recommendation of suture materials for different wound**

| Site or type of tissue | Type of suture | Suture number |
|---|---|---|
| Skin of the face | Nylon or silk | 5/0 or 6/0 |
| Skin of the scalp | Nylon or silk | 3/0 or 4/0 |
| Skin of the limbs or trunk | Nylon or silk | 3/0 or 4/0 |
| Subcutaneous tissue | Plain or chromic catgut | 3/0 or 4/0 |
| Aponneurosis | Chromic catgut | 3/0 or 4/0 |
| Muscle | Chromic or slowly resorbable (vicryl) | 2/0 or 3/0 |

## BASIC SUTURE TECHNIQUE

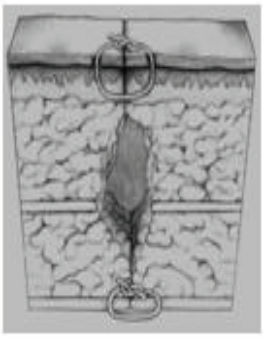
**1. Approximation, not strangulation**

Always do separate knots with absorbable suture under the skin and non-absorbable suture on the skin. Tie the knots firmly, but not too tightly.

- **1.1 How to hold the needle and surgical instrument:** The needle is held near the middle, not close to the ends. The instrument is held with the thumb and ring finger. Use your index and middle fingers for your hand control.
- **1.2 Where to place initial suture:** Try to align skin creases or any irregularities in the wound edge. Try to place the wound edges together by applying traction in the longitudinal axis of the wound. Put the first suture in a place where the greatest tension is, either at the end or middle of the wound. Distance of the needle from the wound edge.
- 1.3. Take a bite that is big enough to go through entire depth of the skin. The bites should be deeper than wider.

Correct method

Incorrect ways of suturing

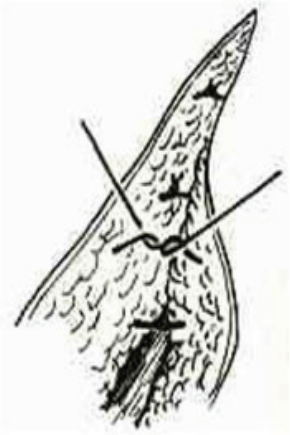


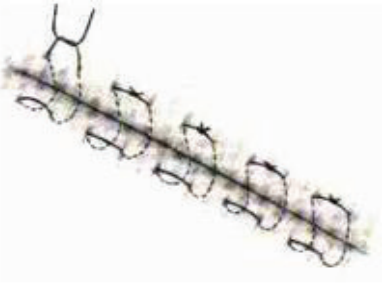
**2. Percutaneous (skin) closure**

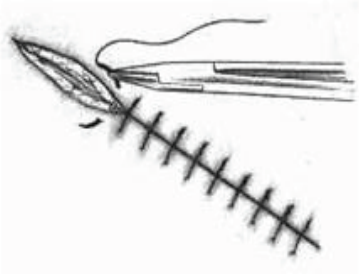
- **2.1. Simple interrupted sutures** - They are most commonly used. Works well for wounds that are not under so much tension.
- **2.2. Vertical or horizontal mattress sutures** - They are the strongest stitches. Very useful to close wounds that are under lots of tension (eg; thigh), and that tend to invert (eg; anterior part of the elbow, the web space).

- **2.3. Continuous suture** - They are utilized to save time. It must be removed as entire suture. If improperly placed, they tend to invert or misapproximate the wound. They MUST NOT be used on the face or on the tissue with questionable viability.
- **2.4. Layered closure** - It is used in wounds that is under much tension or that go deeper than skin. The wound should be visualized carefully to make sure that the muscle or the muscle fascia is not severed.

If the muscle is involved, the muscle or the fascia should be repaired first. If the wound is still under a lot of tension, some sutures should be placed in subcutaneous layers.
If a cosmetic result is required (eg; wounds of the face), subcutaneous stitches should be used before the skin stitches.





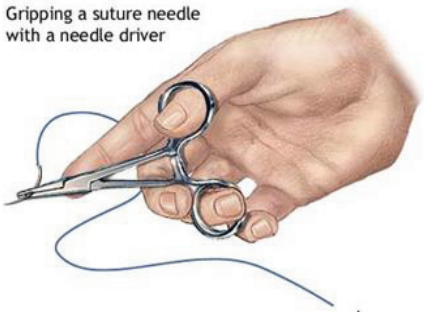


**3. To tie a knot with needle-holder**

Catching the loose end with the needle-holder.

- Slip the knot up towards the nail using the hand that holds the free end, holding the other length of suture with the needle-holder.
- The first knot should be flat.
- Tighten without causing ischemia (pallor)
- Loose end pulled through
- Second knot in opposite direction.

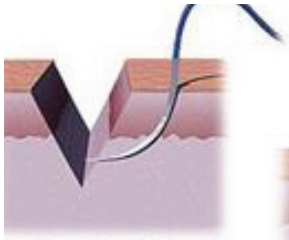
## BASIC SUTURE TECHNIQUE

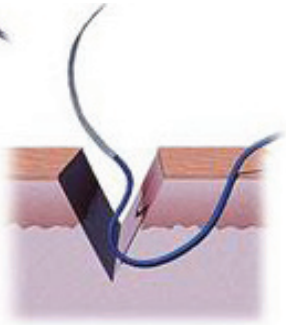




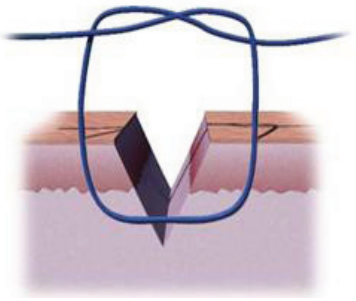
Needle pushed into the base of the opposite side of the wound

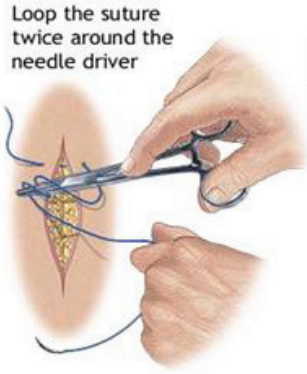

Needle rotated out through second side of the wound


eedle pushed through
in and out into the
ase of the wound

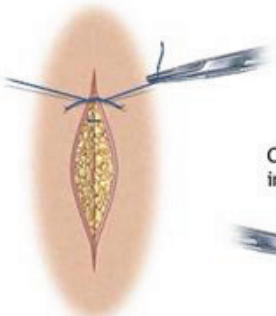

Suture pulled through first side of wound

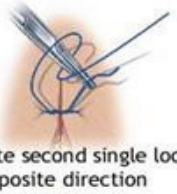
The U shape of proper suture placement

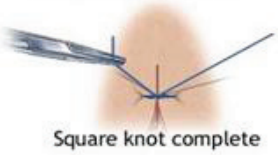



Loop the suture twice around the needle driver


Grab the short end of the suture with the needle driver


Laying down first loop of a knot


Create second single loop in opposite direction


Square knot complete

## DIFFERENT TYPES OF WOUNDS

**Bleeding**

- Don't panic!!
- Apply direct pressure on the bloody wound and get help.
- Ask the assistant to press on the wound edge to stop the bleeding.
- A short application of tourniquet is useful in this situation (no more than 10-15 minutes).
- Once the leaky blood vessel is identified, ligate it with an absorbable suture.
- Slowly release the tourniquet.
- Always remove blood clot from the wound before placing a dressing.
- Blood is an excellent medium for bacteria growth.
- If you cannot identify one bleeding , a hemostatic suture will control the oozing of blood.

**Dirty Wound**

Remove any foreign materials and dirt from the wound as much as possible. They are a source of infection.

**Wound under tension**

If there has been a tissue loss, it may not be possible to close the wound without much tension. Pulling the sutures too tight to place skin edges together will only tear the skin edges resulting in skin ischemia and wound breakdown. Undermining can mobilize the skin to allow closure. Place blunt scissors in the subcutaneous tissue under the skin and loosen up the pressure.

**Untidy or stellate shaped wound**

Traumatic wounds especially those resulted from a blunt trauma have all shapes and sizes with some missing tissue. Skin flaps can undergo ischemia easily. Always close the biggest or main wound first, then close any side extensions. Do not try to do perfect closure. Loose closure will help with drainage and prevent too much tension.

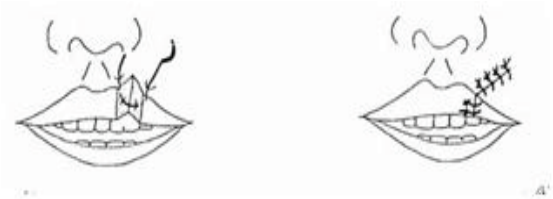
## Specific Type of Wounds

**1. Wound of the ear**

There is a high risk for such wounds to become infected. The infection destroys the cartilage and gives necrosis. In order to prevent the infection you must do a correct debridement of the wound and clean it very well before suture. You must give antibiotics: PenV or PPF, sometimes Cloxacilline should be used. Exposed cartilage: resect the bare cartilage and cover with sutured skin. Systemic antibiotics should be given.

Exposed cartilage : resect the bare cartilage and cover with sutured skin. Systemic antibiotics

**2. Wound of the lips**



As each time you have to suture a wound present on the skin and some mucosa (lips, nostril, episiotomy...) you have to start at a point on the muco-cutaneous junction. Use the smallest suture you have when surgery is required for a face injury (Ethicon, 4/0).

**3. Wound of the cheek**

Take care: If the injury is located in the back part of the cheek: The salivary duct from the parotid gland maybe damaged. Also need to be careful about the facial nerve that supply the sensory and motor function of the face. If the wound is completely through the check, you have to stitch on various levels (mucosa, muscles, skin).

**4. Wound of the fingers → Recall of anatomy**

It may require block anesthesia. Take care that muscular tendons are not damaged. If wound of the anterior of the finger your patient may have difficulties to bend his phalanges.
Muscles and tendon of finger → If wound of the back part of the finger your patient may have difficulties to extend his phalanges.
Injury of a finger → If the tendons are damaged, refer your patient to a surgeon. For the nails try always to insert its base under the skin. You can use a hot paper clip to evacuate a sublingual hematoma.

Wound of the tip of the finger: Excise a minimal amount of exposed bone. Do not graft, encourage healing with regular dressings. Suturing risks tissue ischemia.

Debridement of the finger tip: The ungual phalanx is bare. It must be covered by suturing the lateral edges and preserving the nail.
Evacuation of a subungual hematoma: make a hole in the nail with a white hot paper clip, then evacuate the hematoma.

Damage to the nail: keep the nail by fixing it with two sutures at the edge of the finger, and cover the nail with a rolled dressing before loosely tying the sutures.

**5. Wound of the eyes**

**5.1 Red eye**

***a. Clinical Aspects of a "red eye":***

The eye becomes red and painful: Usually only one eye has this problem SUDDENLY (dust, pieces of bamboo....). The patient feels pain as if he has sand in his eyes. He fears the light. If the problem is not recent, your patient may have an infection → CONJUNCTIVITIS or PINK EYE. Usually both eyes are infected with or without lymph nodes in front of the ears. The conjunctivae are red with dilated blood vessels. The patient may have difficulties to open his eyes because of pus secretion.

***b. The main causes of red eyes are:***

Acute glaucoma -Iritis -Conjunctivitis -Subconjunctival hemorrhage.

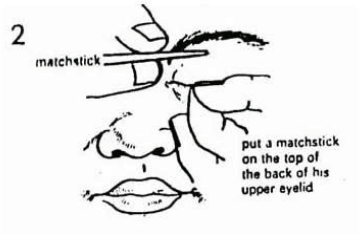
***c. What should you do?***

Most of the time you will refer the patient to hospital.
Where do you look for the foreign body? Under the eyelids (the upper and the lower one), In the cornea.

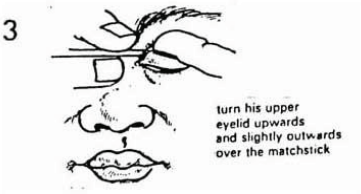
### 5.2 Foreign bodies in the eye

1. Pull his upper eyelid gently down away from his eye.

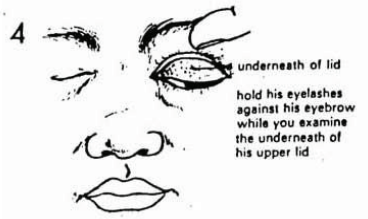

2. Put a matchstick on the top of the back of the upper eyelid.




3. Turn upper eyelid upwards and slightly outwards over the matchstick.




4. Underneath of lid hold his eyelashes against his eyebrow while you examine the underneath of his upper lid.




If any foreign body is seen, you have to remove it with a cotton bud if it's a superficial foreign body. If it is penetrating FB refer the patient to hospital immediately. Take care: do not mistake scleral perforating vessels with subconjuctival pigment for foreign bodies. After removal, clean with NSS then put Terramycine ointment and cover the eye with eye pad. Give Terramycine for 5 to 8 days.

# FRACTURES

## DEFINITION

A fracture is a crack or break in a bone, usually accompanied by injury to the surrounding tissues. Fractures cause pain and swelling. Complications may involve damage to nerves, blood vessels, muscles, and internal organs and can be serious. Most fractures are diagnosed by x-rays, although some require repeat x-rays in 7 to 10 days or computed tomography (CT) or magnetic resonance imaging (MRI).

Treatments range from mild restrictions on activity to casts or surgery. Rehabilitation is often helpful to build up strength and range of motion of the affected body part. Fractures vary greatly in size, severity, and the treatment needed. They can range from a small, easily missed crack in a foot bone to a massive, life-threatening break of the pelvis. Serious injuries, including injuries to the skin, nerves, blood vessels, muscles, and organs, may occur at the same time as the fracture. These injuries can complicate treatment of the fracture, cause temporary or permanent problems, or both.

## CAUSES

Trauma is the most common cause of fractures. Low-energy trauma, such as a fall on level ground, usually causes minor fractures. High-energy trauma, such as high-speed motor vehicle collisions and falls from buildings, can cause severe fractures that involve several bones. Certain underlying disorders can weaken parts of the skeleton so that breaks are more likely to occur. Such disorders include certain infections, benign bone tumors, cancer, and osteoporosis.

## TYPES OF FRACTURES

1. Simple: Bone breaks into two pieces
2. Stress: Hairline break that is often invisible on the x-ray for the first six weeks after the onset of pain
3. Comminuted: Bone fragments into several pieces
4. Impacted: One fragment of bone is embedded into another fragment of bone
5. Compound: Bone protrudes through the skin. Also called an open fracture
6. Complete: Bone snaps completely into two or more pieces
7. Incomplete: Bone cracks but doesn't separate

## SYMPTOMS

Pain is the most obvious symptom. Fractures hurt, especially when force is applied, such as when a person tries to put weight on an injured limb. The area around the broken bone is also tender to touch.
Swelling of soft tissue around the fracture begins within a few hours. The limb may not function properly, so that an arm or a leg, hand, finger, or toe may move in only a limited range or in an abnormal direction. Moving is very painful.
For a person who cannot speak (for example, a very young child, a person with a head injury, or an older person with dementia), refusal to move an extremity may be the only sign of a fracture. However, some fractures do not keep people from moving an injured extremity. Just because an extremity can move does not mean there is no fracture.

## EXAMINATION

- Look- compare one side with the other.
- Look for signs of deformity.
- Look for skin damage.
- Tenderness- where do they have the most pain.

- Palpate – you may feel a sharp edge of a fracture.

## COMPLICATIONS

- Internal bleeding may occur with a closed fracture (one in which the skin is not torn). The bleeding may occur from the bone itself or from surrounding soft tissues. In pelvic fractures this can be a lot. Injury to an artery, vein, or nerve may occur.
- An open fracture (in which the skin is torn) can lead to a bone infection (osteomyelitis), which may be very difficult to cure.
- Fractures of long bones may release enough fat (and other substances in bone marrow) to travel through the veins, lodge in the lungs, and block a blood vessel there.
- Respiratory complications can result.
- Fractures that extend into joints usually damage cartilage (a smooth, tough, protective tissue that reduces friction as joints move). Damaged cartilage tends to scar, causing osteoarthritis and impairing motion in the joints.
- Most fractures heal with few problems. However, some do not heal despite appropriate diagnosis and treatment. This failure to heal is called nonunion. Fractures may also heal very slowly (called delayed union) or incompletely (called malunion).

## DIAGNOSIS

X-rays are the most important tool for diagnosing a fracture. X-rays are taken from several different angles to show how the fragments of bone are aligned. However, some small, non-displaced fractures (called occult or hairline fractures) can be difficult or impossible to see on routine X-rays. Sometimes, additional X-rays taken at special angles reveal the fracture. Occasionally, such small fractures become visible on X-rays only days or weeks later, when the fracture begins to heal, revealing callus (new bone) formation. This course is particularly common with rib fractures.

## TREATMENT

Fractures require immediate attention because they cause pain and loss of function. After initial emergency care, fractures usually require further treatment, such as immobilization with casts or fixation with surgery.

**If open fracture**

- Clean the wound with diluted povidone.
- Put a sterile gauze with sterile Vaseline and povidone on the wound.
- Immobilize your patient.
- Start antibiotic treatment: PENI V or PPF 100,000 u/kg/day.
- Give PENTAZOCINE and refer your patient.
- Treat the shock first before referring your patient.
- Immobilize and refer.

**Cast immobilization**

A plaster or fiberglass cast is the most common type of fracture treatment, because most broken bones can heal successfully once they have been repositioned and a cast has been applied to keep the broken ends in proper position while they heal.

**Functional cast or brace**

The cast or brace allows limited or "controlled" movement of nearby joints. This treatment is desirable for some but not all fractures.

**Traction**

Traction is usually used to align a bone or bones by a gentle, steady pulling action. The pulling force may be transmitted to the bone through skin tapes or a metal pin through a bone. Traction may be used as a preliminary treatment, before other forms of treatment.

**Open reduction and internal fixation**

The bone fragments are first repositioned (reduced) into their normal alignment, and then held together with special screws or by attaching metal plates to the outer surface of the bone. These methods of treatment can reposition the fracture fragments very exactly. Treatment can be the most likely to restore the broken bone to normal function.

**External fixation**

In this type of treatment, pins or screws are placed into the broken bone above and below the fracture site. Then, there will be repositions of bone fragments. The pins or screws are connected to a metal bar or bars outside the skin. This device is a stabilizing frame that holds the bones in the proper position so they can heal. After an appropriate period of time, the external fixation device is removed.

## INITIAL TREATMENT

Immobilize and support the injured limb with a makeshift splint, sling, or a pillow. Elevate the limb to the level of the heart to limit swelling. Apply ice to control pain and swelling. Open fractures need to be treated immediately with surgery to carefully clean and close the wound. Massive open fractures with great losses of the skin, muscle, and blood supply to the bone are the most serious and difficult to treat.

## SPLINT

A splint is a long, narrow slab of plaster, fiberglass, or aluminum applied with elastic wrap or tape. The slab does not completely encircle the limb, which allows for some expansion due to tissue swelling. For this reason, splints are often used for initial treatment of fractures. For finger fractures, aluminum splints lined with foam are commonly used.

**Rules of splinting**

- Splint only if you can do it without causing more pain and discomfort to the victim.
- Splint an injury in the position you find it.
- Apply the splint so that it mobilizes the fractured bone and the joints above and below the fracture.
- Check circulation before and after splinting.
- Always splint in the functional position.
- Always check the neuro-vascular status of the distal extremity after splinting.

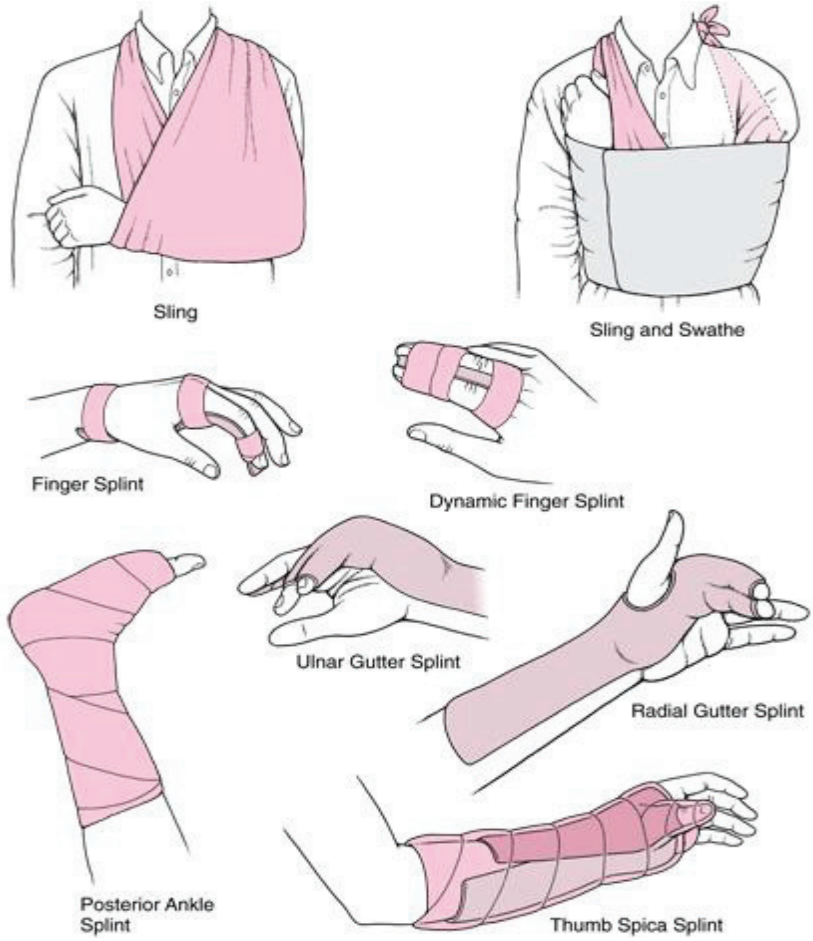
## SLING

A sling by itself provides sufficient support for many shoulder and elbow fractures. The weight of the arm pulling downward helps to keep many shoulder fractures well aligned. Cloth or a strap passing around behind the back can be added to keep the arm from swinging outward, especially at night. Slings permit some use of the hand.

## CAST

A cast is made by wrapping rolls of plaster or fiberglass strips that harden once wetted. Plaster is often chosen for the initial cast when a displaced fracture is being treated. It molds well and has less of a tendency to cause painful contact points between the body and cast. Otherwise, fiberglass has the advantage of being stronger, lighter, and more durable.

In either case, the cast is applied over a layer of soft cottony material to protect the skin from pressure and rubbing. If the cast becomes wet, it is often impossible to completely dry the lining. As a result, the skin can soften and break down (macerate).




# JOINT DISLOCATION

## DEFINITION

A dislocation occurs when bones in a joint become displaced or misaligned. It is often caused by a sudden impact to the joint. The ligaments always become damaged as a result of a dislocation. A subluxation is a partial dislocation.

## COMMON SITES

Although it is possible for any joint to become subluxed or dislocated, the most common sites it is seen in the human body are:

- Shoulders (see Dislocated shoulder)
- Fingers
- Knees
- Wrists(most likely be accompanied by a fracture)
- Elbows (most likely be accompanied by a fracture)

A dislocated joint usually can only be successfully 'reduced' into its normal position by a trained medical professional. Trying to reduce a joint without any training could result in making the injury substantially worse. X-rays are usually taken to confirm a diagnosis and detect any fractures which may also have occurred at the time of dislocation. A dislocation is easily seen on an X-ray.

**Reduce the joint as soon as possible.**

Once a diagnosis is confirmed, the joint is usually manipulated back into position. This can be a very painful process, therefore this is typically done under sedation or under a general anesthetic. It is important the joint is reduced as soon as possible, as in the state of dislocation, the blood supply to the joint (or distal anatomy) may be compromised. This is especially true in the case of a dislocated ankle, due to the anatomy of the blood supply to the foot.

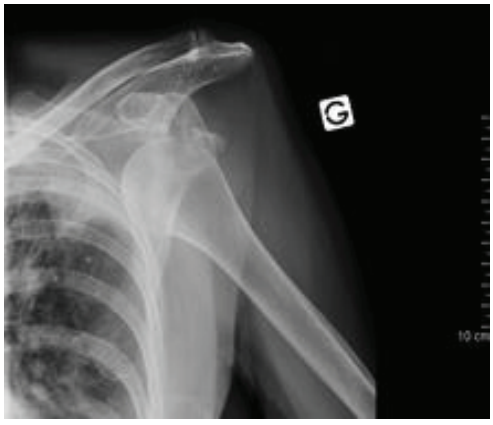
## TREATMENT

After a dislocation, injured joints are usually held in place by a splint (for straight joints like fingers and toes) or a bandage (for complex joints like shoulders). Additionally, the joint muscles, tendons and ligaments must also be strengthened. This is usually done through a course of physiotherapy, which will also help reduce the chances of repeated dislocations of the same joint.

## SHOULDER DISLOCATION

### Dislocated Shoulder

A dislocated shoulder occurs when the humerus separates from the scapula at the glenohumeral joint. The shoulder joint has the greatest range of motion of any joint in the body and as a result is particularly susceptible to dislocation and subluxation. Partial dislocation of the shoulder is referred to as subluxation.

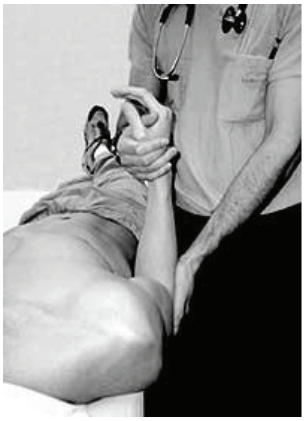


## SIGNS

- Significant pain, which can sometimes be felt past the shoulder, along the arm. Inability to move the arm from its current position, particularly in positions with the arm reaching away from the body and with the top of the arm twisted toward the back.
- Numbness of the arm
- Visibly displaced shoulder
- Some dislocations result in the shoulder appearing unusually square.

## RELOCATING AN ANTERIOR SHOULDER DISLOCATION

- Shoulder muscle relaxation: coach patient to achieve this voluntarily.
- If successful, proceed in sitting position; if not, position patient supine and use intravenous or intramuscular drugs to achieve relaxation.
- Stabilize the elbow against the trunk with one hand.
- With the elbow flexed at 90o, gradually allow the forearm to move laterally to the extent that muscle relaxation allows.
- Never use force.
- A small degree of abduction of the humerus in the latter phase of this maneuver might be helpful.
- The shoulder will likely reduce before the forearm reaches the coronal plane.



# TYPES OF FRACTURES

## TYPES - DESCRIPTION

**Open**

The skin and soft tissue covering the bone are torn, and the bone may be seen coming out of the skin. Dirt, debris, or bacteria can easily contaminate the wound.

**Closed**

The skin is not torn.

**Avulsion**

Small fragments of bone detach from where tendons or ligaments attach to bones. These fractures usually occur in the hand, foot, ankle, knee, or shoulder.

**Osteoporotic**

Osteoporosis weakens certain areas of the skeleton, making them more likely to break. These fractures occur in older people, usually in the hips, wrists, spine, shoulders, or pelvis.

**Compression**

The bone collapses into itself. These fractures occur in older people, very commonly in the spine.

**Joint (intraarticular)**

The fracture disrupts the part of a bone that makes up one of the joint surfaces, where two different bones contact each other. Joint fractures may lead to a loss of motion and gradually developing osteoarthritis.

**Pathologic**

An underlying disorder (such as infection, a noncancerous bone tumor, or cancer) weakens a bone, leading to a fracture.

**Stress**

A bone becomes stressed repeatedly over time because of certain activities, such as walking with a heavy pack or running. Stress fractures commonly occur in bones of the foot and lower leg.

**Occult**

These fractures are difficult or impossible for a doctor to see on an initial x-ray. They may appear as dark or white lines days to weeks after injury, often only after new bone (callus) is formed during healing.

**Greenstick**

A partial crack and a bend occur in the bone, but the bone is not completely broken through. Greenstick fractures occur only in children.

**Growth plate**

The part of the bone that allows bones to lengthen (growth plate) is broken. The bone may then stop growing or grow crookedly. Growth plate fractures occur only in children.

**Simple transverse**

The break divides a bone cleanly across.

**Displaced**

The broken ends of the bones are separated.

**Angulated**

The broken ends of the bones are bent at an angle.

**Nondisplaced**

The normal shape and alignment of a bone are maintained despite cracks completely through the bone.

**Spiral (torsion)**

The bone is twisted apart, leaving sharp, triangular bone ends.

**Comminuted**

The bone is broken into many pieces, often because of high-energy trauma or weakening by osteoporosis.

## Specific Types of Fractures

### FRACTURE OF THE SKULL

1. Clinical signs:
   - Headache;
   - Deformity, look for open fracture or not;
   - Hemorrhage of the ear (otorhagia);
   - Hemorrhage of the nose (epistaxis);
   - Initial loss of consciousness or not;
   - At the moment of examination: consciousness normal or not;

2. Complications:
   - Brain damage;
   - Hemorrhage: Bleeding inside the skull;
   - Hematoma;
   - Secondary neurological disorders: coma and/or fits may occur within 2 to 3 days.

3. Treatment:

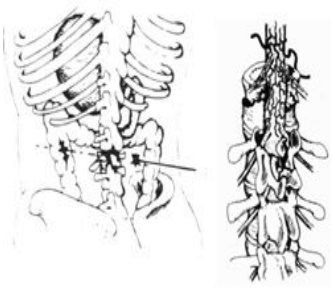
If initial loss of consciousness but normal clinical examination, keep the patient in IPD for 1 or 2 days. Give analgesics (avoid ASA and PENTAZOCINE) and check that his condition is not getting worst: consciousness, vomiting.

If no initial loss of consciousness and normal clinical examination: the patient can go back home with analgesics (avoid ASA) but warn the patient/the family to come back if vomiting occurs or if the patient starts to have abnormal behavior.

If the patient is in coma: do the first care (IV drip, naso-gastric tube, and urinary catheter) and refer him to hospital. For the transportation: put something on each side of the head to keep it from moving.

## FRACTURE OF THE SPINE

It is the most dangerous fracture because the patient may have damage of the spinal cord if the vertebrae are displaced.

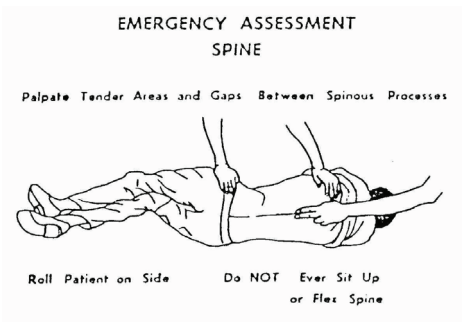


**Complications:**

If the spinal cord is damaged at the level of the neck with spinal cord lesion, your patient may have paralysis of the respiratory muscles, he cannot breathe, he will die. Also he may have paralysis of the four limbs. If the spinal cord is damaged at the upper part of the back, the patient may have paralysis of the four limbs. If the spinal cord is damaged at the level of lumbar area, the patient may have difficulty to pass urine and paralysis of the legs.

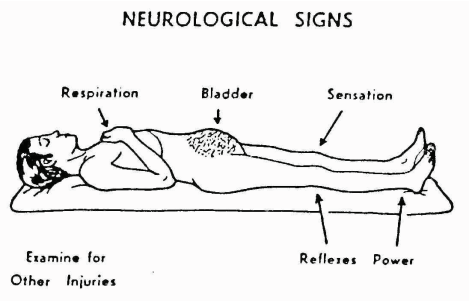
**Emergency assessment of spine:**

Palpate tender areas and gaps between spinous processes. Roll patient on side; do NOT Ever Sit Up or Flex Spine →.




**Clinical signs:**

Back pain: don't move your patient, look for neurological disorders, and ask the patient to move the toes. See if he feels well, if he has normal and symmetric reflexes, if he has no problem with urination (retention or loss of urine), if he has no difficulty to breathe. At that time only, you can roll carefully your patient on one side and palpate any tender area and the gaps between the spines of the vertebrae.




**Treatment:**

You must prevent spinal cord injury so take care when you move your patient (remember how to move him with head traction, to respect the axis head/neck/back). Immobilize him with something on each side of the head to keep him from moving. Give him analgesics. Refer the patient to hospital.

## FRACTURE OF RIB

**Signs:**

Chest pain increasing when you press on the injured areas or when the patient breathes deeply or coughs or laughs.

**Complications:**

Lung damage: the patient may have:
- Superficial dyspnea
- Respiratory distress
- Hemoptysis (spit with blood)
- Respiratory superinfection: the patient cannot cough because of pain, so the secretions remain in the lungs and may cause infection.

**Treatment:**

- Analgesics, rest;
- Plaster on the chest;
- Antibiotics in case of respiratory infection;
- Refer your patient if lung damage.

## FRACTURE OF CLAVICLE

**Clinical signs:**

- Pain;
- Deformity of the clavicle: when you press on it the clavicle is moving;
- The patient has pain on moving his arm.

**Complications:**

- Usually none.

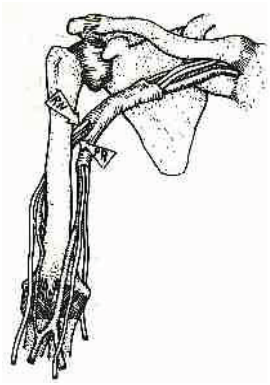
**Treatment:**

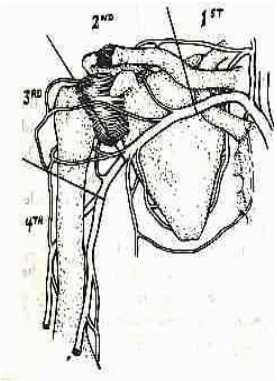
- Analgesics: (avoid ASA) indomethacin for 1 week;
- Immobilization after reduction with a figure of 8 bandage;
- It is not necessary to refer this patient but he must be immobilized for 3 to 4 weeks.

## FRACTURE OF UPPER ARM (HUMERUS)

**Clinical signs :**

- Pain;
- Swelling;
- Hematoma (bleeding and clotting inside form a hard swelling);
- The patient can not move his arm;
- Immobilization to avoid displacement of the fracture inducing complications.



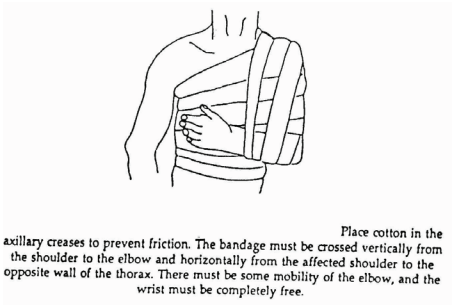


**Complications:**

- Nerve damage with paralysis;
- Blood vessels: Check pulse and look for cyanosis. This is due to the combined artery and nerves bundle situated closely to the shaft of Humerus and a branch of Axillary wind around the neck of Humerus.

**Treatment:**

- Analgesics.
- Immobilization from the shoulder to the elbow.
- Place cotton in the axially creases to prevent friction. The bandage must be crossed vertically from the shoulder to the elbow and horizontally from the affected shoulder to the opposite wall of the thorax. There must be some mobility of the elbow and the wrist must be completely free.
- Refer to hospital.

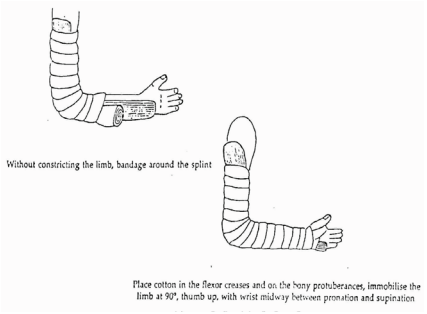


Place cotton in the axillary creases to prevent friction. The bandage must be crossed vertically from the shoulder to the elbow and horizontally from the affected shoulder to the opposite wall of the thorax. There must be some mobility of the elbow, and the wrist must be completely free.

## FRACTURE OF FORE ARM (RADIUS AND ULNAR)

**Clinical signs:**

- Pain
- Swelling
- Deformity: the patient cannot move his arm.



Without constricting the limb, bandage around the splint

Place cotton in the flexor creases and on the bony protuberances, immobilise the limb at 90°, thumb up, with wrist midway between pronation and supination

**Complications:**

– Usually none.

**Treatment:**

– Analgesics
– Immobilization from the elbow to the wrist
– Without constricting the limp, bandage around the splint (above, left). Place cotton in the flexor creases and on the bony protuberances, immobilize the limb at 90º, thumb up, with wrist midway between pronation and supination (below, right).
– Refer to hospital.

## FRACTURE OF FINGER

**Clinical signs:**

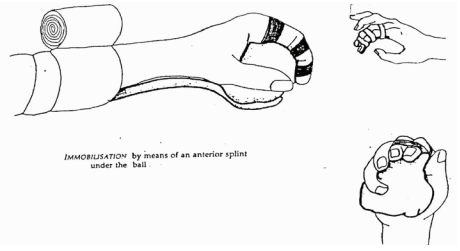
- Pain
- Swelling
- Deformity
- The patient cannot move his fingers.

**Complications:**

- Rupture of a muscular tendon.

**Treatment:**

- Analgesics: indomethacin
- Immobilize together the broken finger with another finger on a curved splint for a month.
- If any muscular tendon rupture, refer to hospital.
- IMMOBILIZATION by means of an anterior splint under the ball.

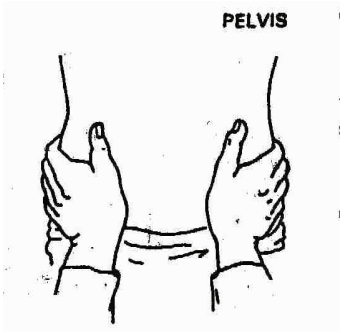


IMMOBILISATION by means of an anterior splint under the ball

## FRACTURE OF HIP BONE

**Clinical signs:**

- Pain
- Swelling
- Hematoma
- The patient cannot move his leg(s)
- Pain when you press the pelvis from both sides with your two hands.




**Complications:**

- Internal bleeding sometimes severe can cause hypovolemic shock;
- Damage of the bladder or the urethra with hematuria or unable to pass urine.

**Treatment:**

- Analgesics (avoid ASA)
- Treatment of shock if any
- Only treatment is to rest until the pain has settled. The fracture usually unites in about 6 weeks
- Refer your patient especially when there are complications.

## FRACTURE OF THIGH (FEMUR)

**Clinical signs:**

- Pain
- Swelling
- Hematoma
- The patient cannot move his leg
- His leg may look shorter with the foot turned outside
- Deformity of the thigh.

**Complications:**

- Bleeding and shock.

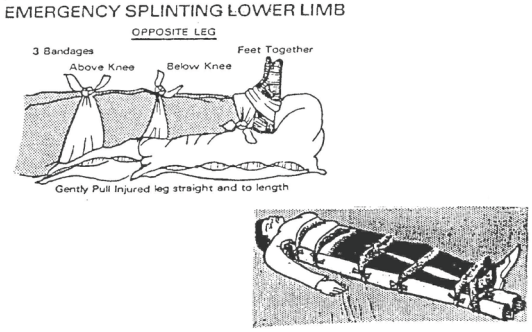
**Treatment:**

- Analgesics (avoid ASA): indomethacin
- IV drip for every patient with broken femur
- Treat the shock
- Immobilize the 2 lower limbs with bamboo splints and bandages
- Refer to the hospital for surgery.

## FRACTURE OF LEG (TIBIA)

**Clinical signs:**

- Pain
- Swelling
- Deformity
- Hematoma
- The patient cannot move his leg.



**Complications:**

- Usually none but sometimes when the fracture is near the knees or near the ankles your patient may have articular fracture.

**Treatment:**

- Analgesics
- Immobilization with bamboo splints from the knee to the ankle (please refer to section on splinting)
- Refer to hospital.

## FRACTURE OF FOOT

**Clinical signs:**

- Pain
- Swelling
- The patient cannot walk, cannot put his weight on the foot.

**Complications:**

- Usually none.

**Treatment:**

- Analgesics.
- Immobilization including the ankle. (please refer to the section on splinting).
- The patient must not walk without crutches.
- Refer to the hospital.

**Remark**

Analgesics: avoid ASA for danger of bleeding; give brufen instead. Refer to hospital for immobilization. If the victim cannot be referred: please see the following table for duration of splinting.

## NUMBER OF DAYS OF SPLINTING

| BONE | ADULT (days) | CHILDREN (days) |
|---|---|---|
| CLAVICLE | 21 | 21 |
| NECK OF HUMERUS | 15 | 15 |
| SHAFT OF HUMERUS | 60 | 60 |
| SUPRACONDYLAR FRACTURE | 45 | 45 |
| TWO BONES OF FOREARM | 90 | 45 |
| DISTAL RADIUS | 30 | 30 |
| SCAPULA | 45 | 45 |
| METACARPAL | 30 | 21 |
| PHALANX | 30 | 21 |
| NECK OF FEMUR | 90 | 60 |
| SHAFT OF FEMUR | 90 | 60 |
| TWO BONES OF LEG | 90 | 60 |
| ANKLE | 60 | 60 |
| METATARSALS | 15 | 15 |

## PLASTER OF PARIS (POP) CASTING

Fracture requires stability to prevent mal-union and non-union. Plaster of Paris (POP) is used to stabilize the fractures.

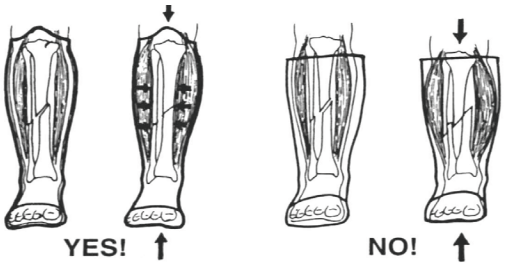
Here are the steps you need to learn how to apply the POP cast for the fracture of limb.

1. **Required materials for POP application:**

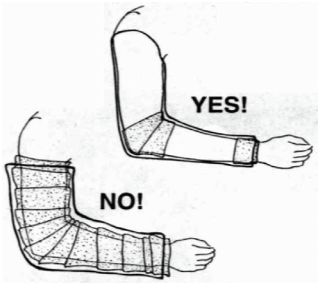
– Plaster of Paris, rolls of 10 and 15 cm
– Water
– Cotton for padding.
– Ointment to fix the padding to the skin
– At least one skilled assistant - and lot of training

**2. Before you start:**

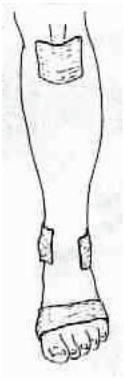
Instruct your assistant about the actual plaster, the direction of traction, the joint positions, the molding of the plaster etc. Wash the actual limb. Dirt or small particles of gypsum under the plaster may damage the skin. Then take measures and prepare the plaster slabs and plaster rolls you need. All materials must be ready and at hand before the application starts.




**3. The padding:**

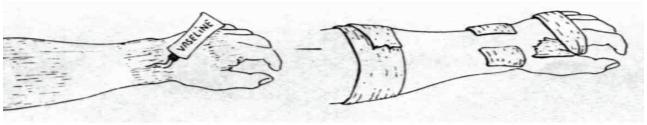



The main point of plaster immobilization is molding of the plaster so that it fits the limb like an elastic stocking with an even pressure against the soft tissues all along the limb. Too much padding prevents good molding.
– A well-fitting plaster: Thin padding just over the bony prominences.
– An ill-fitting plaster: The padding creates an uneven pressure against the soft tissues. This actually obstructs the venous circulation and may cause limb edema.



**4. Correct padding:**

Applying ointment on the skin over the bony prominences will fix the cotton pads. Thin strips of filter or cotton is sufficient padding provided that the cast is well molded to fit every contour of the limb.




**5. The soft tissue pressure fixes the fracture:**

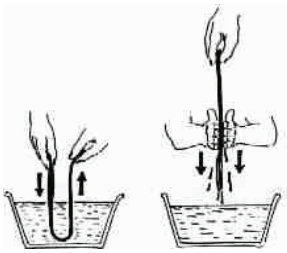
If the cast is wide with thick padding the pressure is not evenly distributed along the shaft of the bone, and the fracture will displace. Mold the cast to fit the contours of the muscles like a stocking.

**6. Applications of POP cast:**

The plaster bandage is made out of slabs and circular turns. For additional strength, two layers of slabs with circular turns between them may be applied.

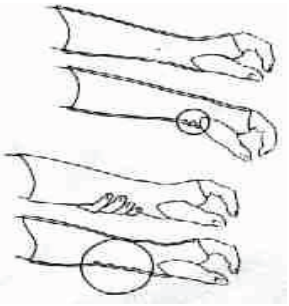
**The slabs**

– Length
  - Measure the length of the slab on the limb.
  - Add 5 - 10 cm for the expected shrinkage of the slab when wet.
  - The enough layers of plaster must be used to assure adequate immobilization and protection, usually 15 layers is recommended.



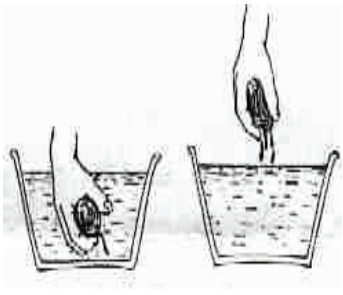
– Water
  - Warm water (37ºC) makes the plaster of Paris harden quickly. Cold water makes it harden more slowly (after 5 - 10 minutes).
  - When applying a sophisticated plaster damage, use cold water. Also the unskilled craftsman should use cold water.

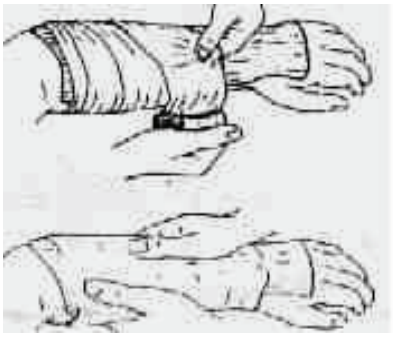
–Application
- Pull the slab through the water once.
- Hold it up at one end and let it drip water.
- You may let your assistant carefully wipe off the excess water from the slab.
- Stretch the slab ends until they are in correct position.
- Then mold the slab onto the skin. No bends and folds on the slab.



– Warning
  - From now on until the cast is stiff, the joints must not change position in order to avoid bends inside the plaster that may create skin damage or obstruct the venous circulation.
  - The assistant should not leave fingerprints on the plaster, for they will cause pressure under the plaster.

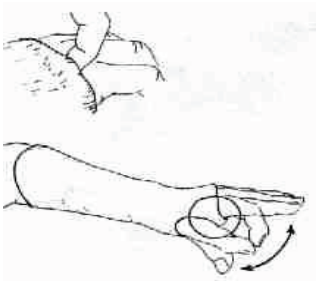
**The circular turns :**
- Are made of plaster rolls 10 or 15 cm wide.
- Put the roll into water. Keep it there until air bubbles do not leak out from the roll.
- Then take the roll out of water and press it for water. Too much pressure will remove the plaster from the gauze.
- Work clockwise from the distal towards the proximal part of the limb.
- Avoid folding of the bandage by smoothing the surface between each roll applied. Plaster strength depends on even application and good molding of the plaster.

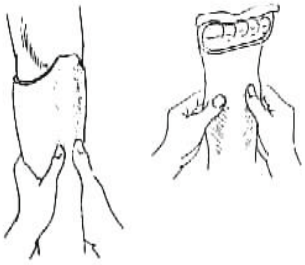




**Before the cast harden:**

- The plaster hardens through a chemical reaction inside the plaster. After some minutes you will feel the plaster becoming warm. Before the temperature rises, smooth outer surface of the cast. The smooth surface makes the plaster stronger and more resist to damp and water that would soften and damage the cast.
- Also smooth and lift slightly the edges of the cast so they do not press upon the skin when edema develops.
- Test the joint movement proximal and distal to the cast: check that the joints not immobilized are really free.
- The hardening process last for 24 hours. Mold the cast carefully to fit these forms. Also do the same for any other cast.





**7. Contra-indication for POP cast:**

- Never apply to an open fracture.

**8. The problem of swelling inside the plaster cast information for your patients**

Edema always develops after injury, and rises to a peak 2-3 days after the injury or surgery. Increased soft tissue pressure may obstruct the limb veins, gradually also the minor arteries. Serious damage to the limb nerves may develop due to lack of oxygen. If the pressure is not relieved in due time, a permanent condition may develop. Concentrate on preventing it, i.e., on fighting the edema problem.

The signs of increasing edema inside the cast

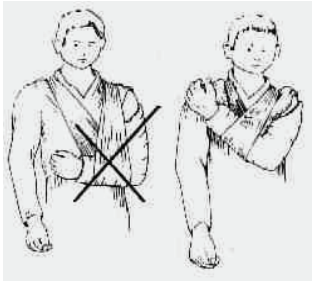
- Swelling distal to the cast
- Cyanosis distal to the cast.

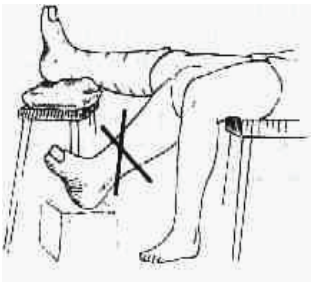
**Signs of alarm**

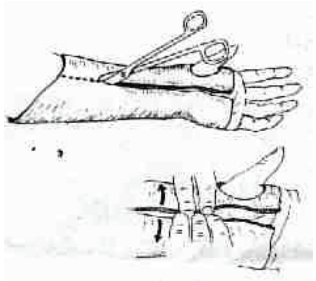
- Increasing pain inside the cast at even slight movement of fingers/toes.

Prevent edema complications by:

- Longitudinal splitting of the plaster bandage in patients where much edema is expected.
- Delaying the plaster application until the 3rd-4th day after the injury.
- Elevation of plastered limb







Active exercises with isometric muscle training inside the plaster provide efficient analgesia.

Cyanosis and / or increasing pain:

- Split the cast immediately.
- If the edema does not recede, remove the cast.

# UPPER GASTROINTESTINAL BLEEDING

## DEFINITION

Haematemesis is vomiting of blood. It may look bright red or it may look like coffee grounds ie brown. Malena means balck motions often like tar. Both indicate upper GI bleeding.

## CAUSES

**Common**

- Peptic ulcers
- Gastritis/gastric erosions
- Mallory Weiss tear
- Duodenitis
- Oesophageal varices
- Malignancy
- Drugs – NSAIDS steroids

## ASSESSMENT

History and Examination to assess severity. Ask about previous bleeds, dyspepsia, known ulcers, know liver disease, dysphagia, nausea, vomiting. Check drugs and alcohol consumption. Ask about other diseases. See handout on GI history and examination.

## EXAMINATION

- Is the patient shocked?
- Check Pulse, BP, urine output
- Signs of chronic liver disease

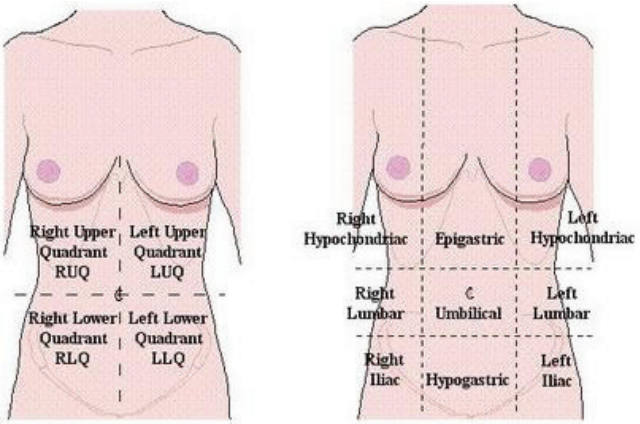
## ACUTE MANAGEMENT

- Protect airway
- Give Oxygen
- Insert 2 large bore IV cannula
- Give IV colloid or blood if available
- Transfer immediately
- Monitor carefully

## TREATMENT

- If not shocked check FBC, LFTs.
- Check stool for blood
- Monitor
- Will need endoscopy

## Acute Abdomen



Take a good history and examine properly. The patient has one or more of the following symptoms or signs: abdominal pain, vomiting, fever, diarrhoea or constipation, abdominal tenderness and abdominal distension. Shock may follow acute abdominal pain. Good history taking and examination are essential to diagnose the correct disease.

Some diseases require immediate surgery: organ rupture (e.g. ectopic pregnancy, aneurysm aorta, splenic rupture), peritonitis (e.g. perforation of stomach, intestine or gall bladder).

## EXAMINATION

Check the patient carefully before providing any treatment. However, in some cases (patients with severe pain), painkillers may be needed before examination. Examine young children when they are calm and quiet. Abdominal pain can be caused by surgical and non-surgical problems.

## PERITONITIS

- Infection of the peritoneal cavity

Peritonitis occurs by the spread of an infection from any organ in the peritoneal cavity or by abnormal communication between the cavity and these organs.

**Causes of peritonitis**

- Cholecysitis
- Gastro or duodenal perforation
- Acute Salpingitis
- Appendicitis
- Ectopic pregnancy

## HARD ABDOMEN WITH MODERATE TO SEVERE PAIN

It usually represents surgical causes like peritonitis, appendicitis, cholecystitis , intestinal perforation/ obstruction, ectopic pregnancy rupture. Renal stones, incarcerated hernia and cholangitis might also need an operation. Refer the patient to the hospital. Give nothing to eat or drink. If you cannot find a car and you have to wait one night, start IV fluids and antibiotics:

- 1st choice: IV ampicillin + IV gentamicin + IV/PO metronidazole
- 2nd choice: IV chloramphenicol + IV gentamicin

## SOFT ABDOMEN WITH MODERATE PAIN

It usually represents nonsurgical causes like pyelonephritis, worms, painful menstruation, PID, peptic ulcer (without perforation), gynaecological or obstetrical problems, hepatitis. Treat according to the cause.

## CHOLECYSTITIS

**Definition**

Acute cholecystitis is a bacterial infection of the gall bladder mostly due to obstruction of the bile ducts. It may follow an attack of biliary colic. Cholecystitis can also be due to malnourishment or typhoid fever.

**Signs and Symptoms**

- Pain, tenderness and guarding in right upper quadrant (RUQ)
- Vomiting
- Fever, rigors
- Jaundice

**Diagnosis**

- Clinical; specific sign is the pain during deep inspiration when the RUQ is palpated, and no pain if this procedure is performed on the LUQ.
- Ultrasound of the gallbladder to reveal stones, if available.

**Complications**

- Empyema (gallbladder fills with pus)
- Peritonitis

**Treatment**

- Bed rest, pain relief (buscopan IV or IM, codeine or tramadol)
- Nil by mouth
- Intravenous fluids
- Ceftriaxone 1 gram IV OD and metronidazole 500 mg IV TID until fever settles then oral ciprofloxacin and metronidazole 500 mg TID total 10 days
- Consider surgical removal of gallbladder
- Without surgery recurrence is 25%

## ACUTE APPENDICITIS

**Definition**

Infection of the appendix occurring especially in young adults (15 to 25 years) and in children. If early treatment is not given severe complications may result. Treatment is ALWAYS a surgical treatment.

**Complications**

- Infection gives inflammation → may cause ischemia (lack of O2) which gives necrosis (death of tissue)
- This necrosis gives perforation →PERITIONITIS
- The infection may also result in an ABSCESS.

**Clinical Presentation**

- Abdominal pain:
  - Sudden onset of epigastric or periumbilical pain shifting to right lower quadrant.
  - Severe pain in Mc Burney's area (initially colicky periumbilical pain → shifts to RIF and becomes constant.
  - [Mc Burney's point lies at the junction of the lateral third with the medial two thirds of a line joining the anterior superior iliac spine and the umbilicus].
  - Increases with deep respiratory movement or cough.

**Other Signs**

- Mild fever up to 38 - 38.5ºC +++
- Nausea more or less vomiting ++
- Slight diarrhea or constipation +

**Clinical Examination**

- Vital signs: temperature, pulse, RR
- Palpation may be characteristic with abdominal muscles spasms or resistance
- Direct tenderness + rebound tenderness in right lower quadrant
- Rectal or pelvic examination may be painful. Pain felt in right lower quadrant from palpation of left lower quadrant (Rovsing's Sign)

**Management**

Refer to surgeon.

- If it's really appendicitis, complications occur soon:

  - In 1 to 2 days → perforation → Peritonitis
  - In 1 to 3 days → ABSCESS → which may also cause Peritonitis
  - If you are for far from any facilities
  - The patient should not eat and drink.
- Start an intravenous infusion
- Give antibiotics:
  - AMPICILLIN 100 to 200 mg/kg/day
  - GENTAMYCIN 5 mg/kg/day
- Give analgesics:
  - PARACETAMOL IM (no morphine and its derivatives morphine-like analgesics (i.e. Pentazocine)
- Then refer.

## ASCARIASIS

### Definition

Ascariasis is a human disease caused by the parasitic roundworm *Ascaris lumbricoides*. Perhaps as many as one quarter of the world's people are infected, and ascariasis is particularly prevalent in tropical regions and in areas of poor hygeine.

### Signs and Symptoms

Most infections are asymptomatic. However, heavy infection, especially of children, may produce symptoms roughly proportional in severity to the worm burden.

### Larval ascariasis

7 days after infection, larvae cause pulmonary symptoms (Loffler's syndrome or pneumonia). Circulating larvae reaching the CNS cause convulsions, meningism, epilepsy, and insomnia; those reaching the eye cause ocular granulomas similar to those of T. canis. Larvae may wander anywhere in the body causing acute symptoms.

### Adult worms

In the small intestine cause intestinal colic, vomiting, intussusception, volvulus, obstruction, perforation; plus anaemia and malabsorption. Death of adult worms in the liver causes abscess formation, recurrent cholangitis, or acute biliary obstruction, with fever, RUQ pain, and jaundice. Worm, larva, or egg presence may initiate stone formation; eggs released into the peritoneum may cause granulomas resembling TB peritonitis. High fever and exposure to tetrachloroethylene or anaesthetics can cause adult worms to migrate (e.g. to Eustachian tubes). Hence it is important to deworm patients in such circumstances.

### Nutritional effects

A child may lose 10% of dietary protein to parasites. Look for kwashiorkor and vitamin A or C deficiency.

### Immunopathology

Hypersensitivity conjunctivitis, urticaria, and asthma may occur in pre-sensitized individuals upon re-exposure. It may also occur upon passing worms, producing intense anal pruritis.

### Diagnosis

It is made by identifying worms or eggs in faeces. There is a marked eosinophilia during larval disease-persistent eosinophilia implies concurrent Toxocara or Strongyloides infection. Worms may be seen on

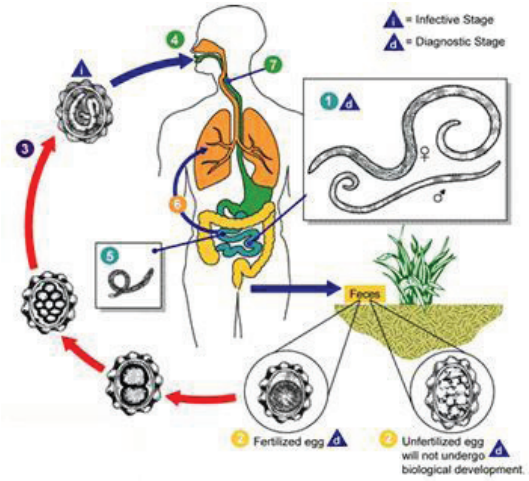
CXR or contrast XR (string-like shadows, where the worms take up contrast medium). The differential diagnosis of larval ascariasis includes toxocariasis, hookworm, strongyloidiasis, schistosomiasis.

**Treatment only effective against adult worms.**

- Albendazole 400 mg PO as a single dose (half dose in children <3 yrs)
- Alternative for adults and children >1 yr mebendazole 100 mg PO bd for 3 days

Pneumonitis is treated with prednisolone, followed by an anti-helminthic 2-3 weeks later. Biliary and intestinal obstruction are best managed conservatively (analgesia, NG tube, antispasmodics, IV fluids, liquid paraffin) followed by anti-helminthic treatment once the acute phase is over. If symptoms of intestinal obstruction worsen or persist >48 hrs, surgical intervention will be necessary.

**Description of the life Cycle**




Adult worms live in the lumen of the small intestine. A female may produce approximately 200,000 eggs per day, which are passed with the feces. Unfertilized eggs may be ingested but are not infective. Fertile eggs embryonate and become infective after 18 days to several weeks , depending on the environmental conditions (optimum: moist, warm, shaded soil. After infective eggs are swallowed , the larvae hatch , invade the intestinal mucosa, and are carried via the portal, then systemic circulation to the lungs.

The larvae mature further in the lungs (10 to 14 days), penetrate the alveolar walls, ascend the bronchial tree to the throat, and are swallowed. Upon reaching the small intestine, they develop into adult worms. Between 2 and 3 months are required from ingestion of the infective eggs to oviposition by the adult female. Adult worms can live 1 to 2 years.

# BURNS

## HISTORY

- When did the burn take place?
- What caused the burn? Electrical burns can cause more extensive damage than is first seen.
- What is the age of the patient?
- Burns are more severe in the very old and very young.
- Has there been any inhalation of hot smoke? Look for burned nose hairs or soot around the nose and mouth.

## EXAMINATION

Severity of burns are evaluated on the basis of the depth, size and location of the burn. The depth of burn is categorised as follows:

**How deep is the burn?**

- **Superficial burn**: Red, dry and painful, it does not blister
- **Superficial partial thickness burn**: Pink and moist blisters may be present

- **Deep partial thickness burn**: White or mottled pink, with some painless areas
- **Full thickness burn**: White, mottled or charred and are dry
  Note: Patients with electrical burns need an ECG.

**Calculate the area burnt**

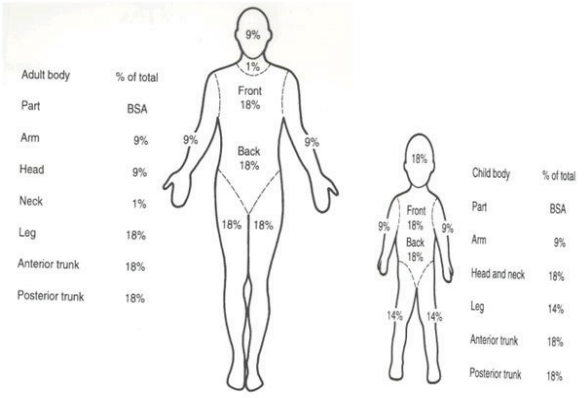
To calculate the amount of burned skin use the patients hand: the area covered with 1 hand = 1% skin area. Do not count any superficial burns. Burns are more severe when on the face, hands, joints and perineum

## RULE OF NINES

| Body's Surface | Adults | Baby and Children |
|---|---|---|
| Head and neck (front and back together) | 9 % | 18 % |
| Arm (front and back together) | 9 % each | 9 % each |
| Leg (front and back together) | 18 % | 14 % each |
| Chest (front only) | 18 % each | 18 % |
| Chest and abdomen (back only) | 18 % | 18 % |
| Genital area | 1 % | 1 % |

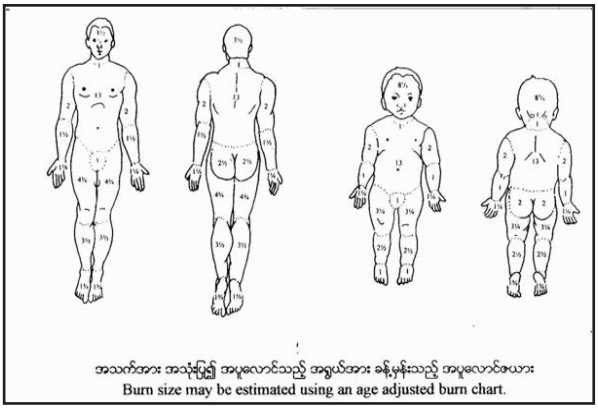
## MILD BURNS

- Patient is in good condition
- No burns on face, hands, joints and perineum.
- Area: partial thickness less than 10%
- Full thickness less than 2%.




## SEVERE BURNS –ALWAYS ADMIT TO IPD

- Inhalation of hot smoke: burns on face, burnt nasal hairs, noisy breathing
- Burns on face, hands, joints or perineum
- Area: more than 10% partial thickness
  Full thickness more than 2%.



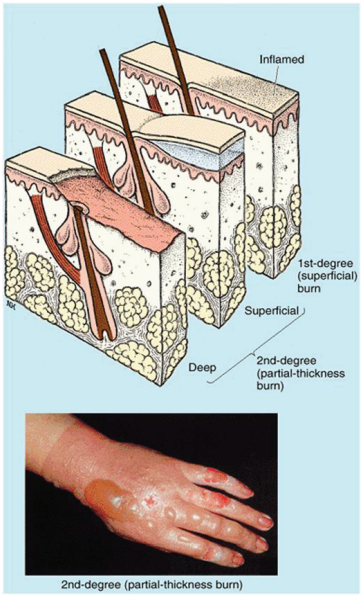

## TREATMENT

- Systemic: compensate for fluid loss
- Pain: burns are extremely painful
- Local: aid healing, prevent infection, prevent contractures

**Emergency treatment- Assess carefully**

- Airway & Breathing: If there is history of smoke inhalation or soot around the face, give oxygen and refer
- Circulation: If there is a severe burn, insert two 16G cannulas and give a fluid bolus (NSS 1L in adults and 20 ml/kg in children)

- Analgesia: Cover the burnt area with cling film. Paracetamol, Tramadol or Morphine



2nd-degree (partial-thickness burn)

**Ongoing treatment for severe burns**

- IV Fluids: a lot of fluid is lost through a burn so calculate the amount needed using the formula
- Total volume of Ringers solution = Weight (kg) x Area of Burn (%)
- Give half of this volume over the first eight hours and the remainder over the next 16 hours
- Insert urine catheter to measure urine output
- Use a fluid input/output chart to monitor fluid balance. If urine output falls to less than 0.5ml/kg/ hour, consider giving a fluid bolus
- Regular observation

**Pain Treatment**

- All patients require pain relief
- Paracetamol, tramadol or morphine
- One method of effective pain relief is covering the burn
- Dressings are very painful so always give analgesia first

**Local treatment**

Clean with antiseptic (not containing alcohol). Tetanus prophylaxis needs to be done (see wounds). Apply silver sulfadiazine cream (avoid antibiotic creams). Cover with sterile bandages. If there is no healing after 21 days, skin grafts are required.

## Abscesses

### 1. WHAT IS AN ABSCESS?

An abscess is a collection of pus in soft tissue. Abscess is a cavity with a wall so thick that the antibiotics cannot have any action. Treatment is surgical.

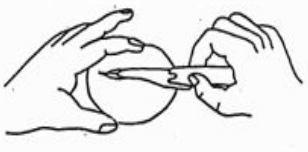
### 2. HOW DO YOU RECOGNIZE AN ABSCESS?

First stage:

- Skin is red, painful, swollen, hot.
- There are lymph nodes in the surrounding area (armpit, groin, neck,...).
- Never press on an abscess.
- Never try to open it with a needle.
- Apply hot wet compresses (TID or QID) until the abscess becomes ripe. Sometimes the abscess decreases by itself.

Second stage:

- The abscess is ripe
- The skin is red, tensed, hot, swollen, less painful and you can feel a fluctuation (like water in the middle of the swelling).


POSITION OF THE HANDS for incision of an abscess

### 3. HOW DO YOU OPEN AN ABSCESS?

- The incision must be done with asepsis → use sterile material.
- General anesthesia with ketamine (Ketalar) is required for this kind of operation. If the abscess is ripe enough

it's possible to open it quickly without anesthesia, but the complete removal of the membrane may be painful and difficult.
- Clean with diluted povidone.
- Hold the abscess firmly and incise it.
- Usually the depth required for incision should be between 0.5 and 1 cm. The length of the scar should be around 2 to 3 cm so that you can insert your finger in the cavity.
- Pus comes out. Press gently to take out all the pus.

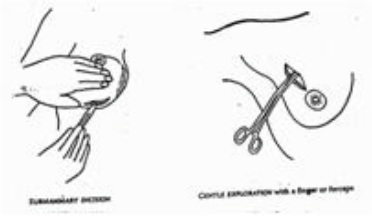
- Explore the cavity with your finger to break any adhesion and evacuate the pus (it's possible to use a force to do that but take care to insert your forceps in a closed position).
- Try to remove the membrane (internal layer) of the abscess completely.
- Clean several times with diluted povidone until there is no more pus or clotted blood coming out.
- Insert wicks with diluted povidone in the cavity.
- Don't forget to count how many wicks you insert in the wound.
- Write it down on the IPD chart.
- Renew the dressing everyday.

## 4. SPECIAL SITUATIONS

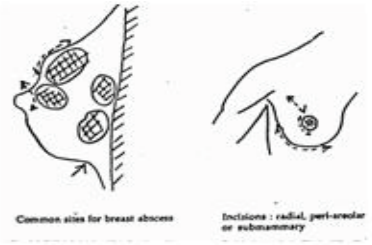
### *4.1 Breast abscess*

- When does it happen?
  Usually it's a complication of breastfeeding, which may occur after cracks or acute lymphangitis.
- How do you recognize a breast abscess?
  First stage: uncollected breast abscess: The breast is hot, red, hard, and painful. Your patient may have fever. If you press on the breast, milk and pus will come out and when you collect this liquid on a piece of gauze or cotton, milk will be absorbed while pus remains on the surface giving a yellow color. Your patient may have lymph nodes in the axially area.
  Second stage: collected abscess: Your patient may have very high fever even with an appropriate management of the uncollected abscess. The skin of the breast is red, hot, and painful. One part becomes soften when it's ripe(fluctuation). At that time, your patient needs surgery. Your patient has lymph nodes in the axillary area.

**Treatment**



You need asepsis, general anesthesia. The technique of incision is nearly the same as for an abscess. You have to avoid giving a scar on the areola.
- If the abscess is superficial and not near the nipples:
- radial incision: straight incision in direction of the nipples.
- If the abscess is near the nipple, circular peri-areolar incision without cutting the areola.
- If the abscess is deep in the lower part of the breast hold the breast in upper position and do a submamary incision.
- Do your incision in the fluctuating part (0.5 to 1 cm deep and 2 to 3 cm long).
- Press the breast to let out the pus.
- Explore gently the cavity with your fingers or a forceps to break the adhesions.
- Remove the membrane as well as you can.
- Clean the cavity several times with diluted povidone until there is no more pus or clotted blood.

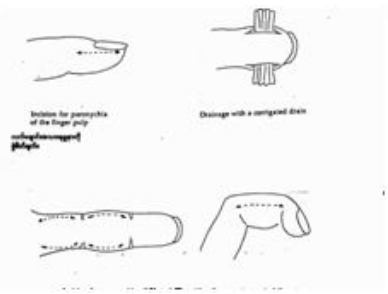


- Insert wick or compress in the wound (don't forget to count them and to write it down).
- Do your dressing with a strong bandage.
- Renew your dressing everyday.
- Common sites for breast abscess.
- Incisions: Submammary, radial, peri-areolar or submammary.

***4.2 Paronychia (Infection of finger pulp)***

In case of paronychia: Infection of the finger pulp. It spreads often from the edges of the nail. Its course is similar to the course of an abscess but it's not an abscess. There is no wall (membrane). This infection needs to be ripe enough before opening it.

- First stage: The finger is hot, red, and painful. Alcoholised dressing or hot compresses.
- Second stage: The pain can decrease, the finger is red with white parts appearing in the middle of the red area. At that time surgery is required.
- Follow up of this patient.
  - Daily dressing.
  - Remove the drainage 2 to 4 days after the operation if there is no more pus.
  - Give anti-inflammatory: Indomethcin.
  - Give antibiotics: PenV or Cloxacillin.



## Skin Ulcers

### IMPORTANT CAUSES

Leprosy should be considered in any patient with a painless burn, injury, or ulcer of a limb. Diabetes with neuropathy often leads to ulcers on the feet, with reduced sensation. Trauma is a very common cause of ulceration, particularly in children. Bites, wounds, and cuts often become infected leading to ulceration.

### MANAGEMENT

Identify and, if possible, eliminate the cause of the ulcer. Check for arterial disease (absent peripheral pulses). Prevent venous stasis by elevating the legs above the heart (do this during the day by raising the mattress with e.g. a chair).

Elevation should be 45° for most people- if peripheral pulses are absent, do not raise the feet >23 cm above the heart. Use compression bandages if difficult to raise legs. Apply clean dressing using short pieces of bandage that do not completely encircle the leg. Dressings wet with saline will encourage healing and soften crusts.

### TROPICAL ULCER

Ulcers due to mixed bacterial infection which predominantly occur on the foot, ankle, or lower leg following minor trauma. A small round painful ulcer forms which then spreads rapidly, exposing the underlying muscles and tendons. The patient is febrile.

After a few weeks, the ulcer stops spreading and the pain diminishes. Good treatment in the early stages encourages the ulcer to heal. Neglected ulcers become fibrosed and may be the site of a future squamous cell carcinoma.

Management: if noted early, the ulcers respond well to antibiotics and daily dressing. Large ulcers may need antibiotics followed by skin grafting. Chronic ulcers should be excised and grafted.

## BURULI ULCER

A chronic necrotizing skin disease of tropical forest areas caused by infection with *Mycobacterium ulcerans*. The method of transmission is not known but is presumed to occur through broken skin. The infection starts as a painless nodule which breaks down to form an ulcer that is relatively painless and has edges that may be undermined for 5-15 cm.
Necrosis is caused by a bacterial exotoxin. There are few systemic signs (although lymphadenopathy occurs). The ulcer may spread rapidly, or become secondarily infected. Without treatment, healing is slow and may lead to scarring, contractures, and deformities.

Diagnosis is on typical clinical picture or AFB in the ulcer's base.
Management: completely excise nodule if recognized early.

- At the ulcer stage: treat any 2° infection, irrigate ulcer with saline, excise all diseased tissue, and cover the wound by skin grafting.
- Antibiotics (streptomycin, rifampicin) have weak activity.
- Infective causes of skin ulcers include: bacteria (streptococci, staphylococci); non-venereal treponematoses, anthrax, mycobacteria,fungal infections, leishmaniasis.

**Treatment**

Current recommendations for treatment are as follows:

- A combination of rifampicin and streptomycin/ amikacin for eight weeks as a first-line treatment for all forms of the active disease.
- Nodules or uncomplicated cases can be treated without hospitalization.
- Surgery to remove necrotic tissue, cover skin defects and correct deformities.
- Interventions to minimize or prevent disabilities.

## SOME CAUSES OF ULCERS

- On the foot or leg
  - Diabetes
  - Leprosy
  - Venous disease
  - Arterial disease
  - Tropical ulcer
  - Chronic osteomyelitis
- On the penis or vagina – see lectures on STI and syndromic management.

80% of skin diseases in tropical rural areas are fungal, bacterial, viral or parasitic infections. These are relatively easy to treat. Key conditions that need to be recognized:

- *Staphylococcoal* and *streptococcal impetigo* and pyoderma
- *Tinea* infections
- Scabies
- Eczema / dermatitis (commoner in urban settings)

# Hernias

## OVERVIEW

A hernia occurs when the contents of a body cavity bulge out of the area where they are normally contained. These contents, usually portions of intestine or abdominal fatty tissue, are enclosed in the thin membrane that naturally lines the inside of the cavity. Although the term hernia can be used for bulges in other areas, it most often is used to describe hernias of the lower torso (abdominal wall hernias). Hernias by themselves may be asymptomatic, but nearly all have a potential risk of having their blood supply cut off (becoming strangulated). If the hernia sac contents have their blood supply cut off at the hernia opening in the abdominal wall, it becomes a medical and surgical emergency.

## INGUINAL HERNIAS

Inguinal (groin) hernia: Making up 75% of all abdominal wall hernias and occurring up to 25 times more often in men than women, these hernias are divided into two different types, direct and indirect. Both occur in the groin area above where the skin crease at the top of the thigh joins the torso (the inguinal crease), but they have slightly different origins. Both of these types of hernias can similarly appear as a bulge in the inguinal area.

## INDIRECT INGUINAL HERNIA

Distinguishing between the direct and indirect hernia, however, is important as a clinical diagnosis. An indirect hernia follows the pathway that the testicles made during prebirth development. It descends from the abdomen into the scrotum. This pathway normally closes before birth but may remain a possible place for a hernia. Sometimes the hernia sac may protrude into the scrotum. An indirect inguinal hernia may occur at any age.

## DIRECT INGUINAL HERNIA

The direct inguinal hernia occurs slightly to the inside of the site of the indirect hernia, in a place where the abdominal wall is naturally slightly thinner. It rarely will protrude into the scrotum. Unlike the indirect hernia, which can occur at any age, the direct hernia tends to occur in the middle-aged and elderly because their abdominal walls weaken as they age.

## FEMORAL HERNIA

The femoral canal is the path through which the femoral artery, vein, and nerve leave the abdominal cavity to enter the thigh. Although normally a tight space, sometimes it becomes large enough to allow abdominal contents (usually intestine) into the canal. A femoral hernia causes a bulge just below the inguinal crease in roughly the mid-thigh area. Usually occurring in women, femoral hernias are particularly at risk of becoming irreducible (not able to be pushed back into place) and strangulated.

## UMBILICAL HERNIA

These common hernias (10-30%) are often noted at birth as a protrusion at the bellybutton (the umbilicus). This is caused when an opening in the abdominal wall, which normally closes before birth, doesn't close completely. If small (less than half an inch) this type of hernia usually closes gradually by age 2. Larger hernias and those that do not close by themselves usually require surgery at age 2-4 years. Even if the area is closed at birth, umbilical hernias can appear later in life because this spot may remain a weaker place in the abdominal wall. Umbilical hernias can appear later in life or in women who are having or have had children.

**Causes**

Although abdominal hernias can be present at birth, others develop later in life. Some involve pathways formed during fetal development, existing openings in the abdominal cavity, or areas of abdominal wall weakness. Any condition that increases the pressure of the abdominal cavity may contribute to the formation or worsening of a hernia.
Examples include:

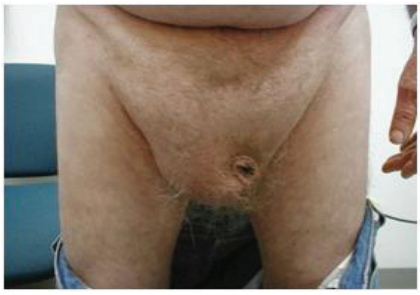
- Obesity
- Heavy lifting
- Coughing
- Straining during a bowel movement or urination
- Chronic lung disease
- Fluid in the abdominal cavity
- A family history of hernias can make you more likely to develop a hernia

**Signs and Symptoms**

The signs and symptoms of a hernia can range from noticing a painless lump to the painful, tender, swollen protrusion of tissue that you are unable to push back into the abdomen—an incarcerated strangulated hernia.

## REDUCIBLE HERNIA

- New lump in the groin or other abdominal wall area
- May ache but is not tender when touched
- Sometimes pain precedes the discovery of the lump
- Lump increases in size when standing or when abdominal pressure is increased (such as coughing)
- May be reduced (pushed back into the abdomen) unless very large



**Right inguinal hernia**

## IRREDUCIBLE HERNIA

- Occasionally painful enlargement of a previously reducible hernia that cannot be returned into the abdominal cavity on its own or when you push it
- Some may be long term without pain
- Also known as incarcerated hernia
- Can lead to strangulation
- Signs and symptoms of bowel obstruction may occur, such as nausea and vomiting

## STRANGULATED HERNIA

It is irreducible hernia in which the entrapped intestine has its blood supply cut off. Pain always present followed quickly by tenderness and sometimes symptoms of bowel obstruction (nausea and vomiting). The affected person may appear ill with or without fever. This is a Surgical emergency.

**Diagnosis- clinical**

**Treatment**

Treatment of a hernia depends on whether it is reducible or irreducible and possibly strangulated.

- Reducible hernia
  - In general, all hernias should be repaired to avoid the possibility of future intestinal strangulation. The treatment of every hernia is individualized, and a discussion of the risks and benefits of surgical versus nonsurgical management needs to take place.
- Irreducible hernia
  - All acutely irreducible hernias need emergency treatment because of the risk of strangulation. An attempt to reduce (push back) the hernia will generally be made, often with medicine for pain and muscle relaxation. If unsuccessful, emergency surgery is needed.

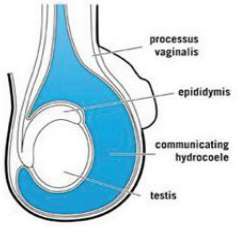
**Large right inguinal hernia: Prominently seen here**

**Appearance in same patient after manual reduction**

# Hydroceles

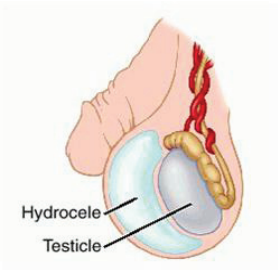
**Filariasis**

Unilateral left hydrocele and testicular enlargement secondary to *Wuchereria bancrofti* infection in a man who also was positive for microfilariae.




## DEFINITION

A hydrocele is a collection of fluid around the testicle (testis), in the tunica vaginalis (the space surrounding the testis). Hydroceles only occur in males.




## PRESENTATION

It typically presents as a painless swelling of the scrotum. Most hydroceles are congenital (ie. present at birth) - these are usually seen in boys aged 1-2 years of age. Most congenital hydroceles resolve by the end of the first year of life. Persistent congenital hydrocele is readily corrected surgically. Secondary hydroceles can affect males of any age, but usually occur in men older than 40 years. It may affect one side of the scrotum or both sides.

## CAUSES

In many cases, no cause is found. Possible causes include:

- Trauma - traumatic hydroceles are common
- Infection (eg. epididymo-orchitis) -filariasis
- Testicular Tumour
- Torsion of the testes - reactive hydoceles occur in up to 20% of cases of testicular torsion

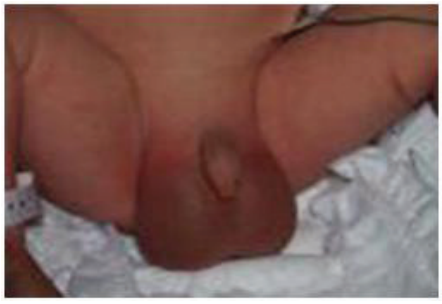
## SYMPTOMS

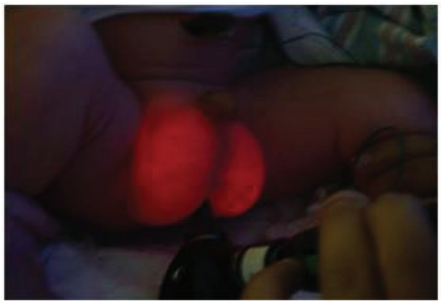
Painless, enlarged scrotum is present. There may be a sensation of heaviness or dragging. Hydrocele is not usually painful (pain may be an indication of an accompanying infection).

## INVESTIGATION

A light shined through the scrotum will cause the hydrocele to illuminate. (transillumination) Investigation is not usually required in children. For adults, an ultrasound of the testis may be required. Since testicular lumps could potentially be missed on physical examination (due to the collection of

**Transilluminated hydrocele**





fluid preventing full examination of the testis), an ultrasound is often advised. An ultrasound of the scrotum will confirm the diagnosis of hydrocele & also identify any abnormal testicular lumps.

## TREATMENT

If the hydrocele is small, no treatment is usually required. Needle aspiration is not therapeutic because the fluid generally re-accumulates quickly & is associated with a risk of infection. For larger hydroceles, or where there is a suspected underlying tumour, surgery may be required. Hydroceles can usually be cured with a relatively simple surgical operation.

# 4 PHARMACOLOGY

## BASIC PHARMACOLOGY AND PHARMACOKINETICS

### WHAT ARE THE GOALS OF PHARMACOLOGY?

To understand all aspects of drug action and efficacy-to develop drugs/treatment regimes that have selective (beneficial) actions without adverse effects

### WHAT IS A DRUG?

A drug is a chemical substance that is usually used to treat a disease/condition. When administered appropriately, it causes a range of physiological and biochemical changes in a complex biological system that relate to its composition, structure, and target.

### FIVE MEDICAL USES FOR DRUGS

- Therapeutic use
- Diagnostic use
- Curative use
- Replacement use
- Preventive or Prophylactic use

### DRUG NOMENCLATURE

Drugs are identified by one of three names:

- Chemical- long name, refers to the chemical structure of the drug
- Generic- shorter preferred name, derived from the chemical name
- Trade- brand name assigned by the manufacturer

**Abbreviations for dosages**

- Bid-twice a day
- Tid-three times a day
- Qid-four times a day

### NAMING COMPLICATIONS

Brand names can change over time as patents expire or companies merge. Most drugs are marketed by numerous names in different countries. Even generic names can differ in different countries.

### WHERE DO DRUGS COME FROM?

- Plants
- Human-derived proteins/steroids
- Fungi/Bacteria
- Synthetic chemicals
- Recombinant proteins

### DRUG ORIGINATION SITES

- Extracts from plants and herbs

  - Opium poppy: juice from seeds yields morphine; powerful painkiller
  - Foxglove: leaves contain digoxin; used to treat congestive heart failure (CHF) can be fatal at high enough doses

**From the body itself**

- Hormones
  - Insulin-used for diabetes
  - Thyroxine-hypothyroidism
  - Growth hormone

**Micro-organisms (bacteria)**

- Antibiotics
  - Penicillin: product of mold; discovered by Alexander Fleming in 1928
  - Interferes with bacterial cell wall synthesis

**Chemical modification of the body's own hormones/regulators**

- Hormonal drugs
  - Estradiol: form of estrogen
  - Prednisolone: synthetic steroid
  - Anti-cancer drugs: modified base components of DNA/RNA-interfere with RNA synthesis

## DRUG CLASSIFICATION

- Over-the-counter (OTC)
- Prescription (controlled substances)
- Schedule 1-highest abuse potential
- Schedule 2
- Schedule 3
- Schedule 4
- Schedule 5-lowest abuse potential

Most narcotic pain prescriptions are classified as Schedule 3. Anabolic steroids are also classified as Schedule 3.

## DRUGS ACCORDING TO SCHEDULES

- Schedule 1: Heroin, LSD, Marijuana
- Schedule 2: Demerol, Morphine, Percocet, Ritalin
- Schedule 3: steroids, barbituates, Tylenol with codeine
- Schedule 4: Ativan, Valium, Xanax
- Schedule 5: Robitussin

## THE STUDY OF DRUGS

- **Pharmacology**: science of drugs
- **Pharmacokinetics**: process related to how the body acts on the drug
- **Pharmacodynamics**: process related to how a drug acts on the body

# Pharmacokinetics

Pharmacokinetics is a branch of pharmacology dedicated to the determination of the fate of substances administered externally to a living organism. In practice, this discipline is applied mainly to drug substances, though in principle it concerns itself with all manner of compounds ingested or otherwise delivered externally to an organism, such as nutrients, metabolites, hormones, toxins, etc. Pharmacokinetics is often divided into several areas including, but not limited to, the extent and rate of Absorp-

tion, Distribution, Metabolism and Excretion. This sometimes is referred to as the ADME scheme. The route of administration critically influences ADME.

Absorption is the process of a substance entering the body. Distribution is the dispersion or dissemination of substances throughout the fluids and tissues of the body. Metabolism is the irreversible transformation of substances and its daughter metabolites. Excretion is the elimination of the substances from the body. In rare cases, some drugs irreversibly accumulate in a tissue in the body.

Pharmacokinetics is often studied in conjunction with pharmacodynamics. So while pharmacodynamics explores what a drug does to the body, pharmacokinetics explores what the body does to the drug.

## ROUTES OF DRUG ADMINISTRATION

- Enteral: enters the body by way of alimentary canal or digestive system.
- Parenteral: uses pathway other than above
- Usually allows drug to be delivered directly to the target tissue

**Enteral**

- Oral
- Sublingual
- Rectal

**Parenteral**

- Inhalation
- Injection
- Topical/ transdermal application

**Systemic Effects**

- Oral
- Injection
- Intranasal
- Oral inhalation
- Sublingual
- Buccal
- Rectal

**Local effects**

- Ophthalmic (eye)
- Otic (ear)
- Topical (skin)

**Most immediate effects produced by:**

- Intravenous
- Inhalation (oral or nasal)
- Sublingual absorption
- Drugs administered orally may require 30 minutes before relief is provided.
- Liquids or powders dissolved in water will act more rapidly than tablets or capsules

## DRUG CONCENTRATIONS

A drug's most intense effects occur during the peak serum concentration. (when the highest level of the drug is circulating through the bloodstream.)

**ADME Process**

- Absorption
- Distribution
- Metabolism
- Excretion/Elimination

### ABSORPTION

For a drug to produce a therapeutic effect, it must be absorbed into the bloodstream and distributed through the circulatory system. It requires the drug molecules to move across a membrane through either:

- Simple diffusion
- Facilitated diffusion

Drugs taken by mouth pass to the stomach and then the intestines. They are absorbed from the GI tract into the circulatory system. Lipid-soluble drugs can easily pass through the Blood Brain Barrier or BBB to affect the CNS. Exercise decreases the absorption of drugs taken by mouth. Blood is diverted away from the GI tract to the skeletal muscles. When the body absorbs less of a drug, the therapeutic effectiveness is decreased. It can be affected by the bioavailability: amount of drug "active" in the tissues.
Example- If the drug's bioavailability is 50%, the body will only absorb 250 mg of a 500 mg dose
Naproxen Sodium: bioavailability is 95%

### DISTRIBUTION

Once absorbed into the bloodstream, the drug is distributed to target sites throughout the body. Exercise increases the distribution of most drugs. Distribution is affected by a drug's lipid solubility.

Drugs with high lipid solubility can easily penetrate fat stores and cross membrane barriers giving a broader distribution. Water soluble drugs can be easily eliminated from the body. Fat soluble drugs can be stored in the body, providing longer lasting effects.

### METABOLISM

Clearing process breaks down substances into water soluble form for easy elimination.

- Primary site - liver
- May also occur in the kidneys, GI tract, and lungs

Exercise can decrease the clearance of some drugs due to the blood being diverted away from the GI, kidneys, and liver to the working skeletal muscles. However, since the duration of the drug's effect is usually longer than an exercise session, the overall effect of exercise on drug metabolism is insignificant.

### ELIMINATION OR EXCRETION

Exercise can slow the rate of excretion since blood flow will be diverted away from the kidneys to the skeletal muscles. Excretion rate is also affected the drug's half-life.
Half-life: time required for the body to eliminate one-half of a dosage of a drug by regular, physical processes.
Example- If a drug has a half-life of 8 hours, it will take 8 hours for the blood concentration of the drug to be decreased by 50%.Naproxen has a half-life of 12-17 hours.
Water soluble drugs will have shorter half-life than lipid soluble drugs. Lipid soluble drugs will remain in the system the longest.

## Pharmacodynamics

Drug dynamics (pharmacodynamics) involves what a drug does to the body. Drug dynamics describes the therapeutic effects of drugs (such as relief of pain and reduction of blood pressure) and their side effects. But drug dynamics also describes where (the site) and how (the mechanism) a drug acts on the body. A drug's effects on the body may be influenced by many factors, such as a person's age and genetic makeup and disorders the person has other than the one being treated.

For drugs to work, they must bind with a receptor. The receptor can be a molecule within a cell or on the cell membrane. Relationship between a drug and its receptor is much like a "lock and key" configuration. Bind to a target to either activate or inactivate it. Most drug targets are proteins. Common drug targets include:

- Receptors
- Enzymes
- Ion channels
- Transporter molecules

Drug dosing: based on the drug's potency, patient's age, patient's condition.
Potency: strength of the drug; the greater the potency, the smaller the dose needed to produce therapeutic effects.

**Examples of Drug Dosing**

- Aspirin
  - Usually manufactured in 325 mg tablet
  - Typical dose= 2 tablets per 4 hours
- Ibuprofen
  - Typical dose = 400 mg


Many Factors Affect Drug Response

## DRUG INTERACTIONS

They occur when one drug alters the effect of another drug. They may change how the body handles one or both of the drugs and may change the way a drug acts on the body. It can be additive or inhibi-

tive. Additive effects occur when someone takes two drugs of the same type at the same time. i.e. two stimulants or two depressants. The effects of the drug "add" together.

Drug interactions may make drugs less effective, cause unexpected side effects, or increase the action of a particular drug. Some drug interactions can even be harmful to the patient.

Drug interactions fall into three broad categories:

- Drug-drug interactions occur when two or more drugs react with each other. This drug-drug interaction may cause one to experience an unexpected side effect. For example, mixing a drug taken to help one sleep (a sedative) and a drug taken for allergies (an antihistamine) can slow one's reactions and make driving a car or operating machinery dangerous.
- Drug-food/beverage interactions result from drugs reacting with foods or beverages. For example, mixing alcohol with some drugs may cause one to feel tired or slow your reactions.
- Drug-condition interactions may occur when an existing medical condition makes certain drugs potentially harmful. For example, if one has high blood pressure they could experience an unwanted reaction if they take a nasal decongestant.

Every drug should actually be packed with instructions showing the possible drug interactions. These should be discussed with the patient.

**Additive effects (agonistic)**

Diet pills (appetite suppressant) which is a stimulant combined with several cups of coffee, also a stimulant may cause heart palpitations, jitteriness, and insomnia.
Drug interactions can easily occur through innocent use of OTC medications.

- Medications for colds/allergies
- Inhibitory effects many occur with the combination of two unrelated drugs

**Inhibitory effects (antagonistic)**

Some antibiotics may inhibit or reduce the effectiveness of oral contraceptives. Aspirin may increase the effects of insulin. Dairy products may reduce the effectiveness of tetracycline.
Alcohol ingested with aspirin may cause GI bleeding. Chronic alcohol consumption and acetaminophen can cause permanent liver damage.

**Adverse Drug Reactions**

Reactions range from a side effect to hypersensitivity. Examples of side effects: drowsiness, loss of appetite. Examples of hypersensitivity: allergic reactions that range from simple rash to bronchial spasm or anaphylactic shock.
They can occur immediately or be delayed. Most delayed effects occur with chronic use of a drug. Example - Chronic use of paracetamol has been linked to liver damage.

# Prescription Writing

## STEPS IN DRUG PRESCRIPTION AND ADMINISTRATION

### 1. Write the Prescription

The six "rights" of drug prescription are:

- Right patient
  - Check the name, address and age of the patient before you write the prescription.
  - Make sure the charts have the same name, address and age as the patient.

- Right drug
  - Use correct spelling and concentration ( Lidocaine 1%).
  - Write the generic name not the brand name.

- Right dose
  - Check clinical guidelines
  - If medicine is dose for weight you must weigh the patient accurately before writing the prescription.

- Right time
  - How many times each day
  - What exact time (morning, afternoon, bedtime)
  - How many days in total the patient must take the medication.

- Right route
  - For example oral, subcutaneous, intramuscular, intravenous.

- Right documentation
  - Write clearly and easy to read on the prescription. If you make a mistake, cross out and sign.
  - Date of prescription
  - The patient's full name, address and age
  - Diagnosis
  - Name of drug, dose, frequency, route, total days to take it
  - Name, signature and position of the prescriber.
  - Additional instructions such as "take with food", "maximum eight tablets in 24 hours.

## STEPS IN DRUG PRESCRIPTION AND ADMINISTRATION

**1. Different Abbreviations to use for writing prescriptions**

| | |
|---|---|
| tab | tablet |
| cap | capsule |
| syr | syrup |
| fl | fluid or liquid |
| ung | ointment |
| gt (gtt) | drops |
| | |
| am | in the morning |
| pm | in the afternoon |
| nocte | in the night time |
| | |
| od | once a day |
| bid | twice a day |
| tid | three times a day |
| qid | four times a day |
| stat | immediately |
| prn | as required |
| | |
| Oh, hrly | every hour |
| Q2h, 2hrly | every 2 hour |
| Q6h, 6hrly | every 6 hours |

| | |
|---|---|
| po | by mouth (oral) |
| ng | by nasogastric tube |
| pr | by rectum (rectal) |
| top | to the affected area (topical) |
| sc | subcutaneous injection |
| im | intramuscular injection |
| deep im | deep intramuscular injection |
| iv | intravenous injection |
| slow iv | slow intravenous injection |

**No abbreviation**

- intranasal
- intradermal
- right eye
- left eye
- both eyes

**2. Prepare the Medicine**

The pharmacist will do this.

**3. Dispense the Medicine (OPD)**

The pharmacist will do this but the medic should also confirm the patient has been given the right medicine clearly labeled.

**4. Administer the Medicine (IPD)**

Check the prescription or the patient chart. Check that the medicine is prepared correctly. Before administering medicine, ALWAYS check first it is the right patient. Make sure patient condition is ok to take the medicine. Administer the correct medicine in the correct way. Complete all the documentation (stock card, sign on patient chart in IPD).

**5. Educate the Patient (OPD and IPD)**

- Action of medicine - make the patient understand why he must take the medicine. If the patient understands why he takes the medicine he will more likely to take it.
- How to take - and also explain to the patient all of additional instructions and any special instructions.
- Side effects – if the patient understands the side effects of the medicine he will not be afraid. Will not stop taking the medicine if he has the side effects.
- Reporting to the clinic - explain about what problems must come to the clinic or tell the CHW. For example if the symptoms get worse or if some new symptoms, or some side effects

**Unwanted drug actions**

- Side effect: side effects are bad responses to medication. They can be mild or severe. Example would be gastric burning caused by aspirin
- Allergic response: The patient is allergic to the drug. The body develops rashes, itching, or swelling of the skin.
- Anaphylactic reaction: a severe form of allergic reaction that is life threatening. The patient develops severe shortness of breath, or stridor. The patient may stop breathing, or may have cardiac collapse.

# Administering Drugs

## ROUTES OF ADMINISTRATION

A route of administration is the way that a drug, fluid, poison or other substance is brought into contact with the body.

**Classification**

- Topical: effect is local, substance is applied externally where it must affect.
- Enteral: effect is systemic (non-local), substance is given via the digestive tract
- Parenteral: effect is systemic, substance is given internal by other routes than the digestive tract

**Topical administration**

| Types | Positions | Examples |
|---|---|---|
| Cutaneous | Skin | Cream, Lotion, Powder<br>e.g. : steroid cream, calamine |
| Inhalational (inh) | Breath it | Asthma medication<br>e.g. : ventolin, becotide |
| Eye drops | Conjunctiva | Antibiotic for conjunctivitis<br>e.g. : terramycin ointment |
| Ear drops | External ear | Steroids, Antibiotic for otitis externa |
| Vaginal (pv) | Vaginal | Antibiotic cream or Suppositories<br>e.g. : clotrimazole |

**Enteral administration**

| Types | Positions | Examples |
|---|---|---|
| Oral ( po ) | Mouth | Antibiotic |
| Sublingual ( sl ) | Under the tongue | Nitroglycerine, nifedipine |
| Rectal ( pr ) | Rectal | suppositories, enemas |

**Parenteral administration**

| Types | Positions | Examples |
|---|---|---|
| Sucutaneous injection (sc) | Under the skin | Insulin |
| Intramuscular injection (im) | Into the muscle | Gentamycin |
| Intravenous injection (I V) | Into the vein | Ceftriaxone |

Medicines come in many different forms, depends on the route of administration.

## ADMINISTERING TOPICAL DRUGS

### Ear

Localized infection or inflammation of the ear is treated by dropping a small amount of a sterile medicine into the ear. Very low dosages of medication are required. The medication must indicate it is for ear usage.

**A: Equipment**

- Medicine bottle with dropper or 1 cc syringe.

**B: Prepare for drug administration**

- Wash hands.
- The medication should be at room temperature. If it is in refrigerator, take some time.

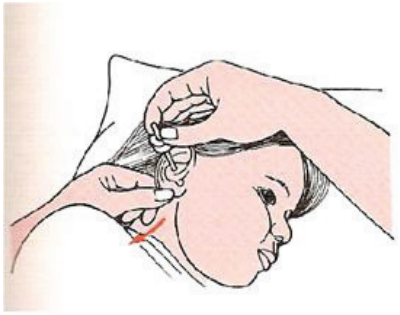
**C: Perform drug administration (Diagram 1)**

Patient should lie on his side and the affected ear is up. Shake the container well and draw the medication up into the dropper. In infants, gently pull the earlobe downward. In adults and children, gently pull the earlobe up and back. This will straighten the external canal so that the medication may be dropped into canal.
Put the right number of drops in the ear. Do not touch the dropper to the ear. The patient is to remain on the side for 5 minutes to allow the medication to coat the surface of the inner canal. Insert a cotton ball if ordered. Repeat in the other ear if indicated.

**D: Complete the procedure.**

- Note on the chart the time that the medication was given and sign your name.
- Wash your hands.

**Diagram 1: administering medication to the ears.**



**A. Pull earlobe downward in a child.**

**B: pulls upward in an adult.**

**Eye**

Sterile drops or ointments in very low dosages may be applied to the eye. The medication must indicate it is for eye usage.

**A: Equipment**

- Eye Medicine should be at room temperature
- Gloves.
- Normal saline.
- Cotton balls.

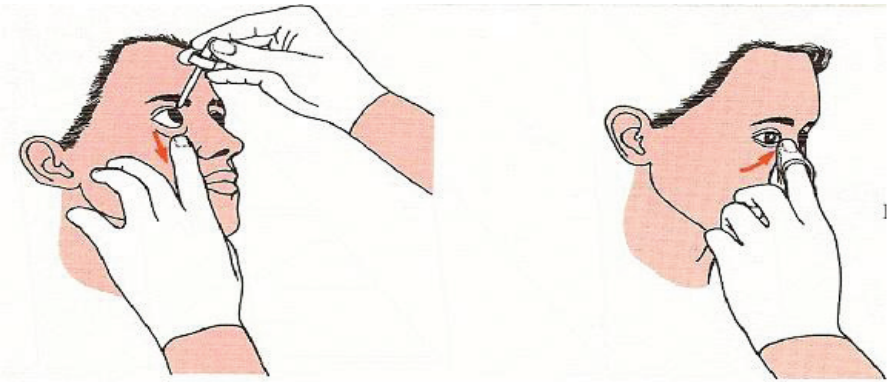
**B: Prepare for drug administration**

- Wash hands.
- Put on gloves.
- Clean the eyes with normal saline.

**C: Perform drug administration (Diagram 2)**

Use cotton balls to wipe eye from the nasal side out. Infants may need to be restrained. Tell the patient to look up, and pull out the lower lid to show the conjunctiva sac. Drop the medication or squeeze the ointment into the conjunctiva sac, not onto the eye itself. Do not touch the eye with the equipment. Using the cotton balls, press the inner corner of the eyelid for 1 minute to prevent medication from draining rapidly into the nose. Tell the patient to blink rapidly a few times.

**Diagram 2: Administering medications to the eyes**



**D: Complete the procedure.**

- Note on the chart the time that the medication was given and sign your name.
- Wash your hands.

**Nose**

Nasal solutions act locally to treat minor congestion or infection. Less medication is required with the spray. There are many blood vessels in the nose so and the medication is absorbed rapidly and acts immediately.

**A: Equipment**

- Nasal medicine
- Cotton bud or bottle with dropper or 1 cc syringe or spray.

**B: Prepare for drug administration**

- Wash hands.

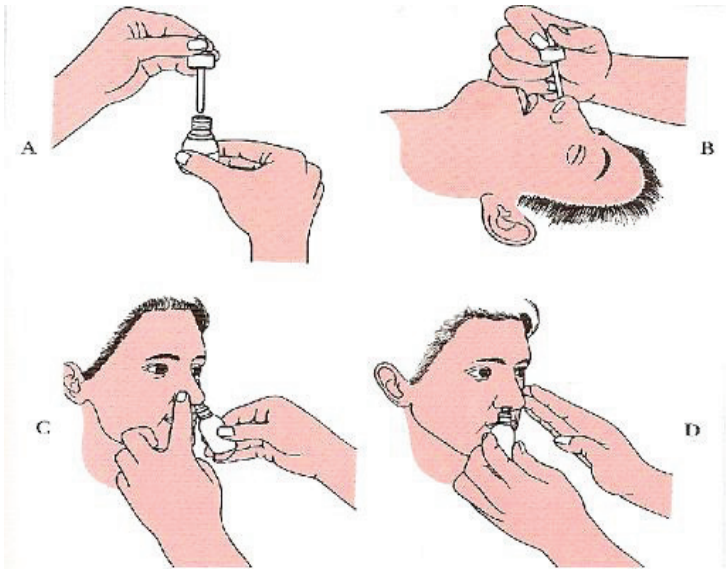



**Diagram 3: Administering medications to the nose (A-B drops) : Administering medications to the nose (C-D spray).**

**C: Perform drug administration (Diagram 3)**

Tell the patient to clean the nose by blowing. Make the patient lie down on his back with the head hanging over the side of the bed. Infants and children must be held by their parent and gently restrained. Draw the medicine into the dropper, administer the correct number of drops into one nostril Repeat administration for the other nostril.
If a nasal spray is used, the patient sits upright, one nostril is blocked, and the tip of the nasal spray is inserted into the nostril. As the patient takes a deep breath, one puff of spray is squeezed into the nostril. After administration, the patient must hold their head back for a few minutes.

**D: Complete the procedure.**

- Note on the chart the time that the medication was given and sign you name.
- Wash your hands.

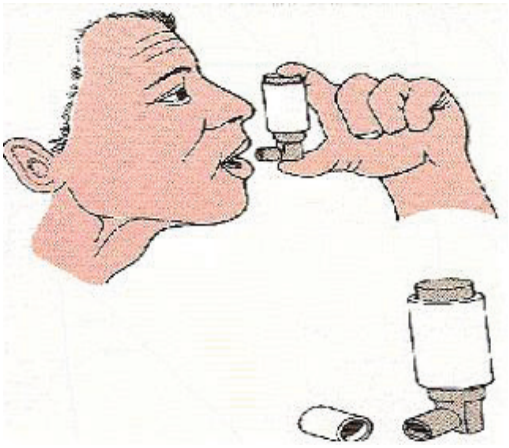
**Metered- dose inhalers**

Used to deliver specific amounts of medication to nasal or lung tissue. These small canisters force the medication out and break it up into small particles that can be carried deep down in the lungs. The medication is carried directly to the site of action. The onset of action is rapid.

**A: Equipment**

- Canister containing medication.

**Diagram 4: metered-dose inhaler.**



**B: Prepare for drug administration**

- Wash hands.

**C: Perform drug administration (Diagram 4)**

Shake the canister. Patient sits up, holding the canister 1 to 2 inches in front of the mouth. The patient should breath deeply and regularly 2 or 3 times. When ready, the patient must squeeze the spray into the mouth at the beginning of inspiration. It is important to squeeze the canister at the right time so that the medication travels with the breath and it is not just sprayed on the back of the throat. The patient should hold the breath as long as possible before exhaling. Repeat if indicated by the prescription.

**D: Complete the procedure.**

- Note on the chart the time that the medication was given and sign your name.
- The canister must be kept clean with water or alcohol wipe.
- Wash your hands.

**Oral**

This is the most common method. It is relatively easy and a wide variety of pharmaceutical forms is available.

**A: Equipment**

- Medicine tray
- Medicine cup or syringe

**B. Prepare for drug administration**

Wash your hands. Read the order on the medication card. Compare medication with label on container. Check for right patients, drug, route, dosage, and time of administration.

Open the container and put the correct number of tablets or capsules into the medication cup. Do not touch the medicine with your hand, use the spatula. For liquids pour into measuring cup or use syringe.
Close medicine container, and check the information again with the medication card. Put the medication container back on the shelf. In the correct place. Place the cup or syringe containing the medication next to the treatment card on the tray. Repeat this process for each medication order for the patient. All of the tablets for one patient may be place in the same medication cup.

**C. Perform drug administration.**

Go the patient's bedside. Ask patient his name and address. Check it is the same on the IPD chart and treatment card that you are using. Explain what you are giving and answer any of the patient's questions. Give any special instruction or patient education as indicated.
The patient place medication in the back of the mouth take a sip of water, and swallow. Most medication dissolves better and cause less stomach discomfort when it is taken with adequate liquid. Remain at the bedside until the medication is swallowed. Do not leave medication at the bedside for the patient to take later. You are responsible for making certain the medication is given when order.

**D. Complete the procedure**

- Note on the chart the time that the medication was given and sign your name.
- Clean the medication tray. Wash your hands.
- Check the patient again and report any adverse effects.

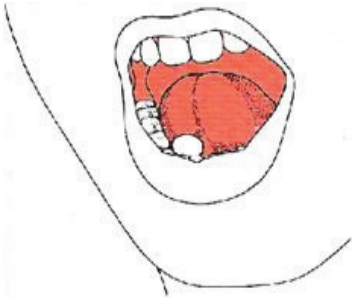


**Diagram 5: Administering sublingual medications.**

**Sublingual (Diagram 5)**

The patients put the tablet or capsule under the tongue where it dissolves. The medicine is rapidly absorbed through the blood vessels and enters the systemic circulation. This site is used for nitroglycerine tablet to relieve angina pain and nifedipine capsules for severe hypertension.

**Rectal**

Some patients are unable to take oral medication but rectal can be given for:

- Emergency treatment of convulsions (diazepam)
- Infants (paracetamol)
- Vomiting (paracetamol, metronidazole)
- Too sick to take medicine (paracetamol)

**A: Equipment**

- Medicine tray
- Lubricant (KY jelly)
- Gloves

**B. Prepare for drug administration**

- Wash your hands
- Read the order on the medication card.
- Compare medication with label on container. Check for right patients, drug, route, dosage, and time of administration
- Obtain the proper number of suppositories.
- Place the cup containing the medication on the tray.

**C: Perform drug administration**

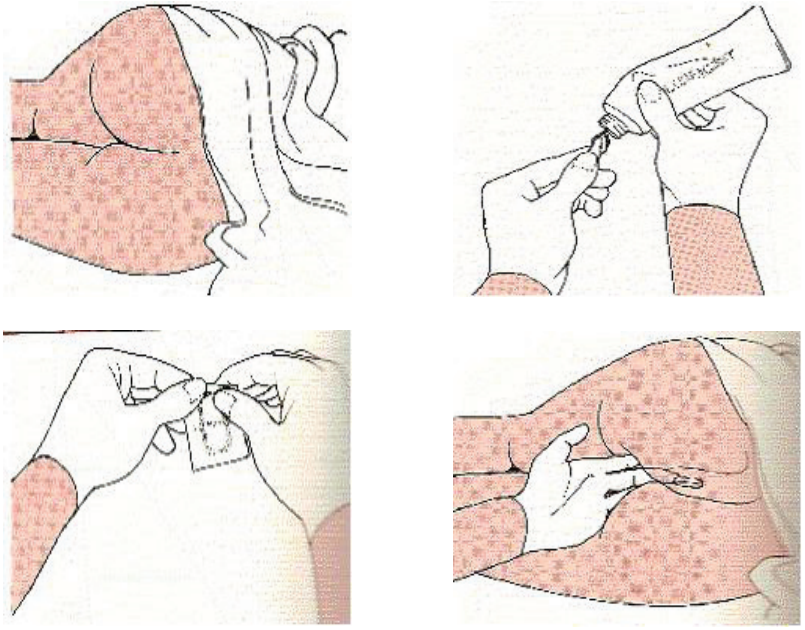
Go the patient's bedside. Ask patient his name and address. Check it is the same on the IPD chart and treatment card that you are using. Explain what you are giving and answer any of the patient's ques-

tions. Give any special instruction or patient education as indicated. Help the patient to lie on his side (Diagram 6).
Put on the gloves. Remove the suppository from the foil packet and place a small amount of KY jelly on the tip of the suppository and on the inserting finger. Tell the patient that you are ready to begin.
Hold the suppository at the anus for a few seconds, and tell the patient to take deep breaths in and out.
Use your finger to push the suppository into the rectum about 1 inch.
If more than one suppository is indicated, insert up to two at the same time. Or you should insert a second suppository immediately after the first. The patient should remain on the side for about 20 minutes.

**D. Complete the procedure**

- Note on the chart the time that the medication was given and sign your name.
- Dispose of the foil packet or plastic containers and the gloves.
- Clean the medication tray. Wash your hands.
- Check the patient again and report any adverse effects.

**Diagram 6: Administering rectal medications**

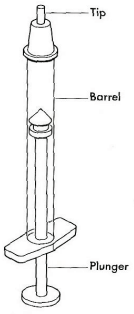


## Injection

An injection is a method of putting liquid into the body using a needle and a syringe. Depends on the route and the specific medicine, the effect of the injection can be local or systemic.
There are generally four types of injection.

- Subcutaneous (sc)
- Intramuscular (im)
- Intradermal
- Intravenous (iv)

There is greater emphasis on sterile technique in giving parenteral medication, because the risk for infection is high. There is also a need to correctly determine the proper sites for the injection.



**A. Equipment**

**1. Syringe**

Syringes are available in 1,3, 5, 10, 20, and 50 ml sizes. Syringes are made of plastic or glass. Syringes are made up of three main parts.

- The tip is the end of the syringe for attaching the needle.
- The barrel is the container for the medication.
- The plunger is the inner portion that fits into the barrel.


**2. Needle**

The hub is the part that attaches to the syringe.

Suggested guide for selecting syringe and needles.

| Route | Gauge | Length (Inches) | Volume to be injected |
|---|---|---|---|
| Intradermal | 25 to 27 G | 3 /8 to 1/2 | 0.01 to 0.1 ml |
| Subcutaneous | 25 to 27 G | ½ to 1 | 0.5 to 2 ml |
| Intramuscular | 20 to 22 G | 1 to 2 | 0.5 to 2 ml |
| Intravenous | 15 to 22 G | ½ to 2 | Unlimited |

**3. Medicine tray**

**4. Alcohol swabs**

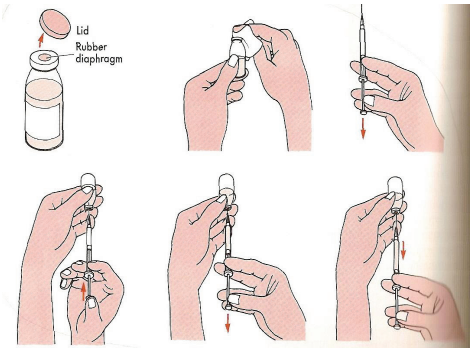
**5 Gloves**

**B. Prepare for drug administration.**

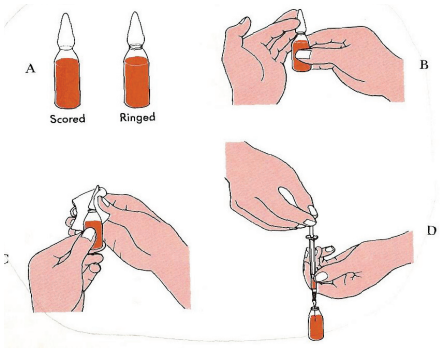
- Wash your hands.
- Check for the right patient, drug, route, dosages, and time of administration.
- Compare the medication card with the label on the container.
- Attach the correct needle to the syringe, keeping the needle covered with a cap. If the medicine is in a multi dose vial with a rubber stopper, use a 22 – 24G needle to withdraw the medication, then change to a new sterile needle for the injection.
- Prepare the medicine by opening the ampoule or other container.
- Insert the needle into the medication container and fill the syringe with the proper amount of medication.
- Point the needle up and tap the barrel of the syringe so air moves into needle and can be removed. Then check again that you have the correct amount of medicine in the syringe
- Compare the medication card with the label on the used container again.
- Put the unused medication containers back on the shelf in the correct place.

**Diagram 7: Prepare injections**

**Prepare injection from vial**




**Prepare injection from ampoule**



- Do not mix more than one medication in syringe
- Place the syringe and alcohol swabs next to the medication card on the tray.

**C. Perform Drug Administration**

*I. General Guidelines*

Go the patient's bedside. Ask patient his name and address. Check it is the same on the IPD chart and treatment card that you are using. Explain what you are giving and answer any of the patient's questions. Give any special instruction or patient education as indicated.

Put on gloves and use an alcohol wipe to clean the skin. Following the specific procedure for intradermal, subcutaneous or intramuscular injection, insert the needle firmly. Pull back slightly on the plunger.

If blood comes into the syringe remove, select another site for injection. If no blood, push the plunger down to give the medicine.

*II Specific Guidelines*

**a. Perform subcutaneous injection (sc)**

The maximum you can inject sc is 2cc. sc injections are absorbed slowly. The onset of medication action is slow, but it will last for a long time. For example, insulin and heparin are most frequently given subcutaneously.

**Technique**

Draw up the prescribed dose of medication and then add 1 to 2 of air. Point the needle down and tap the syringe so the air is at the top. This will force all the medication into the tissue when it is injected and not leave any drops in the needle.

Press the skin flat with one hand, insert the needle at a 45-degree angle with the other hand. On the abdomen it is often easier to grasp the skin with your hand, pull it up into a small roll, and insert the needle quickly at a 90-degree angle.

Although it is the policy to always aspirate for blood you must not aspirate when you are injecting heparin.

**Diagram 8: Administering subcutaneous injections**

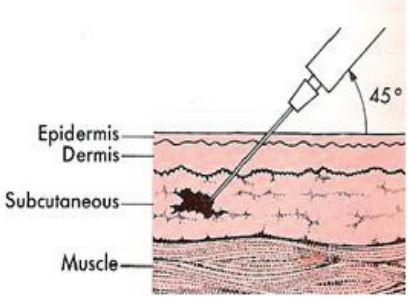
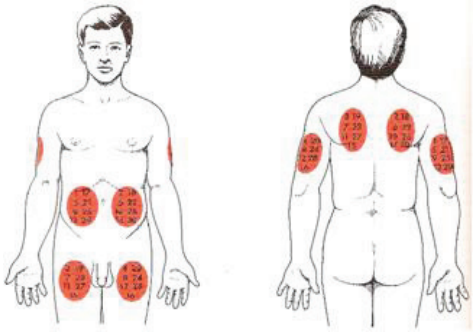



**Diagram 9: Body sites for subcutaneous injections**



**b. Perform intramuscular injection (im)**

The medication is injected deep into the muscles. The muscles contain large blood vessels and nerves, and it is important to take care you do not damage them. The rich blood supply means the medicine is absorbed rapidly and completely.

Five muscle sites are commonly used:

- Deltoid: No more than 2 cc may be injected here (less in children),

- Dorsogluteal: A common injection site for adult. However, it is not developed enough to be used for children under 3 years of age.
- Rectus femoris: It is used in both children and adult, especially for self-injection.
- Vastus lateralis: The preferred site for IM injection in infants; it is also a good site for healthy adult.

**Technique**

Carefully select and expose the site before picking up the syringe. Insert the needle firmly, usually at a 90-degree, past the skin and subcutaneous tissue.

**Diagram 10: Administering intramuscular injections**

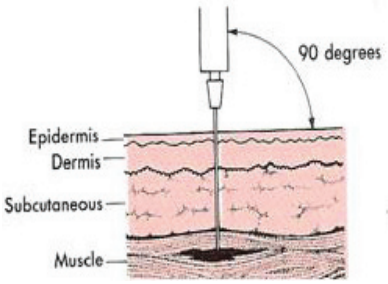
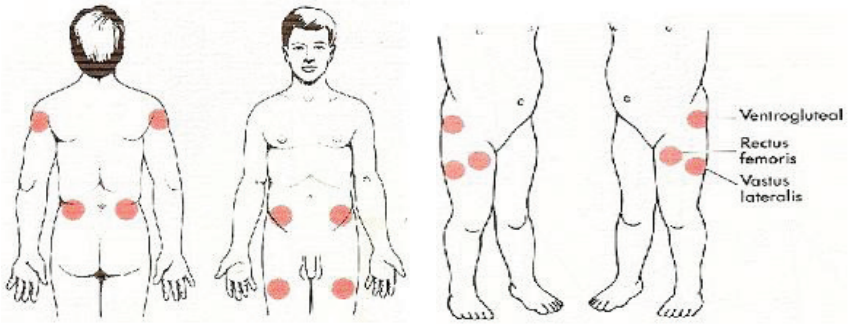



**Diagram 11: Body sites for intramuscular injections**

**ADULT**




**CHILD**

**c. Perform intradermal injection**

Intradermal injections are used for vaccination and local anesthetics. The blood supply to this area of the skin is less than in other areas, resulting in very slow absorption.

**Technique**

- Insert the needle firmly at a 15-degree angle. The bevel of the needle should be pointing upward.
- As you inject the medicine you should see a small lump appear at the injection point.

**Diagram 12: Administering intradermal injection**

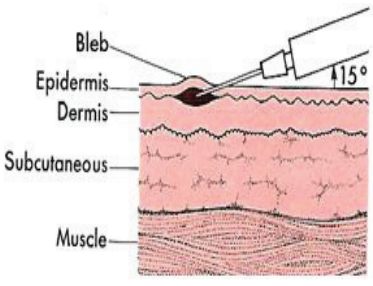
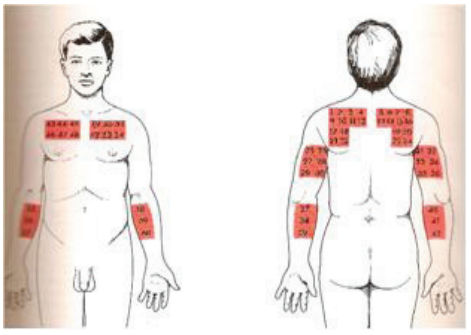



**Diagram 13: Body sites for intradermal injection**



**D. Complete administration of injections.**

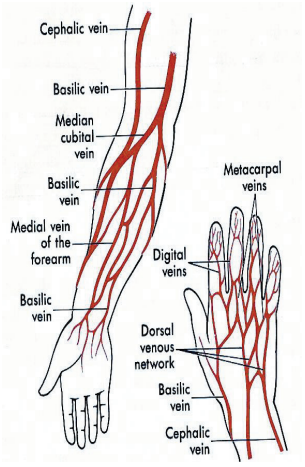
- Dispose of the syringe and needle. Do not attempt to put the cap back on the needle, because you may accidentally injure your self.
- Note on the chart the time that the medication was given and sign your name.
- Clean the medication tray. Wash your hands.
- Check the patient again and report any adverse effects.

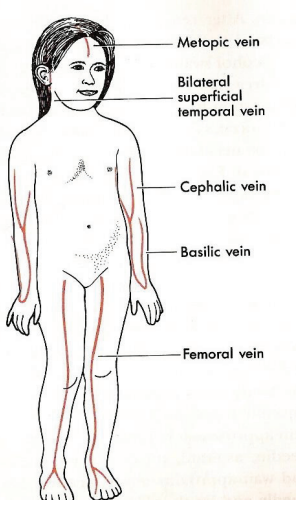
**d. Perform intravenous injection**

The intravenous route is used when medicine needs to enter the bloodstream directly. More skill and care is needed to administer medication intravenously than with other routes. The effect of the medications is immediate, and mistakes may produce serious problems for the patient. The iv medicine is given through a cannula that stays in the vein.

In some emergency conditions, named senior staff can give specific medicines directly into a vein without using a cannula. You must be very careful to look for and prevent infection at the site of the cannula.

ADULT




CHILD

**Diagram 14 : Sites used for intravenous injection**

## COMMON PROBLEMS WITH IV ADMINISTRATION

| Problem | Symptoms and Signs | Action |
|---|---|---|
| Infection | Pain redness fever malaise | Remove cannula and put it in the other arm. |
| Infiltration (fluid in the body tissue) | pain swelling necrosis | Remove cannula and put it in the other vein. Apply hot compress. |
| Blockage | solution will not flow into vein | Flush cannula with 2cc of normal saline. Adjust position of needle. Check for problems with giving set. |
| Allergy or anaphylaxis | New onset rash, dyspnoea, stridor, face swelling | Stop infusion/injection. Immediately inform senior medic. |
| Circulation overload | New onset of dyspnoea, facial oedema, chest pain, lung crepitations | Stop infusion. Immediately inform senior medic. |

We use three kinds of iv administration.

- iv push or iv bolus.
- Continuous infusion
- Intermittent infusions uses a reservoir (buret) to allow intermittent administration of iv medicine and solutions. Can be used to give iv bolus very slowly for example in babies and children.

**Equipment:**

- Alcohol swabs
- 2cc syringe containing sterile normal saline solution.
- Unsterile gloves
- Syringe and needle containing the medicine
- Bottle containing the iv solution for infusions

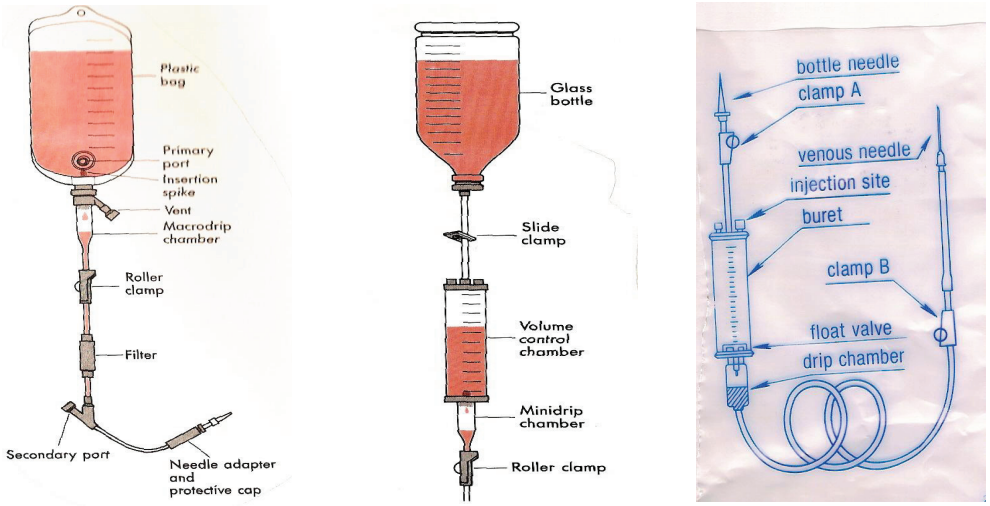



**Diagram 15: Equipment for iv infusion**
**A. Continuous infusion: iv bag with giving set attached**
**B. Intermittent infusion: infusion set attached to iv bottle**
**C. Intermittent infusion: reservoir (buret) and tubing**

## IV PUSH OR IV BOLUS.

<u>iv push or iv bolus</u> means to administer a single dose of the medicine from the syringe and needle directly into the cannula

**Prepare for drug administration.**
Go the patient's bedside. Ask patient his name and address. Check it is the same on the IPD chart and treatment card that you are using. Explain what you are giving and answer any of the patient's questions. Give any special instruction or patient education as indicated.

Check the skin around the iv cannula for signs of swelling, infection, pain and tenderness. Put on gloves and clean the outside of the cannula with alcohol.

Insert syringe containing normal saline into port and press plunger gently. If it is not possible to inject the normal saline, or if injection causes pain or swelling, consider one of the problems. If necessary, adjust or resite the cannula.

**Administer iv bolus injection.**
Insert syringe containing medicine into port and press plunger to inject the medicine according to special instructions. Following drug administration, insert saline syringe and flush reservoir slowly. Continue to press the plunger while you remove the syringe.

## CONTINUOUS INFUSION

**Continuous iv infusion** is the administration of a solution from the bag of solution through an iv giving set.
iv solutions come in large volume bottles. The largest size is 1000cc. A patient receiving an intravenous infusion should be checked hourly, and the rate of infusion should be closely monitored. Intake and output records should be closely monitored.

**Prepare the infusion.**
Wash your hands. Check for the right patient, drug, route, dosages, and duration of administration. Compare the medication card with the label on the bottle. Check expiry date on the bottle.

Check that the solution in the bottle is clear, and that the bottle is not leaking. Calculate the drip rate for the prescribed dose and duration. Write it on the bottle. Holding the bottle upright, remove the protective cap. Clean the rubber stopper with an alcohol wipe. Open the packet containing the giving set. Remove any twists from the giving set and close the clamp. Remove the guard from the bottle-needle. Holding the drip chamber, insert the bottle-needle of the giving set into the rubber stopper of the bottle.
Hang up the bottle. Holding the rubber collar, remove the protector from the tip of the giving set. Open the clamp, allow solution to run until it comes out at the tip of the giving set then close the clamp. Ensure there are no large air bubbles in the giving set tubing. Replace the guard at the tip.
With the clamp closed, squeeze the drip chamber so that some solution stays in it. Do not allow the fluid level in the drip chamber to go above the marked line.

Prepare for drug administration. (See under iv push)
*Administer continuous iv infusion.*

- Remove the guard from the tip of the giving set.
- Insert the tip securely into the iv cannula. Use tape to keep the position.
- Open the clamp and check that fluid flows freely into the iv cannula.
- Adjust the clamp to obtain the correct number of drops per minute.

**Complete the procedure.**

- Note on the chart the time that the medication was given/started and sign your name.
- Dispose of alcohol wipes, needles and other waste.
- Clean the medication tray. Wash your hands.
- Check the patient and report any adverse effects.
- Infusions should be checked regularly.

## INTERMITTENT INFUSION

It uses an infusion set with a reservoir (buret) to allow intermittent administration of IV medicine and solutions. Can be used to dilute an IV bolus and give it very slowly, for example in babies and children.

**Prepare the infusion.**

Wash your hands. Check for the right patient, drug, route, dosage, and duration of administration. Compare the medication card with the label on the bottle. Check expiry date on the bottle. Check that the solution in the bottle is clear, and that the bottle is not leakin.

Holding the bottle upright, remove the protective cap. Clean the rubber stopper with an alcohol wipe. Open the packet containing the infusion set. Remove any twists. Open both clamps. On the label of the infusion set, read the number of drops per ml (cc). Calculate the drip rate for the prescribed dose and duration.

Remove the guard from the bottle-needle. Insert the bottle-needle straight through the rubber stopper of the IV bottle. Close both clamps and hang up the bottle. Insert air needle straight through rubber stopper of iv bottle. Open clamp A and allow required amount of fluid to enter the buret. Close clamp A. Squeeze and release the drip chamber until it is half filled to prevent air from entering the blood stream. Do not fill the drip chamber completely.

Remove the protector from the tip of the infusion set. Open clamp B, allow solution to run until it comes out at the tip of the infusion set then close clamp B. Ensure there are no large air bubbles in the tubing. Replace the protector at the tip. Open clamp A and adjust the fluid amount in the buret. Close clamp A. Add the medicine from the syringe through the injection site of the infusion set.

Prepare for drug administration. (See under iv push)
*Administer intermittent iv infusion.*

- Remove the protector from the tip of the infusion set.
- Insert the tip securely into the iv cannula. Use tape to keep the position.
- Open clamp B and check that fluid flows freely into the iv cannula.
- Adjust clamp B to obtain the correct number of drops per minute.

*To fill buret again for a new infusion,*
Close clamp B. Open clamp A and allow required amount of fluid to enter the buret. Close clamp A. Squeeze drip chamber slightly to release the float valve from the bottom of the buret. Adjust clamp B to obtain the correct number of drops per minute.

**Complete the procedure.**

- Note on the chart the time that the medication was started and sign your name
- Dispose of alcohol wipes and other waste
- Clean the medication tray. Wash your hands.
- Check the patient and the infusion regularly. Report any adverse effects

## Calculating Drug Dosage

Measurement Units means how do you describe the size of the dose you will give. The size of the dose means the WEIGHT of the dose.
Weight

- Kilogram kg
- Gram gm
- Milligram mg
- Microgram mcg

| | |
|---|---|
| 1 kg = 1000 gm | 1 gm = 0.001 kg |
| 1 gm = 1000 mg | 1 mg = 0.001 gm |
| 1 mg = 1000mcg | 1mcg = 0.001 mg |

Medicine Unit refers to the pharmaceutical form of the drug. It describes the drug preparation.
One medicine unit can be -

1 tablet
1 capsule
1 ampoule

Or
A volume of liquid

For example:
Paracetamol 500mg per one tablet
- The measurement unit is mg
- The medicine unit is one tablet

Phenobarbitone syrup 60mg per 5cc
- The measurement unit is mg
- The medicine unit is 5cc

Diazepam 5mg
- The measurement unit is mg
- If you use tablets (5mg per tablet) the medicine unit is one tablet
- If you use injection (10mg per 2cc) the medicine unit is 2cc

*Example 1: How many tablets to give for 250mg of Paracetamol*

| | |
|---|---|
| From the medicine bottle, read how many measurement units are contained in each medicine unit and write as a fraction.<br>***Paracetamol 500mg per one tablet*** | $\frac{500\ mg}{1}$ |
| Note how many measurement units should be given.<br>***Paracetamol 250mg***<br>divide by N.<br>(N means the unknown number of medicine units) | $\frac{250\ mg}{N}$ |
| Write down the two fractions as an equation. | $\frac{500\ mg}{N} = \frac{250\ mg}{1}$ |
| Cross multiply the equations | $\frac{500\ mg}{N} \times \frac{250\ mg}{1}$ |
| Straight line equation again | 500mg x N = 250mg x 1 |
| Solve N | $N = \frac{250mg \times 1}{500\ mg} = \frac{1}{2}$ |
| Answer: Number of tablets (N) = ½ (half tablet) | |

Example 2: How much syrup to give for 120mg of phenobarbitone

| | |
|---|---|
| From the medicine bottle, read how many measurement units are contained in each medicine unit and write as a fraction.<br>***Phenobarbitone 60mg per 5cc*** | $\frac{60\ mg}{5\ cc}$ |
| Note how many measurement units should be given.<br>***Phenobarbitone 120mg***<br>divide by N.<br>(N means the unknown number of medicine units) | $\frac{120\ mg}{N}$ |
| Write down the two fractions as an equation. | $\frac{60\ mg}{5} = \frac{120\ mg}{N}$ |
| Cross multiply the equations | $\frac{60\ mg}{5} \times \frac{120\ mg}{N}$ |

| | |
|---|---|
| Straight line equation again | 60mg x N = 120mg x 1 |
| Solve N | N = $\frac{120mg \times 5}{60\ mg}$ = 10 |
| Answer: Volume of syrup (N) = 10cc | |

## CALCULATE HOW MUCH TOTAL MEDICATION IS NEEDED (OPD)

**Drug order: Paracetamol 250mg bid for 5 days**

| | | |
|---|---|---|
| Calculate how many medicine units for one dose (N) | = | ½ tablet |
| Write down how many doses per day | = | 2 doses |
| Write down how many days | = | 5 days |
| Multiply all together = ½ x 2 x 5 | = | 5 tablets |

**Drug order: Phenobarbitone syrup 120mg od for one month**

| | | |
|---|---|---|
| Calculate how many medicine units for one dose (N) | = | 10cc |
| Write down how many doses per day | = | 1 dose |
| Write down how many days (1 month) | = | 30days |
| Multiply all together = 10 x 1 x 30 | = | 300cc |

Example 2: How much injection to give for 15mg of diazepam

| | |
|---|---|
| From the medicine bottle, read how many measurement units are contained in each medicine unit and write as a fraction.<br>***Diazepam 10mg per 2cc***<br>write as a fraction reduced to lowest terms | $\frac{10\ mg}{2\ cc} = \frac{5\ mg}{1\ cc}$ |
| Note how many measurement units should be given.<br>***Diazepam 15mg***<br>divide by N.<br>(N means the unknown number of medicine units) | $\frac{15\ mg}{N}$ |
| Write down the two fractions as an equation. | $\frac{5\ mg}{1} = \frac{15\ mg}{N}$ |
| Cross multiply the equations | $\frac{5\ mg}{1} \times \frac{15\ mg}{N}$ |
| Straight line equation again | 5mg x N = 15mg x 1 |
| Solve N | N = $\frac{15\ mg \times 1}{5\ mg}$ = 3 |
| Answer: Volume of injection (N) = 3cc | |

*Calculate infusion rate.*

The drop factor (drops per cc) is the number of drops per ml(cc) of fluid.

You must always read the infusion set or the iv bottle for the drop factor. The flow rate (drops per minute) is the rate at which iv fluids are given.

To calculate flow rate = $\frac{\text{Total of fluid to give}}{\text{Total time in minutes}}$ x Drop factor

Example: 1000cc Normal Saline in 4 hours. Drop factor is 15.

Flow rate = $\frac{1000}{(4 \times 60)^*}$ x 15 = 62.5 drops per minute.

Approximate: **Between 60 and 65 drops per minute.**

## Patient Adherence to Medication

Adherence is the degree to which a person takes prescribed drugs as directed.
Adherence to (compliance with) drug treatment is important. However, only about half the people who leave a doctor's office with a prescription take the drug as directed. Among the many reasons people give for not adhering to drug treatment, forgetfulness is the most common. The key question then is: Why do people forget? Sometimes, the psychologic mechanism of denial is at work. Having a disorder causes concern, and having to take a drug is a constant reminder of the disorder. Or, something about the treatment, such as possible side effects, may greatly concern the person, resulting in a reluctance to follow the plan.

### RESULTS OF NOT ADHERING

Most obviously, if a person does not adhere to treatment, symptoms may not be relieved or the disorder may not be cured. However, not adhering may have other serious or costly consequences. It is thought that up to 23% of nursing home admissions, 10% of hospital admissions, and many doctor visits, diagnostic tests, and unnecessary treatments could be avoided if people took their drugs as directed.

Not only does not adhering add to the cost of medical care, but it can also worsen the quality of life. For example, missed doses can lead to optic nerve damage and blindness in people with glaucoma, to an erratic heart rhythm and cardiac arrest in people with heart disease, and to stroke in people with high blood pressure. Not taking all prescribed doses of an antibiotic can cause an infection to flare up again and may be contributing to the problem of drug-resistant bacteria.

### CHILDREN AND ADHERENCE

Children are less likely than adults to take or be given drugs as directed.
Sometimes parents do not understand a doctor's instructions. Also, parents (and patients) forget, on average, about half the information 15 minutes after meeting with a doctor. They remember the first third of the discussion best and remember more about diagnosis than about the details of treatment. That is why doctors try to keep the treatment plan simple and often provide written instructions.

### OLDER PEOPLE AND ADHERENCE

Although adherence is probably not affected by old age itself, it is affected by several factors that are common among older people, such as physical or mental impairments, the use of more drugs, and an increased risk of drug-drug interactions and side effects. Taking several drugs makes remembering when to take each drug harder and increases the risk of adverse drug-drug interactions (see Factors Affecting Response to Drugs: Drug Interactions), particularly when over-the-counter drugs are also being taken. Doctors may be able to simplify the drug regimen—by using one drug that serves two purposes or by reducing the number of times a drug must be taken—to improve adherence and to reduce the risk of interactions.

Because older people are generally more sensitive to drugs than younger people, they are more likely to have adverse drug reactions and may require a lower dose of certain drugs.

## IMPROVING ADHERENCE

People are more likely to adhere to treatment if they have a good relationship with the medic and pharmacist. Such relationships involve two-way communication.

Communication can start with an information exchange. By asking questions, people can come to terms with the severity of their disorder, intelligently weigh the advantages and disadvantages of a treatment plan, and ensure that they understand their situation correctly. By discussing concerns, people can learn that denial of their disorder and misconceptions about their treatment can lead to forgetting to take drugs as directed, resulting in unwanted effects. You can encourage adherence by providing clear explanations about how to take the drugs, why the drugs are necessary, and what to expect during treatment. When people know what to expect from a drug, good and bad, they and the health care practitioners involved in their care can better judge how well the drug is working and whether potentially serious problems are developing. Written instructions help people avoid mistakes caused by poor recall of their discussions with the doctor and pharmacist.

Good communication is important, particularly when people have more than one health care practitioner, because it ensures that all practitioners know all the drugs prescribed by the others, and an integrated treatment plan can be developed. Such a plan can help reduce the number of side effects and drug-drug interactions and possibly result in a simpler drug regimen.

When people participate in decisions about their treatment plan, they are more likely to adhere. By participating, people take responsibility for the plan and are therefore more likely to follow it. Taking responsibility includes helping monitor the good and bad effects of treatment and discussing concerns with at least one of their health care practitioners—doctor, physician's assistant, pharmacist, or nurse. People should report unwanted or unexpected effects to a health care practitioner rather than adjust a drug dose or discontinue a drug on their own. When a person has good reasons for not following a plan and explains them, the doctor or other health care practitioner can usually make an appropriate adjustment. It is wise for people to keep an up-to-date list of all of their drugs and to take it with them to any health care appointments.

People are also more likely to adhere if they believe that their health care practitioner cares whether they follow the plan. People who receive explanations from a concerned practitioner are more likely to be satisfied with the care they receive and to like the practitioner more. The more people like the practitioner, the more likely they are to adhere.

Memory aids can help people remember to take their drugs. For example, reminder cards can be placed in different areas of the home, or taking a drug can be associated with a specific daily task, such as brushing teeth. A wristwatch that beeps can be used as a reminder of when to take a drug. A health care practitioner or the person can mark the drug dose and the time of day to take it on a calendar. When the drug is taken, the person checks the appropriate space.

A pharmacist can provide containers that help people take drugs as instructed. Daily doses for a month may be packaged in a blister pack marked with calendar days, so that people can keep track of doses taken by noting the empty spaces. Caps or stickers the same color as the tablet or capsule can be placed on each container to help people match the drug to the instructions on the container. Multicompartment boxes or trays that contain compartments for each day of the week and/or for different times of each day can be used. The person or caregiver fills the compartments on a regular basis, such as at the beginning of each week. By looking at the box, the person can determine whether the pills have been taken.

## CLASSES OF DRUGS

- Cardiovascular
- Gastrointestinal
- Antibiotics
- Respiratory
- Endocrine
- Analgesics
- NSAIDS

# REFERENCE:


1. **Burmese Border Guidelines (BBG 2007)**
2. **General Practice, Third Edition (J. Mutagh)**
3. **Grant Atlas of Anatomy (13th Edition)**
4. **Harrison - Principles of Internal Medicine 16th Edition**
5. **Health Messenger Magazines**
6. **IMCI handbook**
7. **Integrated Management of Pregnancy and Childbirth**
8. **Manual of Family Practice, Second Edition**
9. **Medic Training Manual, 2009 (IRC Mae Hong Son)**
10. **Medic Traing Curriculum, 2008 (Aide Medicale Internationale, Thailand)**
11. **Merck Manual 17th Edition**
12. **Obstetrics by Ten Teachers**
13. **Oxford Handbook of Clinical Medicine**
14. **Practical Fracture Treatment Ronald McRae**
15. **The Anatomy Coloring Book Kapit and Elson**
16. **Where there is no Doctor**
17. **WHO Managing Complications in Pregnancy and Childbirth**
18. **WHO Paediatric Resuscitation**
19. **WHO Primary Child Care - A Manual for Health Workers**


# ACKNOWLEDGEMENTS


**The photos, diagrams, flowcharts and tables are adopted from the following sites.**

- http://www.aap.org/ (American Academy of Pediatrics)
- http://www.baby-safety-concerns.com (Your Baby Safety Guide)
- http://www.cdc.gov/ (Centers for Disease Control and Prevention)
- http://www.cedars-sinai.edu
- www.enchantedlearning.com
- http://en.wikipedia.org/ (Wikipedia)
- http://www.ghorayeb.com (Otolarynogology Houston)
- http://www.immune.org
- http://www.moondragon.org (MoonDragon Birthing Services)
- http://www.nejm.org/ (The New England Journal of Medicine)
- http://www.netteranatomy.com/
- http://www.nlm.nih.gov/ (The A.D.A.M. Medical Encyclopedia)
- http://www.pedisurg.com (the Pediatric Surgery)
- http://www.stdhelp.org/ (the STD Support Community)
- http://www.unfpa.org/rh/
- http://www.vaccineinformation.org (Vaccine Information)
- http://www.who.int/topics/reproductive_health/en/ (WHO Reproductive Health)
- http://www.who.int/reproductivehealth/en/
- www.3Dscience.com