

# Child Health for Nurses and Health Extension Officers in Papua New Guinea

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## Contents

Child Health for Nurses and Health Extension Officers in Papua New Guinea .....	0
Chapter 1: The importance of child health .....	0
Chapter 2. Normal growth and development .....	0
Chapter 3. Infant feeding .....	3
Chapter 4. Malnutrition .....	19
Chapter 5: Care of newborn babies.....	40
Chapter 6. Disorders of newborn babies.....	46
Chapter 7. Low birth weight babies.....	0
Chapter 8: Care of ill children in the outpatient clinic .....	3
Chapter 9. Diarrhoea.....	0
Chapter 10. Intestinal worms .....	9
Chapter 11. Other gastrointestinal diseases .....	14
Chapter 12. Fever .....	20
Chapter 13. Malaria and other vector-borne diseases .....	25
Chapter 14. Anaemia .....	37
Chapter 15: Respiratory disease .....	44
Chapter 16. Ear diseases .....	5
Chapter 17: Tuberculosis .....	0
Chapter 18. The brain and nervous systems .....	3
Chapter 19: Renal (kidney) and genital diseases .....	1
Chapter 20: Heart disease .....	7
Chapter 21: Diseases of bones .....	13

Chapter 23: Diseases of the Eye .....	10
Chapter 24: Skin diseases .....	14
Chapter 25: Leprosy .....	4
Chapter 26: Dental health.....	5
Chapter 27: Community health services .....	8
Chapter 28. Maternal health .....	13
Chapter 29: The health of young children at community health clinics .....	4
Chapter 30. School Health .....	12
Chapter 31: Immunisation .....	4
Chapter 32: Accidents .....	10
Chapter 33. Sexually transmitted infections .....	20
Chapter 34. Human immunodeficiency virus infection and children living with AIDS	24
Chapter 35: Social problems affecting children .....	31
Chapter 36. Children in urban towns and cities .....	37
Chapter 37: Teaching parents and children .....	41
Chapter 38: Family planning and contraception .....	44
Chapter 39: Drug doses, fluids, and paediatric rules .....	57
Chapter 40. Practical procedures .....	88

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# INTRODUCTION

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## Chapter 1: The importance of child health

Child and adolescent health is a very important subject in all countries. All health workers in Papua New Guinea must know a lot about the health of children and adolescents because:

Children up to the age of 15 years make up 36% of the population. Adolescents between 15 and 19 years of age are an extra 11% of the population, meaning that children and adolescents together are nearly half the PNG population.

Young children are the most likely people in a community to develop diseases. This is because they have not yet built up protection (immunity) to these diseases, and because nutrition is so important at a young age.

Diseases which cause many deaths and much sickness in children are often preventable.

Children who are poorly fed (malnourished) and sick during early childhood do not develop. They do not learn to do things at the times their brains are ready. They may never catch up. They may never be as skilled or smart at doing things as they would have been if they had been well

nourished and well throughout childhood.

Children who are constantly sick are less able to learn properly at school. So, childhood illnesses may affect a person throughout their life.

Children who miss school through sickness may not reach a high standard of education. When they leave school, they will not earn as much money as they would have done if they had been healthy during childhood. In a town this will mean they are less likely to get a job and have less money to buy their family food. In the village, this means they may not understand modern methods of agriculture, and so not grow as much food as they might have done if they had been healthy when they went to school. Thus they pass on this disadvantage to their children and the next generation.

A healthy adult can only come from a healthy child. People who are sick or hungry cannot participate in community development or raising their standards of living. For a community to improve, its children must first be healthy.

Children and adolescents learn quickly and can be taught many new things. Some adults find it more difficult to change their ways of thinking and doing things. So, health education *with* children and adolescents is more likely to be successful.

For all these reasons child and adolescent health means planning for

the country's future. When the children of today grow up healthy and strong, to become the adults of tomorrow, they will be able to develop their community and country wisely and well.

## High risk periods for illness in children

**Newborn or Neonate.** First 4 weeks of life.

In PNG the neonatal mortality rate is about 24 per 1000 live births.

Many babies die in this period due to:

- ◆ Asphyxia – baby fails to breathe at birth
- ◆ Obstetric complications – illnesses in the mother and difficulties during birth of the baby
- ◆ Birth injury
- ◆ Bleeding (haemorrhage) from cut umbilical cord
- ◆ Infection of umbilical cord leading to septicaemia or tetanus
- ◆ Low birth weight
- ◆ Congenital abnormalities – abnormalities the baby is born with
- ◆ Cold injury (hypothermia), especially in the Highlands
- ◆ Death of the mother. The newborn baby is likely to die of starvation or diarrhoea if her mother dies

A high proportion of Neonatal deaths occur in the first few days of life and many can be avoided by helping the mother to be as healthy as possible during pregnancy, delivering in a health centre or hospital with a skilled birth attendant, clean delivery, and early essential newborn care (drying, skin to skin contact with the mother,

breast feeding in the first hour of life), and referral of unwell babies with their mothers.

**Infant.** An infant is in the first 12 months of life.

Infant mortality rate means the number of children under 12 months of age who die out of every 1000 children born alive, e.g. if in a village or district 250 children are born alive and 12 of these children die before they reach 12 months of age. The infant mortality rate equals:

$12/250 \times 1000$  equals 48 infant deaths per 1000 live births

In Papua New Guinea, the infant mortality rate varies between districts and provinces, and between urban and rural settings. It is improving over time as community development, education and health services improve, but it is still higher than in many other countries. The national average is approximately 42 per 1000 live births. It is even higher in remote rural areas, where health care services are limited.

Main causes of illness and deaths in infants are:

- ◆ Respiratory diseases – Pneumonia, bronchiolitis
- ◆ Sepsis
- ◆ Malaria
- ◆ Diarrhoea, especially likely if baby is bottle fed
- ◆ Malnutrition. This is due to either:

- i. Lack of exclusive breast feeding, or lack of an adequate weaning diet
- ii. Chronic illness
- iii. Adoption or social and environment problems

**Child.** 1-5 years old (pre-school and early primary school child).

The number of deaths in this age group per 1000 live born babies is the child mortality rate (about 12/1000) and when added to the infant mortality rate gives the Under 5 mortality rate (about 54/1000).

In this age group many deaths are due to conditions that are mainly preventable

- ◆ Malnutrition. Protein energy malnutrition either marasmus (wasting) or kwashiorkor. Malnutrition often occurs with other diseases, e.g. malaria, measles, pneumonia, diarrhoea, anaemia, worms, tuberculosis.
- ◆ Infections
  - i) Respiratory infection (pneumonia, whooping cough).
  - ii) Diarrhoea (watery diarrhoea, persistent diarrhoea, dysentery)
  - iii) Malaria
  - iv) Meningitis
  - v) Tuberculosis
  - vi) HIV
  - vii) Measles
- ◆ Anaemia. Many children in Papua New Guinea have anaemia (low haemoglobin or red blood cell count). Anaemia can cause

tiredness and chronic ill health, it weakens the body's defences, and makes the child more likely to die from other diseases, and makes it harder for the child to do well in school. Anaemia is due to:

- i) Malaria
- ii) Not enough iron or protein in diet. Anaemia is common in malnourished children.
- iii) Hookworm
- iv) Chronic infection or other chronic illnesses
- v) Trauma and accidents: such as burns, poisoning, falls, drowning, traffic accidents

While the above disease are the serious ones which may kill the child, there are other diseases which are very common but not common causes of death, but they may have severe effects on overall health or development. These common diseases are:

- ◆ Otitis media (discharging ears) which can lead to deafness and speech delay.
- ◆ Skin lesions (sores, tinea, scabies), which can lead to serious infections or rheumatic heart disease;
- ◆ Dental caries (if child eats a trade store diet, highly processed or sweet food), can lead to obesity, infections, heart disease in adolescence and adult life.

**School child and adolescents** - These children often have:



- ◆ Infectious diseases (e.g. chicken pox)
- ◆ Intestinal worms (e.g. hookworm, roundworm)
- ◆ Malnutrition, including undernutrition and in some populations, obesity
- ◆ Malaria
- ◆ Skin diseases (e.g. sores, scabies, tinea)
- ◆ Respiratory diseases
- ◆ Tuberculosis or HIV
- ◆ Anaemia
- ◆ Chronic non-communicable diseases like asthma, allergies, epilepsy, heart disease (such as rheumatic fever)
- ◆ Learning problems, social problems or mental health problems
- ◆ During adolescence issues of reproductive health become important. Health workers need to be familiar with these issues and be able to help their patients to deal with them.



**Figure 2 - Today's children are tomorrow's community leaders**

## Causes of illnesses in children

The kinds of illnesses that children have depend on the following:

### Social and economic factors

Poor hygiene, poverty (lack of money) and lack of education are common all over the world. These are factors mainly responsible for "tropical diseases"

- ◆ Poor hygiene:
  - i. Overcrowding in homes spreads respiratory and skin diseases
  - ii. Unwashed hands spread the causes of diarrhoea
  - iii. Incorrect disposal of faeces spreads worm infection and other infections such as gastroenteritis, dysentery and cholera
  - iv. Poor rubbish disposal leads to breeding of flies and rats which can carry diseases
- ◆ Poverty (not enough money). This leads to bad housing and bad nutrition.
- ◆ Lack of education. Uneducated parents are likely to give their children unclean foods (causing diarrhoea), the wrong foods (causing malnutrition) or let their children pass their faeces on to the ground (spreading worm diseases).

### Customs

Malnutrition for example, in mothers or children may occur because people think that the mothers

and children should not eat meat or eggs or fish.

Babies can get tetanus if the local custom is to put dirt on the cut umbilical cord.

It is most important that you find out what the customs and beliefs are in the place where you work. Although these customs and beliefs may seem strange or foolish to you the people believe them to be very important (just as you think that your own beliefs and customs are important). If you take no notice of people's beliefs or customs they will soon not bother to listen to you.

Customs and practices can be divided four groups:

- ◆ **Good.** Those which help children to be healthy, e.g. breast feeding, or being vaccinated. Health workers should always encourage good customs.
- ◆ **Bad.** Those likely to cause sickness, e.g. not tying the umbilical cord, or starting solid feeds too early in young infants. Try to change these bad customs by education.
- ◆ **Unimportant.** Those that neither help nor harm the child, e.g. wearing armbands or neck bands, burying the placenta. These customs should be left alone.
- ◆ **Uncertain.** Customs and practices that you do not know if they are good, bad or unimportant. Observe these customs to decide into which group they should go.

**Insects.** Flies carry diseases such as skin infections, eye infections (trachoma) and bowel infections.

- ◆ Anopheles mosquitoes spread malaria.
- ◆ Other kinds of mosquitoes spread dengue fever, filariasis and encephalitis.
- ◆ Mites spread scabies and scrub typhus.

### Inherited (genetic) diseases

Some diseases, like thalassaemia (see page 103), are passed on from parents to their children.

### Accidents

Burns are common where there are open fires. Kerosene poisoning is common where kerosene is left lying around in drink bottles. Road accidents are becoming more and more common.

## Prevention of infant deaths

Lowering the high infant and child mortality rate depends upon the following factors:

### Social and Economic Factors

- ◆ Better education.
- ◆ Better standard of living.
- ◆ More maternal and child health services.

**Pre-natal Factors** Better care of mothers during pregnancy and labour.

- ◆ Attention during pregnancy to diet, anaemia and malaria.

- ◆ Tetanus immunization to mothers during pregnancy. This will protect the baby from tetanus since the mother's antibodies against tetanus will pass across the placenta to the foetus. The baby will then be born with antibodies against tetanus.
- ◆ Skilled help during labour for complications.

### Neonatal factors

Provision of Early Essential Newborn care for all babies and skilled care of sick babies.

### Infant Illnesses

### Water, sanitation and hygiene

Better personal hygiene and environmental sanitation, housing, clean water, faeces disposal, rubbish disposal.

### Immunisations

- ◆ Pentavalent vaccine, to protect against whooping cough, tetanus, diphtheria, Hepatitis B and Haemophilus influenzae type b (Hib) .
- ◆ PCV (pneumococcal conjugate vaccine) to protect against diseases such as pneumonia and meningitis caused by the pneumococcus bacteria
- ◆ BCG to protect against tuberculosis
- ◆ Sabin oral vaccine and IPV (injectable polio vaccine) to protect against poliomyelitis
- ◆ Measles/Rubella (MR) vaccine to protect against measles and Rubella (German Measles)

- ◆ Use of Pyrethrin-impregnated mosquito nets
- ◆ Vitamin A

### Nutrition

- ◆ Continue breastfeeding as long as possible.
- ◆ Use all available animal protein (fish, meat, eggs, milk) as food
- ◆ Use locally available vegetable protein (peanuts crushed up and roasted or boiled and mashed, beans, ferns, green leaves)
- ◆ Mix oil or fat in the food (dripping or tin gris, peanut oil).

### Anaemia

- ◆ Give iron and folic acid (Fefol tablets) to the mother during pregnancy (Fefol 1 tablet daily)
- ◆ Start giving mashed food (a range of complementary food: kaukau, potatoes, paw paw, banana, fruits and vegetables) to baby by 6 months of age.
- ◆ Antimalarials to treat malaria
- ◆ Treatment of hookworm infections, 6 monthly albendazole and vitamin A

### Population pressure

As child health services improve, and less children die, the population will increase. This means more people to feed and look after. Unless agriculture can keep up with the increase there will be shortage of food and a shortage of land.

There will also be not enough places in school or jobs for children when they leave school. The birth rate in Papua

New Guinea is about 30 per thousand and the death rate is about 7 per thousand. This means that the population is increasing by 23 per thousand or 2.3 percent every year. The fertility rate is decreasing in PNG, but not fast enough and many women and adolescent girls have unwanted pregnancies because they have no access to family planning methods or have a lack of education.

If the population continues to increase like this, it will double in about 30 years. This means the population, which in 2000 was just over 5 million, will grow to 10 million by the year 2030.

The aim is, therefore, "Not more, but healthy children."



**Key message:**  
Prevention is better  
than cure

### Family Spacing and Planning

This helps a family to space their children so that one has finished needing to be breast fed before the next one is born. It also lets the family stop having children after enough have been born.

This means there is enough food for all children, and each child grows up into a healthy, strong adult. It also allows the mother to have some rest between pregnancies. This keeps the mother

strong and healthy and lets her look  
after her children well.

## Chapter 2. Normal growth and development

Growth means increase in height and weight. Development means increase of function (ability to do things). Growth and development go together but what you measure is different. Other words used for development include: “neurodevelopment” which means development of brain and nervous system functions.

### The foetus.

- ◆ During the first three months the main body systems, brain, heart, lungs, bowel, limbs, etc. are all developing. Harmful environmental factors, like rubella infection in the mother, or excessive alcohol intake, or smoking, may interfere with the development of different organs at this early stage.
- ◆ For example, a baby born after a mother has contracted rubella may be born with certain deformities, e.g. congenital heart disease, deafness, cataract (cloudy lens in the eye), microcephaly (small head and brain).
- ◆ During the last six months the foetus increases greatly in size. This is mainly a stage of growth. Malnutrition, smoking or illness in the mother, or disease of the placenta that interferes with its blood supply, will stop the foetus growing properly. The baby may be born small, not weighing as much as he should.

**The infant.** Growth and development occurs all the time. But it often goes fast for a while and then slows down before going fast again. The baby's growth can be measured by her weight, height and head circumference.

An infant's *development* is checked by finding out:

- ◆ What she can do in the way of moving around (gross motor development)
- ◆ How she plays with toys or reaches for objects (fine motor development).
- ◆ How she sees (vision)
- ◆ How she hears and develops language (hearing)
- ◆ How she talks and makes her wants known (language)
- ◆ How she interacts with people (smiles, laughs, talks) and fits into his family and community (social behaviour).

### Developmental milestones

Development continues slowly all the time. It does not jump from one step to the next. However, it is usual to look at a child at different ages, and to compare him with himself as he was at a younger age.

The various things the baby and young child learns to do are called milestones. In watching development, we notice at what age the child learns to do certain things, such as smile at his mother, sit without support, grasp objects with his hands, walk and talk.

We record at what age the child has reached these various milestones and compare them with what's normal development.

You must remember all children are different. Some walk early, others walk late. The average age at which children reach various milestones is given later (see page 12). It is important that you realize there is a range of normal. Any one child can differ from the average, but still be quite normal.

### Developmental milestones by age

**4 weeks.** The baby sleeps for most of the day. If suddenly disturbed he will bend his body and throw his arms out and forward (startle response or Moro reflex). A loud noise may give the baby a startle response. His rooting and sucking reflexes are well developed from birth so he can feed. When the baby's cheek is touched he turns his head towards the side that is touched. When his lips come into contact with something he begins to suck. The rooting reflex is how the baby finds the nipple when his mouth is lying close to the mother's breast. The baby has a well-developed sense of taste.

**4 months.** The baby has control over her eyes and follows moving objects with her eyes. She can balance her head and likes to sit with her back supported. She can recognise her mother and laughs and smiles.

**7 months.** The baby can sit and reach for objects with his hands. He is interested in what is near him and puts

things in his mouth. He squeals and makes many noises. The feel of objects in his mouth and the sounds that he makes are important parts of the baby's learning.

**10 months.** The baby can roll over and sit up without help. She starts to copy sounds that she hears. She likes to have people she knows around, but by now she is shy of strangers and will cry if they try to pick her up.

**12 months.** The baby can crawl and often stands alone. He listens carefully to words and will do simple things if told to. He likes to copy actions. He shows when he is pleased or angry or frightened.

**18 months.** She walks and may run. She recognises pictures. She can speak a few words but says a lot more in her own baby talk. She gets used to doing things and dislikes changes. She knows when she wets herself.

**2 years.** He likes running and jumping and is never still. He can speak simple sentences. He can put several things on top of each other. He is able to tell his mother when he wants to have a bowel action.

**3 years.** She likes play acting, and this helps her to say her words and show her feelings. She learns quickly about the outside world, but has very little experience, so that accidents may happen if care is not taken.

**4 years.** The child asks many questions, plays with other children and learns to co-operate.



## Play

Play is very important for the education of young children. It helps physical, mental, social development and is important also for health. All normal children like to play. If a young child does not play she is probably ill. Expensive toys are not necessary for play. Young children often like simple toys such as paper bags, pencils, or a ball. Make sure she cannot injure (hurt) herself with any of her toys, or that a toy is not small enough for her to swallow. Children also like to copy things their parents and other adults do, e.g. playing with small toy boats, using pots and pans, sweeping.

To help a child play and learn properly, she needs to have:

- ◆ Plenty of room so that she can move about and find things out for herself.
- ◆ Independence. The child should be encouraged to do the things they want to do.
- ◆ Several different kinds of toys so he can practice doing different things.
- ◆ Toys she can play with without needing the help of adults.
- ◆ Opportunities to find her own play things.

## Different ways children play

- ◆ *Physical play.* This exercises the muscles and keeps the child healthy and strong, e.g. running, jumping, climbing, swimming.

- ◆ *Manipulative play.* This is play that makes the child use her hands and eyes. It teaches her such things as the size, shape and colour of objects. Playing with sand, earth, clay and water gives enjoyment to children as well as education.
- ◆ *Creative play.* e.g. Painting, paper cutting, sewing, using crayons, beads, shells. These things also help children to use their hands and eyes together.
- ◆ *Imaginative play.* The child dresses up and pretends he is an adult he knows. He may pretend he has a house, a boat or family.
- ◆ *Listening to stories.* All children like hearing stories. It helps their knowledge and imagination develop and helps them to learn about the world, and learn right and wrong. These stories can be read from books or just told to them. Parents and Bubus have good simple stories to tell, and children benefit from hearing them. Even before children can read words, they often like reading pictures in a book (looking at the pictures and saying what is happening in the picture).
- ◆ *Listening to and making music.* Children like listening to music, and this can be calming and relaxing. They like to sing along with music and play instruments (home-made drums or guitar can be entertaining and creative).

**Playground.** The following will need to be thought about if a playground is to be established.

- ◆ *Accommodation.* A shady area outside with a shelter is suitable. There must be somewhere equipment can be locked away when the children leave.
- ◆ *Tables and chairs.* These must be small enough for young children to use.
- ◆ *Cupboards.* To store the toys and equipment in. Some will need to be kept locked.
- ◆ *Toilets.* There should be enough clean toilets for the number of children who come.
- ◆ *Handwashing facilities.* Children must be taught to wash their hands with clean water and soap after going to the toilet and before eating. Each child should have his own towel.
- ◆ *Tooth brushing facilities.* Children should also be taught to brush their teeth and rinse out their mouth after a meal. Each child should have her own toothbrush.
- ◆ *Drinking facilities.* Enough clean drinking water must be available. Each child should have his own cup.
- ◆ *Indoor play equipment.* Parents can make different size pieces of wood and cardboard cartons into models of things the children know, e.g. trucks, boats, houses, animals. Hammering sets, beads to thread, jigsaw puzzles, paint-brushes, paints, crayons, pencils, paper, glue, scissors that are not too sharp, and clay are useful things to have.
- ◆ *Outdoor equipment.* Large packing cases, tyres, oil drums, wooden planks, etc. make useful equipment, but must be made safe

with no sharp edges. A large, shallow container with water should be provided for water play. Sand play can be provided by using the bottom of an old water tank into which sand, at least 12 inches deep, can be placed. All edges must be safely turned down and not sharp. It should be raised about a foot off the ground so that the children do not get inside it. At night it must be securely covered so that it is not contaminated by animals.

What a playground or preschool gives to a child.

- ◆ A safe place to play; with an adult to supervise and encourage her.
- ◆ Teaches him to do things and lets him practice doing these things.
- ◆ Teaches him to be friendly and to play with other children.
- ◆ Allows her to express her feelings through play.

**Emotional support.** It is well known that children need food to grow properly. To grow and develop normally they also need emotional support from their family, and especially from their mother. And they need a loving, caring and trusted father.

Six things are needed for emotional support

- ◆ **Love.** A child who does not feel loved will not grow properly. She will not learn as quickly as normal children. Instead she becomes sad

and lonely and no longer interested in what goes on around her.

- ◆ **Security.** A child needs to feel safe. He can only feel safe if his parents show that they love him and take good care of him. He must know that his parents will look after him and help him when he is hungry, and play with him and keep him happy and comfortable. The love and security a child gets from his mother and family is very important. It allows him to feel friendly with people outside his family when he grows up.
- ◆ **Acceptance as a person.** The young child needs to know that her mother, father and family love her as she is. They do not compare her with other children and tell her that he is slow to do this or that. They do not tell her that she is not as good as some other child. They show her respect as a person with her own likes and dislikes. They realise that she is unique and special, as all children are.
- ◆ **Recognition of achievement.** The young child needs to know that his parents are happy and pleased when he has learnt to do something new. His parents help him to learn things and encourage him to do these things. They teach him because they love him. They show they are proud of him and this helps the young child to feel secure.
- ◆ **Independence.** As the child grows she needs to be allowed to decide more and more things for herself.
- ◆ **Wise and consistent use of authority.** Children need to know

what they can what they cannot do. Parents must teach children how they are expected to behave, and to respect other people.

Parents should be consistent and make sure that they do not change the rules they expect their children to obey.

## Summary of normal growth and development

The following are approximate averages.

Normal variation covers a wide range on both sides of the average.

### Weight

Approximate averages:

Age	Weight (kgs)
Birth	3 kg
4 months	6 kg
1 year	9 kg
2 years	12 kg
3 years	15 kg

4 years	18 kg
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### Height

Approximate averages

Age	Height (cms)
Birth	45 cm
1 year	70 cm
2 years	80 cm
3 years	90 cm
4 years	100 cm
8 years	125 cm

## Head circumference

Approximate averages.

Age	Circumference (cms)
Birth	33 cm
4 months	40 cm
1 year	45 cm
2 years	48 cm
12 years	52 cm

## Mid arm circumference

Approximate averages

Age	Circumference (cms)
Birth	10 cm
4 months	14 cm
1 year	16 cm
5 years	17 cm


 Key Message: Mid arm circumference less than 14 cm in a child aged between one and five years means the child is malnourished



Figure 3 - Measurement of mid-arm circumference.

Average age of getting first (deciduous) teeth

Tooth	Age
2 lower central incisors	7 months

2 upper central incisors	9 months
2 upper lateral incisors	11 months
2 lower lateral incisors	13 months

4 first molar	15 months
4 canines	19 months
4 second molars	26 months

**Note:** Individual children may show wide variations from these average figures

The 20 DECIDUOUS TEETH

Upper Jaw  
4 INCISORS  
2 CANINES  
4 MOLARS

Lower Jaw  
4 MOLARS  
2 CANINES  
4 INCISORS



Figure 4 - First or deciduous teeth.



### Estimating a child's age by counting his teeth

If the child's date of birth is recorded in his health record book you can accurately work out his age.

But, if you do not know the child's date of birth you can estimate (work out) his approximate age by counting the number of teeth.

Number of teeth	Age
No teeth	Under 7 months
1-19 teeth	Age in months is 6+ number of teeth
20 teeth	2-5 years
21 or more teeth	6 years or more

E.g. Child with 8 teeth is approximately  $6 + 8 = 14$  months old

### Average age of gross motor development

Ability	Age
Baby able to support his head	3 months
Able to sit supported	6 months
Able to stand supported	9 months
Able to stand alone	12 months
Able to walk alone	15 months

### Average age of fine motor development

Ability	Age
Able to grasp objects in hand	5 months
Able to transfer objects from one hand to another	7 months
Able to oppose forefinger and thumb ("pincer")	9 months

### Average age of social and language development

Ability	Age
Smiles at mother	6 weeks
Begins to chew	6 months
Able to say 2-3 words with meaning	12 months
Able to join 2-3 words to make a sentence	2 years
Bowel control	2 years
Bladder control	3 years

**N.B.** the above approximate average age developmental skills are often different in individual children.



Key message: All children are  
different

\*\*\*\*\*PICTURE HERE OF DIFFERENT CHILDREN IN GROUP

There are many unkind or unhelpful labels that children who are neurologically different can be given – health care workers should not use these and should discourage the use of these labels which stigmatise children. Such labels include being “retarded” or “spastic”. It is better to describe exactly what the child can and cannot do according to their age, and use the term developmental delay.

Any child with suspected developmental delay should be referred to a paediatrician for assessment. Sometimes there are underlying and treatable reasons - for example a child who is not speaking a few words at the normal time may be deaf.

It is wrong to stigmatise children as even if they are slow in developing, they are still unique individuals with all the same human rights as any other person, including the right to love, care and protection. It is important that other children learn about tolerance and respecting the rights of others. Even though these seem like ‘adult concepts’, children can learn this from an early age.

## Chapter 3. Infant feeding

It is widely recognised that good nutrition during the first 1000 days of the child's life is vital for normal growth and development and good health and lays a strong foundation for the child's future wellbeing. This 1000 day period is from conception to the age of 2 years. Whilst this chapter is focussed on feeding after birth it is very important that mothers have a good diet during pregnancy so that the foetus will grow well and the newborn baby will be well nourished.

### Importance of breast feeding

Breast feeding is best. Some people think it is smart to bottle feed their babies, but it is not clever to do this.

Why breast milk is best for the baby?

- ◆ It is always fresh
- ◆ It is safe and free from infection
- ◆ It is made by nature for babies
- ◆ It is easy to digest. Cow's milk has a thick indigestible protein which clots in the baby's stomach
- ◆ It is the right temperature.
- ◆ It contains some antibodies (substances that protect the baby against infections).
- ◆ It helps the baby receive love and warmth from mother.
- ◆ It helps family spacing and gives the mother enough time to look after the baby.

It is best for the mother because

- ◆ It costs nothing.
- ◆ It saves time as it is always ready.
- ◆ It helps the uterus to return more quickly to the normal size.
- ◆ It helps the mother show love for the baby
- ◆ It has a contraceptive effect, and the mother is unlikely to become pregnant while she is fully breast feeding.



**Figure 6 – Breast milk is best milk.**

Artificial feeding is only safe if

- ◆ The mother is educated and can understand how to mix the milk and can read instructions on the milk tin.
- ◆ The family is rich and can spend a lot of money on buying enough milk powder. If milk is made with too little powder (too dilute) the child will become malnourished.
- ◆ The mother has plenty of time to keep the feeding things clean and boil the water she is going to use.
- ◆ The house has a refrigerator to store the milk in when it is made, otherwise it will spoil within 1-2 hours and bacteria start to grow in the milk.
- ◆ The windows and doors of the home have fly-wire screens to keep the flies out.

Without all these things, a baby who is artificially fed will be given a weak mixture of milk containing many bacteria. The baby becomes malnourished, has many attacks of diarrhoea and is at high risk of dying.

## Physiology of breast feeding

Development of the breast

- ◆ *During adolescence* the nipple ducts develop. and milk ducts develop
- ◆ *During pregnancy* the milk-producing (active glandular) tissues develop.
- ◆ *After birth of the baby* the secretion of milk is caused by a change in the mother's hormones (increased

prolactin and others) and by the baby sucking.

Milk continues to be produced well if

- ◆ The baby sucks well at the breast.
- ◆ The breast is emptied at each feed. This is usually done by the baby sucking at the breast. If the baby does not empty the breast by sucking, the mother should squeeze (express) the milk out of her breasts with her hand.
- ◆ The mother is not worried or depressed. If the mother is worried her milk will not flow well from the breast.

**Sucking.** When the baby sucks, he pulls the nipple and part of the breast into his mouth. His jaws hold the breast, and the nipple is squeezed by his tongue against the roof of his mouth (palate). So, difficulties may occur if the nipple is not normally developed (e.g. inverted or pulled inwards), or if the baby's jaw or palate are abnormal (e.g. cleft palate).

## Composition of milk

**Colostrum** is the dark yellow sticky fluid that comes from the breasts during the first few days after delivery. The baby should be allowed to suck this colostrum from the first hour of life. It is very healthy for a baby, it is rich in protein, vitamin A and protective substances including antibodies.

True milk starts to be produced about three days after delivery. Its composition compared with cow's milk is approximately as follows:

	Protein	Fat	Sugar	Iron absorption
Human milk	2%	4%	6%	Well absorbed
Cow's milk	4%	4%	4%	Poorly absorbed

## Management of breast-fed baby

### Educated mothers

When the baby sleeps between feeds she should be in a clean cot. By putting her in nappies the bed is kept clean and dry. She can be left while the mother does her work and cares for her other children. Babies should only be put to sleep face up (supine) not on their tummy (prone), as there is a risk of sudden infant death (SIDS). A baby should not be left to cry in her cot. She may be hungry in which case she should be fed. She may be wet, too hot, being bitten by mosquitoes, or just bored, in which case she should be picked up. To breast feed satisfactorily, the mother must be confident (feel sure she can do it). If the mother feels she cannot breast feed the baby well she may not produce enough milk.

At night the baby usually sleeps by the mother. His mouth is close to her breast and he sucks when he wants. This keeps the baby happy and does not disturb the mother. The mother needs to be careful not to roll onto the baby or smother the baby with bedding. This very unlikely to happen, but anyone affected by alcohol or sedative drugs should not be sleeping in the same bed as a baby as this markedly increases the risk of rolling on top of the baby.

The baby should be fed "on demand", i.e. when he is hungry and ready for feeds. This keeps the baby happy and decreases pain and swelling of the breasts in the mother. By the time the baby is one month old he will have shown his own feeding rhythm, usually 5-6 feeds a day. It is not a good idea to try to feed babies "by the clock".

### Village mothers

The baby spends most of his time between feeds in a *bilum* (bag) held close to her mother or hanging in a shady place. She is fed whenever she cries and quickly gains weight. She may be so full of milk that she sometimes vomits or passes loose stools - but this does not matter. She is well nourished and happy.

Village mothers can be experts on breast feeding. The main thing to teach village mothers is to keep themselves, their clothes, and their babies clean. Remember that all babies are different and need different amounts of milk. As long as they are gaining weight and

following along (up) the centiles of the growth chart they are getting sufficient milk.

## Problems of breast feeding

Baby does not get enough milk from the mother (undernutrition).

### Signs

- ◆ The baby cries a lot between feeds.
- ◆ He does not gain weight well and becomes thin and undernourished.
- ◆ His bowel action becomes hard and small.
- ◆ He is unhappy and sucks at his fingers.

## Treatment of undernutrition

### Increase supply of breast milk

How to increase mother's supply of breast milk

- ◆ Talk with the mother and make sure she really wants to breast feed her baby.
- ◆ Explain to the mother that you will give her extra food and fluid and also some medicine. Explain that this will increase her supply of breast milk.
- ◆ Make sure the mother gets plenty of food.
- ◆ Give the mother at least one extra cup of milk to drink three times a day.
- ◆ Give the mother 1 chlorpromazine (Largactil) tablet 25 mg three times a day for 7-10 days. If no chlorpromazine is available an alternative is metoclopramide (Maxalon) 10mg four times daily

- ◆ Encourage the mother to let the baby suck at the breast many times a day as well as during the night.

Usually after 7-10 days of this treatment the mother will produce plenty of milk. The chlorpromazine tablets can now be stopped.

**Complementary feeds.** If the breast supply cannot be increased enough the baby will need supplementary (extra) feeds. He is given the breast first, and afterwards given a small feed of milk prepared from milk powder or infant formula from a cup and spoon. Treated in this way, the flow of breast milk is kept up, and it may increase. In a week or two, supplementary feeding may no longer be necessary.

**Cracked nipple.** Sucking causes pain for the mother if she has cracked nipples. Lactation (the supply of breast milk) may fail. The baby should be taken off the breast that is sore to allow the nipple to heal. Milk from sore breasts should be expressed by hand into a cup and then given to the baby using a spoon. The nipple should be kept clean and lanolin or vasoline applied twice a day to the cracks. When it heals the baby is put back on that side.

**Mastitis** is inflammation or infection of the breast. If not treated, inflammation of the breast may develop into a breast abscess.

### Causes

- ◆ Engorgement (hard, painful swelling of the breast), due to poor emptying

- ◆ Bruising of breast tissue by rough handling.
- ◆ Cracked nipples allowing entry of infection.

#### Prevention

- ◆ Prevent engorgement by regular emptying of the breast.
- ◆ Cleanliness of breast and hands.

#### Treatment

- ◆ The baby continues to suck at the breast unless there is an abscess, or the nipple is cracked.
- ◆ Aspirin or paracetamol is given to the mother for pain.
- ◆ Flucloxacillin or cloxacillin is given for the infection.

#### Breast abscess

##### Cause

- ◆ Infection following mastitis or cracked nipple.

##### Treatment

- ◆ Express the breast gently and let the baby suck from the other breast. Keep the breast expressed regularly every four hours. Put on a dressing and bind the breast. Give aspirin or paracetamol for analgesia, and flucloxacillin or cloxacillin for the infection. Usually, the abscess will need to be incised and drained.
- ◆ Inverted or flat nipples. Mothers' breasts should be checked at the antenatal clinic and if the nipples are flat or inverted, the mother

should be taught to pull the nipples out at least twice a day.

- ◆ Milk flows too quickly. The milk may choke the baby who becomes frightened. He spills or regurgitates the milk.
- ◆ Express a little milk from the breasts before allowing the baby to suck. Usually, the milk only flows too quickly at the beginning of feeds. Sometimes it helps if the mother lies flat on her back to breast feed the baby. This means the baby has to suck upwards, and the milk will not flow so quickly.

### Failure of breastfeeding

#### Difficulties breastfeeding with the baby

- ◆ Low birth weight or preterm baby where the baby is too immature to suck well or the nipple is larger than the baby's mouth opening
- ◆ Birth injury - the baby cannot suck
- ◆ Infection - the baby is too unwell to suck
- ◆ Congenital abnormality, e.g. cleft palate
- ◆ Twins, if the mother is not producing enough milk for both babies
- ◆ Adoption

#### Difficulties in breastfeeding with the mother

- ◆ Engorgement, breast abscess
- ◆ Worry or lack of confidence
- ◆ Wrong ideas about the value of bottle-feeding
- ◆ Wish to have sexual relationship again with her husband. The mother stops breastfeeding




because the parents wrongly believe that the sperm will spoil the breast milk and poison the baby.

- ◆ Wish to go out to work and leave baby behind at home
- ◆ Mother becomes pregnant again and therefore stops breastfeeding. This is because she wrongly believes her breast milk is spoilt because she is pregnant.
- ◆ Mother is malnourished or has a chronic illness, such as tuberculosis or HIV.
- ◆ Death of mother

**N.B:** Bottle fed babies often die because of

- ◆ Starvation - the milk mixture is too dilute; and
- ◆ Infection - repeated attacks of diarrhoea

 Key message:  
Breastfeeding should  
continue as long as  
possible (two years)

### Starting the baby on food (complementary food)

After the baby is six months old, breast milk by itself is no longer enough to gain weight and provide enough iron and other nutrients. The baby needs breast milk *and* extra food from the

age of six months. Start mashed food early at 4-6 months. Then the baby will be used to the foods and will be taking enough by the time he is six months old.

Yams, taro, sweet potato, sago are very bulky foods. Young children may not eat enough of these foods to get enough energy and protein to grow properly and. their growth will be affected. Teach parents to add protein foods (e.g. fish, peanuts that have been roasted and then grounded up, or peanuts that have been boiled and then mashed, mashed cooked beans, eggs or meat) to the usual village diet of kau-kau (sweet potato), pumpkin, bananas, etc. Teach parents to mix edible oil or dripping (tin gris) in with the food. As well as starting solid foods between 4-6 months, breast feeding should continue as long as possible (two years).

Reasons for starting solid foods early are:

- ◆ To teach the baby the taste and feel of new foods.
- ◆ To teach him to take food from a spoon.
- ◆ To get his digestive organs ready to deal with solid food.
- ◆ To increase the supply of minerals especially iron, in the diet.
- ◆ To get the child used to village foods by the time he can no longer get enough breast milk from the mother.

**Key message:**  
Mashed food should  
start between 4-6  
months

When beginning new foods, it is important to start them one at a time and increase slowly. Start with half a teaspoon and increase by half a teaspoon each day.

If the baby refuses a food, do not force him to take it - he will only spit it out. Try again after a few days. New foods should be given before milk feeds.

Make sure that the food given to the baby is clean and not too hot!



**Figure 8 – Start mashed food when the baby is 4-6 months old.**

The food given to the baby depends upon:

- ◆ Food that is locally available

- ◆ Customs and beliefs of the family

The advice you give about what foods to feed the baby will depend on these two things. You should add to what people already do and not try to make them change their food habits. Usual foods that mothers first start to give their babies include mashed up bananas, mashed up sweet potato, mashed up pumpkin, mashed up sago, mashed up rice or soups. Encourage the mother to start one of these foods, whichever is locally available and acceptable to her, by the time the baby is 4-6 months old.

#### **Protein foods:** foods for growth

- ◆ Fish (fresh or tinned)
- ◆ Meat (fresh or tinned)
- ◆ Shellfish
- ◆ Chicken
- ◆ Eggs
- ◆ Roasted and then ground up peanuts or boiled and then mashed peanuts.
- ◆ Mashed cooked beans
- ◆ Sago grubs

#### **Energy foods**

- ◆ Sweet potatoes, potatoes yams, taro, bananas, sago, rice, bread, oil, dripping (tin Gris)
- ◆ Coconut cream should be added to foods, to add energy (calories).

#### **Vitamin containing foods (vegetables and fruits)**

- ◆ Pumpkin
- ◆ Green leaves (pumpkin tops, taro tops, sweet potato tops, kumu, aibika, tulip, ferns, Aupa)

- ◆ Pawpaw, pineapple, banana, orange, mango

These foods must be well cooked and mashed up, as the baby cannot yet chew.

When the baby develops teeth, meat, fish and crab meat no longer need to be cut in small pieces. A piece of vegetable, fruit, fish or meat can be given to the baby to hold in his hand and feed himself. By this time he should be holding and drinking from a cup.

By the time the baby is 12 months old he should be eating the same food as the rest of the family. All this time breastfeeding continues. You must make sure that the mother knows that you expect her to continue breastfeeding, and that the foods are *in addition* to breastfeeding.

### Special conditions

If the mother has tuberculosis or leprosy, continue breast feeding, otherwise the baby will become sick and may die. Do not wean the baby (i.e. do not take her off the breast). Check the baby regularly, and make sure she is gaining weight.

If the mother has twins and not enough milk for both, try to teach the mother to breast feed both and give both extra powdered milk (e.g. Sunshine or Anchor milk) by cup and spoon. If she can't manage this, admit the mother and twins to hospital to be breast fed and artificially fed (feed on infant formula or powdered milk) under supervision.

If the mother dies, try to find another woman to continue breast feeding. Admit the baby to hospital if there is no one to look after the child. Find a guardian for the child as soon as possible.

### Inadequate (not enough) breast milk.

Encourage the mother to eat a better diet. Give chlorpromazine 1 tablet, 25 mg three times per day for 7 days. An alternative if chlorpromazine is not available is metoclopramide (Maxalon) 10mg four times daily for 5-7 days. Tell the mother to let the baby suck at the breast many times during the day and night.

If the baby is adopted. Some mothers adopt young babies. The most suitable adopting mothers are those who are about to wean their own young children. Their own child is around two years and is gaining weight on solid food.

- ◆ *If the adopting mother has a baby aged four months or older,* encourage her to give her own baby mashed up foods. Teach her to let the younger baby (adopted baby) suck on the breast.
- ◆ *If the adopting mother has no breast milk.* You can help the adopting mother produce breast milk (induction of lactation) by giving her chlorpromazine (Largactil) tablets. Give the mother 1 tablet, 25 mg t.d.s. for days or metoclopramide (Maxalon) 10mg four times daily. Encourage the baby to suck many times at the breast.

- ◆ Breastfeed as long as possible. Using a feeding bottle for a village baby may kill her - either by slow starvation or by repeated attacks of diarrhoea. If forced to use artificial feeding - use a cup and spoon, never a bottle with a rubber teat.

## Ten rules for good nutrition in young children

There is no need for malnutrition to be a problem among young children in Papua New Guinea. If families obeyed the rules for good nutrition, they would grow up strong, healthy, and well nourished. You must follow these rules, or there will be consequences for the baby and the family.

- 1) **Look after the mother's health during and after pregnancy.** The baby's health depends on the mother being healthy. A foetus takes 9 months to fully develop into a term baby inside the mother's uterus. During this time the baby is fed from the mother's body. If the mother is sick, malnourished or anaemic the baby will not grow properly inside the uterus. At birth the baby will be smaller than he should be. He starts his life at a disadvantage and may never catch up.

After birth the baby depends on his mother's milk for his food. If the mother is sick, malnourished or anaemic she will not produce enough milk for the baby. So, if a baby is to grow well and be well

nourished his mother must be healthy.

- 2) **Breastfeed the baby.** Breast milk is the best milk for babies. It is clean and safe. It is always ready for the baby and it does not cost any money. It contains all the food substances that a baby needs during the first 4 - 6 months of life. In addition, it contains proteins called antibodies that protect the baby against illnesses. A baby who is fed breast milk has a good start in life. She will grow well and will have fewer illnesses than a baby who is fed cow's milk.
- 3) **Start solids by the age of four months.** When a baby is six months old she can no longer get all the food she needs from breast milk. She needs to be given some solid food as well as breast milk. It takes the baby a few weeks to become used to solids. So start to give the baby soft mashed-up solids by about the age of four months. She will then be used to eating solids by the time she really needs them at 6 months of age.

The food that people give first to babies is different in different areas. It depends upon what foods are available and what foods people believe are good for babies. Always take account of people's customs. Often you must add to what people do; but never tell people to stop doing what they are used to doing. They will not listen to you. The first food people give to their babies is an energy food, usually their staple food. Encourage parents to give the food they are used to giving to

their babies; but teach them to give it earlier starting at four months of age.

If the baby's age is not known begin giving soft food when the baby starts to roll over.



Figure 9 - Use a cup and spoon if baby has to be artificially fed.

4) **Add a protein food and some fats or oil (tin Gris) to the staple.**

Protein foods are needed for growth. When the baby is used to eating solids, teach the parent to mash up a protein food. This should then be mixed in with the staple. Well cooked beans or boiled mashed up peanuts or fish or ferns are good protein foods. These protein foods that people can grow or find in the bush are just as good as more expensive protein foods like fish, meat and eggs. Fats or oils, e.g tin Gris, margarine, edible oil, coconut cream provide plenty of energy.

5) **Add some protective food to the diet.** Protective foods such as vegetables and fruit provide vitamins and minerals. These are necessary for good health. Dark green leafy vegetables like Aibika, pumpkin tops, and sweet potato leaves are rich in vitamins and

minerals. These foods are easy to grow and are cheap. We must encourage parents to give some of these foods each day to their children.

You will note that nutrition commandment 3, 4, and 5 tell us to give children meals made up of a staple food plus a protein food and a protective food. This is a mixed diet. A mixed diet is a good diet.

6) **Feed the child three meals a day.**

Children need at least three meals a day. It may not be possible for a mother to cook three times a day. But when she cooks, she should cook enough food for the child to be given three meals a day. Food that has been already cooked can be kept wrapped up in a leaf. The child can then eat this later as his next meal.

7) **Give children snacks in between meals.**

A snack is a piece of food that a child holds in his hand and eats while he plays. Children need snacks in between meals. Snacks can be pieces of fruit (e.g. banana, pawpaw, mango, and pineapple), staple food (e.g. kaukau, taro, wild berries, insects, grubs or a pieces of coconut). Children over three years can usually find their own snacks in the bush or gardens. Younger children need to be given snacks as they are unable to find them themselves.

8) **Put the child's meal on a separate plate.** Children need to have their own portions of the meal put on a separate plate or leaf. Otherwise

they will get only the left-overs from the main cooking pot.

A young child cannot eat as fast as an adult. Also, she is unable to reach into the cooking pot and get her own food. So she must be helped to have enough of all the food having it put on her own plate.

- 9) **Protect children from infections.** A child who is ill does not eat much. He may lose the food he does eat by vomiting or diarrhoea. If he has a fever his body will burn energy at a faster rate than usual. It is important to continue feeding children when they are sick. After an illness the child should be given an extra meal for one week to catch up on his nutrition.

Malnutrition and infections often go together. They each make the other worse. Protection from infection will help the child stay well nourished. A safe water supply protects the child from diarrhoea. Good hygiene will protect him from skin diseases like sores and scabies. Immunizations help protect him from disease like measles, whooping cough or tuberculosis. To keep the child well-nourished we must pay attention to his environment and protect him from infections.

- 10) **Space pregnancies more than three years apart.** When babies are born too close together the health of both the mother and the older child suffers. The first child must be large enough to eat enough food by himself before the next baby is born.

When the second baby is born the mother cannot continue to put all her attention on the first baby. Also, the second baby will now drink the mother's breast milk. So the first baby should be at least three years old before the next baby is born.

If the mother has babies born too close together she is always pregnant or lactating. Her body does not have a chance to rest and recover, and she will become malnourished. The mother's ill health will affect the health of her babies. Family planning advice and help is an important way of preventing malnutrition in young children.

If parents follow these 10 commandments for good nutrition their children will grow well. Malnutrition would then no longer be a problem for young children in Papua New Guinea.

### Artificial feeding (cows milk)

Sometimes artificial feeding may be necessary.

Warning - Artificial feeding may kill the baby.

Do not artificially feed a baby unless breastfeeding by his own mother or another woman is not possible.

- ◆ **Fresh cow's milk.** This is available in villages that have their own cows. The milk must be very fresh and collected under very clean conditions. Fresh milk must always be boiled and then cooled before use.



- ◆ **Long life milk.** The liquid milk has been ultra-heat treated to allow it to keep for several months provided it is not opened. When it is opened it must be used straight away or stored in a refrigerator.
- ◆ **Full cream powdered cow's milk.** This is the best form of cow's milk to use in Papua New Guinea. The powder keeps well in the tins.

There are many different kinds of full cream powdered cow's milk. Sunshine, Anchor, Farm Fresh, Highlands, Gala or Lactogen milk are the ones usually used. The advantage of Lactogen milk is that it is a bit easier for the baby to digest. It also has extra vitamins and iron added. Use full strength full cream milk for babies aged 4 weeks or older. For babies younger than 4 weeks, use half strength full cream milk.

#### How to make up full strength full cream milk

It is easy to make up liquid milk using full cream instant milk powder. One part by volume of the milk powder is mixed with three parts by volume of cool previously boiled water. This makes full-strength milk (milk as strong as fresh cow's milk).

- 1) One 50 ml medicine measuring cup of full cream instant milk powder, plus three \*medicine measuring cups of cool, previously boiled water

OR

- 2) One big cup full of full cream instant milk powder, plus three

\*big cups full of cool, previously boiled water.

Place the milk in the refrigerator as soon as it is made.

\*If instant full cream milk powder is not available, follow the instructions on the can.

#### How much milk to give each feed.

To find out how much milk to give to a baby, weigh her. Multiply the baby's weight in kg by 30. This tells you the number of millilitres (ml) of milk the baby needs each feed.

e.g. If the baby weighs 5 kg, she needs 5 x 30 equals 150 ml of milk each feed.

Do not give more than 240 ml of milk at a time.

Feed the baby six times a day.

Remember that all babies are different. Some want more, others want less milk. If a baby always finishes all the milk you give her add more milk to each of her feeds. When a baby has had enough milk she will stop and go to sleep as she would if she were breastfed. Never force a baby to finish her feed. She knows how much she wants, just as you know how much food and drink you want. Remember to feed the baby by cup and spoon, not a bottle.

After it has been made, the milk must be used immediately or placed in a refrigerator. If the refrigerator is not working, only make up one feed at a time and do not keep any milk that is

left over - give it to the mother to drink.

#### To mix up half strength full cream milk (sugar-milk)

- 1) Mix one 50 ml medicine measuring cupful of full cream instant milk powder and half a medicine \*\*measuring cupful of sugar with six medicine measuring cups full of cool, previously boiled water,

OR

- 2) Mix one big cup full of full cream instant milk powder and half a big cup full of sugar with six \*\*big cups full of cool, previously boil water.

I doubt whether there will be instructions to make up  $\frac{1}{2}$  strength milk on the instructions

**The number of feeds.** Although demand feeding is possible for babies who are artificially fed, it takes a lot of time and wastes a lot of milk. In the tropics milk in the cup should be used for one feed only. It should not be kept to offer the baby small amounts from time to time. This is one of the dangers when mothers who live in a village or in poor settlements bottle-feed their babies. They offer the baby small amount of milk frequently, which is the way they breastfeed a baby. As a result the milk goes sour quickly, becomes infected, and the baby gets diarrhoea. So feed the baby every 3 or 4 hours, six times a day.

There are many other kinds of artificial milks used in feeding babies. They are expensive and not as good as breast

milk. If the mother uses other kinds of milk you must teach her to follow the instructions written on the tin **Extra vitamins and iron**. Babies who are artificially fed should have extra vitamins and iron unless these have been added to the milk powder. Low birth weight babies and twins need extra vitamins and iron.

*Vitamins Multiple Liquid.* (Pentavite or Abdec), which contains vitamins A, B, C, and D, should be given to all artificially fed babies, low birth weight babies and twins. Give 0.6mls (24 drops using the dropper provided) each day.

#### Special points to remember if baby is artificially fed

No baby should be sent home to a rural village being bottle-fed.


Mothers have to be taught to wash the cup and spoon in hot soapy water. Then rinse off all the soap, rub the corners with a brush or fingers to get rid of all the milk, and then rinse well in very hot water. If possible, feeding utensils should be stored in a sterile container with a lid.

- ◆ Once the milk is prepared it should be covered with a clean cover until cooled. If possible it should be placed in a refrigerator in a fly-proof room if it is not used immediately.
- ◆ Only one feed is prepared at a time, unless it can be stored in a refrigerator.
- ◆ Hands must be washed before touching the feed things.



- ◆ Try to keep flies and other insects away.
- ◆ Make sure the milk is not too hot by spilling a drop of it on to your arm.
- ◆ Artificial feeding of small babies takes time. It requires a lot of attention to hygiene as well as to the making up of the feeds and the feeding of the baby. If a mother or guardian cannot manage artificial feeding at home safely, you must send the baby together with his mother or guardian to a health centre or hospital.

In a hospital the baby's feeding can be supervised until the mother or guardian learns how to do it safely. Sometimes it will not be safe to send the baby home being artificially fed. He will have to stay in the health centre or hospital until he is able to eat a village type diet. The usual cause for babies needing to be artificially fed is that the mother has died.

 Key message: If breastfeeding is impossible, give full cream milk to the baby by cup and spoon

## Baby Feed Supplies (Control) Act 1977

To prevent an increase in artificial feeding in Papua New Guinea, the National Parliament passed the *Baby Feed Supplies (Control) Act* in 1977. The purpose of this Act was to safeguard the health of babies by promoting breastfeeding. It aims to discourage artificial feeding, and particularly to discourage the use of feeding bottles, teats, and dummies.

Whenever possible, babies should be breastfed. If breastfeeding is not possible, the mother or guardian must be taught how to make up the milk in the correct strength and under hygienic conditions. The Act aims at ensuring that this happens.

Bottles are discouraged as they are difficult to keep clean. Babies under 6 months of age can be fed by cup and spoon. Babies over 6 months of age can be usually fed by cup.

Under this Act:

- ◆ Feeding bottles, teats and dummies can only be obtained from a pharmacist.
- ◆ The mother or guardian must produce an authorization (prescription) to buy a feeding bottle, teat, or dummy.
- ◆ Only a registered medical practitioner, HEO, or nurse can write an authorisation.
- ◆ Before writing an authorization the health worker must do the following:

- ◆ Satisfy himself that it is in the baby's interests.
- ◆ Instruct the mother or guardian how to clean the bottles properly (clean with bottle-brush and boil in clean water for 5 minutes or soak in sterilising solution).
- ◆ Instruct the mother or guardian to keep milk in a refrigerator if it is not immediately used.
- ◆ Instruct the mother or guardian how to mix the milk in the correct strength.
- ◆ The authorization can only be given to the mother or guardian.
- ◆ The authorization is written as follows:

Address: .....

## Authorization

Authorization to supply  
 ..... (name of mother  
 or guardian) of .....  
 (address) for use by  
 ..... (name of baby)

Number to be supplied Item

- Feeding bottles
- Teats
- Dummies

Date: .....

..... Name of  
 authorized person (in capital letters)

Signature:.....

Designation (e.g. Medical Practitioner,  
 H.E.O., Nurse):

.....

Health workers who do not follow these instructions in the Act are liable to K200.00 fine for a first offense and K500.00 fine for a second offense.

A similar fine applies to shop keepers and other people who supply feeding bottles, teats, or dummies without authorization. If you see a shop or trade store, other than a pharmacy, selling feeding bottles report the shop to a health inspector.

The Act has been successful in preventing the spread of feeding bottles in Papua New Guinea. Since the Act was passed, breastfeeding has increased. Along with the increase in breast feeding there has been a decrease in malnutrition in young children. There has also been a decrease in diarrhoea cases and deaths from diarrhoea in young babies. This is an example of legislation (law) promoting health.

**The Act was amended in 1984.** Some parents were buying baby cups and using them like feeding bottles. Because of this the Act was amended. The Minister for Health can now put a notice in the National Gazette and add any baby feeding aid to feeding bottles, teats, and dummies. Baby cups have now been added, and are only available on authorisation.

In the last 2 decades the Act has not been properly enforced, and more pharmacies and supermarkets are selling infant feeding bottles without a prescription. Although this has been a substantial social change, the principles of the Baby Feed Supplies (Control) Act of 1977 are still very relevant to mothers and children in many parts of Papua New Guinea.

### Prescription for a bottle

- ◆ Find out who will be making up the milk and feeding the baby.
  - ◆ Talk to this person
    - i. What milk is she going to use?
    - ii. Does she know how to mix the milk correctly?
    - iii. Does she have a feeding bottle brush?
    - iv. How is she going to clean the bottles? (Boiling for 5 minutes in water or using Milton).
    - v. Does she have clean water supply?
    - vi. Does she have electricity?
    - vii. Does she have a fridge?
    - viii. Does she have enough money to buy enough milk powder each week?
  - ◆ If the person:
    - i. Knows how to mix the milk correctly
    - ii. Knows how to keep the bottles clean
    - iii. Has enough money to buy the milk
    - iv. Has facilities in the home to safely bottle feed
- You can give her a prescription for feeding bottles and teats. She will need 2 or 3 feeding bottles and 4 or 5 teats.
- ◆ Give Pentavite 0.6ml (24 drops using the dropper provided) daily if using Sunshine or Anchor or Farm Fresh milk. (Special baby milks have the vitamins added, so Pentavite is not needed with these milks).
  - ◆ Advise the mother to continue breastfeeding if she can. i.e. If the baby is bottle fed while the mother is at work, the mother can breast feed the baby during the nights and weekend when she is not at work
  - ◆ If the person does not have the facilities at home to safely bottle-feed. You must not give her a prescription for feeding bottles and teats. Encourage and support the mother to breast feed.
- If she cannot breast feed:
- ◆ Teach her how to mix up the milk in a cup, and to feed the baby by cup and spoon. Teach her how to make up only one feed at one time.
  - ◆ Arrange for regular follow-up of the baby.

## Chapter 4. Malnutrition


### Failure to grow properly

All children should grow. The simplest record of growth is the baby's weight. During the first four months of life the baby should gain at least 0.5 kg every month. From 5 to 12 months of age the baby should gain at least 0.5 kg every two months. Between 1 to 2 years the baby should gain at least 0.5 kg every four months. If a baby does not gain this amount of weight she is not growing properly. Between the age of one to five years, the mid upper arm circumference (MUAC) should measure 14 cm or more.

During the first few months of life the baby gains weight rapidly. He has usually doubled his weight by the age of 4 months, often earlier. During this time the baby gets all the food he needs from his mother's breast milk.

As he gets bigger, breast milk is no longer enough to supply all the food the baby needs to grow properly. This is why it is important that babies should start to eat mashed soft food by the time they are 4-6 months old. The baby at this age needs food *as well as* breast milk. It is normal for the growth of babies to slow down after the first few months of life. However, in Papua New Guinea the growth of many babies slows down far more than it should between 4 month and 3 years because they are not fed enough.

After 4-6 months of age the baby no longer gets all he needs from breast milk. He does not yet eat the full adult type of diet until he is about 3 years old. This period is a dangerous one for young children. Slowing down of growth more than normal is a sign of malnutrition. Children with malnutrition get infections like pneumonia and diarrhoea more easily than children who are growing normally. Children who get infections don't eat and they use up their bodies' energy and protein quickly. This causes malnutrition. This is a vicious (bad) circle. Malnutrition increases infections and infections lead to more malnutrition. Many children die during this period from an overwhelming infection and the complications of malnutrition. Death is due to infection plus malnutrition. In addition, children who are malnourished become sicker than normal children do when they catch infections e.g. measles is a much more severe disease in malnourished children.

 Key message: If the mid arm circumference in a child over the age of 12 months, measures less than 14 cm the child is malnourished

The best way to make sure a child is growing properly is to weigh her regularly each month. Each month her weight should be put on her weight chart. One weight taken at a single time tells you very little. To know about the child's growth, you need to know her weights over several months. When you join up each of his monthly weights on his weight chart you will see the child's line of growth. A child's line of growth should always be moving upwards. If it does not move up over a period of one to two months, or if it moves down, it means the child has stopped growing. This warns you that the child is in trouble. She is either not receiving enough food or has some infection or chronic disease. Figure 10 shows you the weight chart of a child who was growing properly. Figure 12 shows you the weight chart of a child who has severe malnutrition. Notice that this child had stopped growing for several months *before* her malnutrition became obvious.

A child's weight for age only tells us about her weight. But growth in height is also important. In the same way that there is a standard weight for age chart, there is also a standard height for age chart which allows for monitoring the child's increase in height over time.

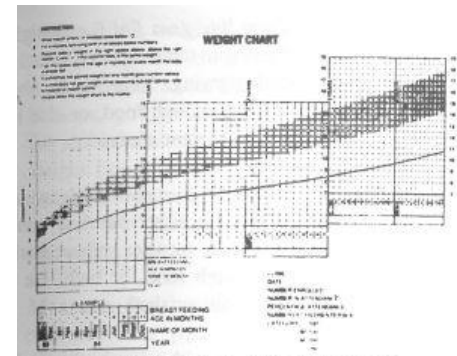


Figure 10 — Baby's weight should be drawn monthly on a weight chart.



Figure 11 — Child with kwashiorkor, showing misery, oedema of face and legs, and sparse straight hair.

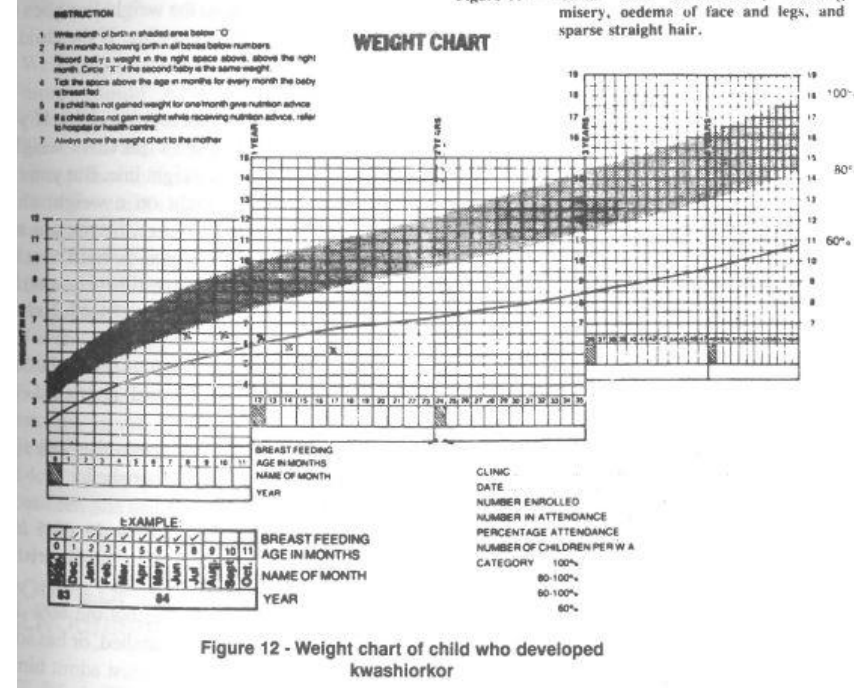


Figure 12 - Weight chart of child who developed kwashiorkor

## Diagnosis of malnutrition

A normal range for any measurement is the range of values (from the highest to the lowest) which includes the large majority of children (children of the same age are not all of the same weight or height).

There are several terms to understand when discussing malnutrition.

- ◆ **Malnutrition** literally means bad nutrition and can refer to too much or too little nutrition. In PNG and low and middle income countries, malnutrition usually refers to too little nutrition.
- ◆ **Overweight** means a child's weight is above the normal range. This is an uncommon problem in PNG but is increasing in urban areas among the wealthier families.
- ◆ **Underweight** specifically refers to being below the normal range of weight for age.
- ◆ **Stunting specifically** refers to being below the normal range of height for age.
- ◆ **Wasting.** This is a measure of thinness. It is not necessary to know the child's age to determine thinness. If a child's weight and height are measured we can check what the weight should be for that height on a weight for length or weight for height chart. Wasting is defined as a weight for height (or length) below the normal range.
- ◆ Wasting is also assessed by measuring the MUAC. It is present if the MUAC is below 14cms in a child aged between 1 to 5 years.

- ◆ **Undernutrition** refers to being underweight, stunted or wasted. Children with severe undernutrition may be both stunted (shorter than they should be for their age) and wasted (lighter than they should be for their height). The term also includes the result of inadequate amounts of micronutrients (vitamins and minerals)
- ◆ **Malnutrition** in PNG almost always refers to severe undernutrition.
- ◆ **Kwashiorkor** refers to the presence of oedema (swelling) in a malnourished child

Under-nutrition and malnutrition are very common in PNG and contribute very significantly to childhood illness and, in severe cases, death. The current estimates are that one out of two children are stunted, one of three underweight, one in seven wasted, and one in fifteen severely wasted.

It is easy to diagnose malnutrition when you see a very thin (wasted) child. But this is severe malnutrition, and the child may die. It is important to diagnose malnutrition before it becomes severe and obvious.

The following methods can be used to diagnose malnutrition:

- ◆ Look at the child's weight line. This is the best way of diagnosing malnutrition. But to look at the child's weight line you need these four things:
- ◆ You must know his age or date of birth,
- ◆ You must know his weight over the past few months,

- ◆ You must know his present weight, and
- ◆ You must have a weight chart, (use the weight chart in the child's Health Record Book).

It is important that the weights are accurate. The most accurate scale available should always be used for weighing young children.

What does the child's weight mean?

- ◆ If the child's weight line is going upwards, then he is growing. If he is growing he is well nourished.
- ◆ If the child's weight line goes flat (i.e. weight stays the same) for one to three months, then child has stopped growing. This means that either he is not eating enough food, or else has some infection or chronic disease.
- ◆ If the child's weight line goes down, this means he has lost weight. He either has had some infection, e.g. diarrhoea, worm infection, measles, tuberculosis, HIV, or is not getting enough food, or both. He is becoming severely malnourished.

Some children are born with a low birth weight. These children often remain with weight below normal on the weight curve. But as long as the weight line goes up each month the child is growing. If the child is growing he is well nourished.

**Look at the child's present weight.** If you do not know the child's previous weight you cannot make a weight line. But you can put his present weight on a weight chart provided you know his

age, his weight, and have a weight chart. If you do not know the child's exact age you can estimate (guess) the age by counting the number of teeth he has.

- ◆ If the child's present weight is above the -2 Z-score line, then he is probably well nourished.
- ◆ If the child's weight is below the -2 Z-score line then he is probably malnourished.
- ◆ *If the child's weight is below the -3 Z-score line* then he is probably very malnourished (marasmus).
- ◆ If the child's weight is below the -3 Z-score line and he looks very malnourished, or has some other illness as well, you must admit him to a health centre or hospital.
- ◆ If the child's weight is above the -3 Z-score line, weigh the child each month for the next 3 months to see the child's weight line. If the weight line is flat or goes down, then the child definitely is malnourished. If the weight line goes upwards over the next 3 months, it means the child is growing. Either he was not malnourished or else he is recovering well.

**Measure the child's mid upper arm circumference (MUAC).** This is not as reliable as putting the child's weight on a weight chart. But it is useful if you have no weighing scales or if you do not know the child's age. You only need a tape measure.

- ◆ Well-nourished children aged 12 months or more should have a mid-upper arm circumference (MUAC) of 14 cm or more. Remember that



a child aged 12 months will be expected to have 6 teeth. So if you do not know the child's age, count his teeth. If you can count 6 or more teeth you know the child is 12 months or more. This means you can measure his MUAC to see if he is malnourished.

- ◆ If a child 12 months or more has a MUAC less than 14 cm he is probably malnourished. Babies less than 12 months old have a smaller MUAC. Children older than 5 years have a larger MUAC.
- ◆ A MUAC threshold of 14cm can only be used for children aged between one and five years.

## Types of severe malnutrition

There are 3 types of severe malnutrition children.

1. **Children who are wasted.** Wasted children, or children with wasting, are thinner than normal, they have slack skin over limbs, buttocks and abdomen, and you can see their ribs. These children are diagnosed by low weight for height or low MUAC. Wasting shows that the child is malnourished at the present time and needs treatment.

Children may be wasted because:

- ◆ They are not eating enough food; or
- ◆ They have a chronic or recurrent illness; or
- ◆ Both not eating enough food and a chronic or recurrent illness.

Remember the vicious (bad) circle of malnutrition and infection. Each makes the other one worse. When you see a child who is wasted you must find out why he is wasted. Is it not enough food? Or is it a chronic or recurrent illness? Or is it both, not enough food *and* illness? This is important because the treatment is different. A child with wasting due to chronic illness needs his disease to be diagnosed and treated. Food by itself will not cure his wasting. He needs treatment for his illness as well as food.

A good rule to remember is that older children who are wasted have chronic illness, e.g. tuberculosis, heart disease, unless there is a famine (sudden food shortage). A famine occurs after disasters, e.g. earthquakes, floods, drought, volcano eruption, war, frost.

Very severe wasting (weight below -3 Z score line) is called marasmus.

2. **Children who are stunted.** Stunted children, or children with stunting, are smaller in height than normal. They are diagnosed by low height. Stunting shows that the child was malnourished in the past, he may or may not be malnourished now. If he is not wasted, i.e. if his weight is normal for his height, he is no longer malnourished. He does not need urgent treatment now, but he needs a good mixed diet.
3. **Children who are both wasted and stunted.** These children are both thinner than normal (wasted) and smaller in height than normal (stunted). This shows that they are



malnourished now and were also malnourished in the past. These children need treatment.

If the mother is given help with her child's diet as soon as he stops growing, severe malnutrition can be prevented. The main things in the diet needed for growth are proteins, which build muscle, and calories (or joules) which supply energy. Children who do not grow properly are usually short of both proteins and energy (calories or joules) in their diets. This is called protein energy malnutrition (PEM)

The commonest kind of PEM is this failure to grow properly between 4 months and 3 years of age. PEM is an important reason why children of this age often get infections. It is the reason why these infections are often severe, and why the children often die. PEM also affects the brain of young children. These children will not grow up as clever as they were meant to be. PEM is a very dangerous disease.

### Severe protein-energy malnutrition (PEM)

Children who have a severe lack of protein and calories (or joules) or who fail to grow over a long period of time develop obvious signs of malnutrition as well as failure to grow. There are three types of severe PEM.

**Marasmus (wasting).** The baby does not get enough food to eat and becomes starved. This usually means there has been a failure of breast feeding. Artificially fed babies often get marasmus. The milk is made too dilute.

It also gets infected and causes diarrhoea.

The signs of marasmus are:

- ◆ Growth failure. The baby's weight below the bottom line (-3 Z scores line) of the weight chart.
- ◆ Marked wasting of muscle and fat. The baby's face looks like an old man's face. In addition, there may be:
  - ◆ Diarrhoea
  - ◆ Anaemia
  - ◆ Vitamin deficiencies

Marasmus in an older child usually means chronic disease, unless there is a famine (food supply fails). Famines happen in war or after floods, frosts or drought.

Tuberculosis is the most common chronic infection causing marasmus. Other infections or chronic conditions, such as HIV, heart disease, kidney disease, diabetes, or cancer can also cause marasmus

**Kwashiorkor.** This usually occurs in a child aged between one and three years. She has often been displaced (pushed away) from her mother's care and her supply of breast milk by the arrival of another baby. The child is usually given the staple diet to eat such as sweet potato or taro or sago. The food is bulky. A large amount must be eaten to get enough energy (calories or joules). The child may have difficulty digesting such large quantities. In addition, this food contains too little protein for the growth needs of the child. As well as all

this, the child is unhappy because he has been displaced from his mother. Kwashiorkor is caused by not enough protein in the diet of a young child.

The signs of kwashiorkor are:

- ◆ Growth failure. The child's line of growth has stopped going upwards.
- ◆ Wasting of muscle
- ◆ Oedema of the face, feet and legs
- ◆ Unhappy child who is not interested in his surroundings
- ◆ Loss of appetite

In addition, there may be:

- ◆ Diarrhoea
- ◆ Hair changes. The hair loses its dark colour and loses its curl and shininess. It becomes lighter in colour, straight and some falls out.
- ◆ Skin changes. The skin may get dark patches that peel off leaving light coloured skin or ulcers behind. This usually happens on the legs and buttocks. It is called flaky paint dermatosis.
- ◆ Anaemia
- ◆ Vitamin deficiencies

**Marasmic-kwashiorkor.** Sometimes a young child has been starved and so has marasmus. But he also has oedema of his legs and may have the other signs of kwashiorkor. This is called marasmic-kwashiorkor. This child's weight is below the bottom line (-3 Z score line) of the weight chart. As well as this he has oedema.

These words marasmus, kwashiorkor and marasmus-kwashiorkor do not really matter. They are all severe kinds

of the one disease, protein energy malnutrition (PEM). The term Severe Acute Malnutrition (SAM) is now used to describe these forms of severe malnutrition- although in most cases the problem has been going on for some time.

## Causes of protein-energy malnutrition

### Children less than 6 months old.

- ◆ Inadequate (not enough) breast milk:
  - i. Poor nutrition or infection in the mother. This causes a low birth weight baby and poor lactation.
  - ii. Low birth weight baby. This baby cannot suck strongly. The baby sucking is the stimulus for the mother to produce breast milk.
  - iii. Twins
  - iv. Mother worried or anxious, and so her milk supply gets less
  - v. Mother died
  - vi. Artificially fed baby
  - vii. Adopted baby
- ◆ Chronic or recurrent illnesses in the baby:
  - i) Chronic or recurrent (repeated attacks) of diarrhoea
  - ii) Chronic or recurrent pneumonia
  - iii) Birth injury
  - iv) Congenital heart disease
  - v) Chronic urinary infection
  - vi) Cleft palate

If the young baby who is malnourished does not improve after one week's feeding in the health centre, you should refer her to hospital. She probably has a chronic or recurrent illness which needs to be diagnosed and treated.

#### Children older than 6 months.

- ◆ Bulky starchy staple (e.g. kau kau, taro, yam, sago, banana) with very little other food in the diet
- ◆ Ignorance about foods suitable for young children
- ◆ Infections (e.g. diarrhoea, pneumonia, measles, whooping cough, tuberculosis)
- ◆ Intestinal parasites (e.g. roundworms)
- ◆ Lack of food due to poverty or poor budgeting
- ◆ Cultural beliefs and food customs
- ◆ Too short spacing between babies

#### Young children at risk of getting PEM

If we look at the above causes of PEM we can tell which young children are likely to get PEM. These children are said to be at risk of getting PEM. They need extra care and help so that we can prevent them getting PEM.

#### The reasons for young children being at risk of getting PEM.

- ◆ Birth weight below 2.5 kg.
- ◆ Poor maternal health
- ◆ Death of mother or father, or separation of parents, or baby born to young or single mother who is unsupported

- ◆ Mother already has more than 5 children
- ◆ Twins
- ◆ Artificially fed baby
- ◆ Previous death of a sibling (brother or sister)
- ◆ Father unemployed (if lives in town)
- ◆ Adoption
- ◆ Family or domestic violence
- ◆ Poor housing environment, such as no water or sanitation, or overcrowding
- ◆ Infections (e.g. severe diarrhoea, measles, tuberculosis, whooping cough).
- ◆ Next baby born less than 3 years after last baby born.
- ◆ Failure to gain weight adequately. Minimum weight gains are:
  - i. Age 0 - 4 months: 0.5 kg, each month
  - ii. Age 5 - 12 months: 0.5 kg, each 2 months
  - iii. Age 1 - 2 years 0.5 kg, each 4 months

#### Reasons why young child may not receive enough protein and/or calories (joules)

- ◆ *Lack of knowledge by parents.* They do not know the child needs plenty of food to grow properly. They do not know that feeding milk to a baby in a bottle is very dangerous. They do not know that the baby should start to be given mashed up solids by the time he is 4-6 months old.
- ◆ *Food habits.* Most Papua New Guinean diets are bulky and contain mainly starch. There is a lot of

waste in bulky foods. A child who eats bulky food has to eat a lot of it to get enough calories. But his stomach cannot hold such a large amount of food, and he is unable to get enough protein from this kind of food.

Sometimes people's beliefs about food for young children make it difficult for the young child to have enough protein. Some parents think that fish or eggs or chicken or other protein foods have a bad effect on young children. Diarrhoea may be treated by starving (not giving food to) the child. This makes the child's nutrition worse.

- ◆ *Lack of money (poverty).* This is more likely to happen in urban areas. The family may live in a squatter settlement and have no land in which to grow any food. The father may not have a job or he may lose his money by gambling or drinking. There is not enough money to buy food needed for the child. There may be overcrowding in the house, and poor water and sanitation – this is also poverty.
- ◆ *Social reasons.* Changes in the traditional way of life may produce malnutrition. The mother may go out to work. She leaves her baby behind at home, perhaps in the care of a younger woman or girl, and the baby is artificially fed (given powdered milk). The mother may think it is a good idea to copy mothers in rich countries and bottle-feed her baby. However, he gets several attacks of diarrhoea and after a few months has marasmus.

The mother may become pregnant again while her baby is still breastfeeding. The mother may stop breast feeding and loses her supply of breast milk, which contained an important amount of protein. When the new baby is born, the mother may not have time to take as much care of the first baby as she used to. Sometimes a mother, father or other guardian may neglect a baby, and not take care of him. Social factors such as alcohol and/or drug abuse, adoption, domestic (family) violence an unmarried mother and broken marriages may cause the baby to be neglected. If the mother dies before the baby has stopped breastfeeding, the baby is very likely to get marasmus.

- ◆ *Illness in the child.* Infections may stop the child feeling hungry and eating. Illness also uses up the protein and calories that should be used for growth. Diarrhoea and vomiting prevent food being absorbed properly.
- ◆ *Unhappiness.* A child may lose his appetite and not eat because he is unhappy. He may be neglected (poorly looked after) and treated unkindly. If there is domestic violence this will cause the child to be unhappy and scared or make the mother unable to focus on caring for the baby if she is injured or abused.

Common illnesses that make nutrition worse are:

- ◆ Diarrhoea
- ◆ Respiratory infections

- ◆ Tuberculosis
- ◆ Measles
- ◆ Whooping cough
- ◆ Chronic malaria
- ◆ Severe hookworm infection
- ◆ HIV infection

## Treatment of PEM

There are 3 aims in the treatment of PEM

- 1) Supply enough calories (joules) and protein and micronutrients (vitamins and minerals) in the diet for the child to start growing again.
- 2) Treat infections and other diseases which the child has.
- 3) Teach parents how to feed the child properly so that he will grow well.

## Mild cases

These are children who are failing to grow as shown by the child's weight chart. They do not look starved, nor swollen with oedema. If you treat these cases early you will prevent them going on to severe kinds of PEM like marasmus or kwashiorkor. It is also much easier, as well as being far better for the child and his family, if you treat PEM in the early stage. Don't wait for PEM to become severe. Treat it early.

The treatment of these mild cases is mainly education.

- ◆ *Explain to the parents* that their child is ill because he is not having enough of the foods that build his body.

- ◆ *Find out what foods are available* to the child, what foods are locally grown and what food can be bought. What food parents can buy depends on how much money they earn.
- ◆ Find out how the parents are already feeding the child, what foods they give and why.
- ◆ *Find out if they have any customs or beliefs* about not giving the children certain foods.
- ◆ *If possible, admit the mother and child to the ward for a short period of 5 to 7 days.* Give the child the type of diet he gets at home but add in extra protein foods (e.g. beans, peanuts, fish, meat, eggs). Also add in other foods that he needs if they are missing from his diet (e.g. dark green leafy vegetables, fruit). Give the child a spoonful of dripping (tin gris) mixed with his food 3 times a day.

During this time the mother learns how to prepare the food and feed her child with the right kinds of food. You must teach her using cooking and eating utensils (saucepans, plates, spoons etc.) like those she has at home. The food that you teach her to use must be food that she can go on giving the child when she goes home. If it is not possible to admit the mother and child, you will have to spend a lot of time talking with the mother and showing her how to do the things you tell her.

## Admitting high risk patients

- ◆ *Always try to admit a baby under 6 months who has mild PEM.* You

must find out whether the lack of breast milk is due to a cause in the baby or a cause in the mother. Try to increase the mother's breast milk by improving her diet and treating any sickness she has. If the baby is artificially fed, her feeds must be carefully prepared. It is not safe for her to have artificial (powdered) milk feeding in a village. She should stay under supervised care until she is eating solids well and no longer needing powdered milk to drink.

- ◆ Always try to admit a child with mild malnutrition who does not gain any weight after 3 months, treatment as an outpatient.
- ◆ Always admit a malnourished child if he has another illness (e.g. pneumonia).

#### Treatment of mild PEM also includes:

- ◆ Never give the mother milk powder to mix with water for the baby to drink. This will give the baby diarrhoea and probably kill her.
- ◆ Some better ways to add protein to the child's diet:
  - i. Give the mother milk powder and show her how to use it as a food supplement. Show the mother how to mix in 2 level tablespoons of milk powder to the child's normal food. Two tablespoons of milk powder should be mixed in with his food twice a day.
  - ii. Milk powder can also be given by itself as a ball. Two level tablespoons of milk powder are mixed with a little water into a paste and rolled into a ball. Some sugar can be added for taste. The child should eat this twice a day.
- iii. Another way to give protein is to use ground-up roasted peanuts. The peanuts are first roasted and then put through a grinder twice. Another way is to boil the peanuts and then mash them up. The child needs 2 tablespoon of ground-up roasted peanuts or boiled mashed peanuts each day.
- iv. High protein biscuits. Peanut cookies contain protein. If parents buy biscuits for their child, encourage them to buy the high protein biscuits like peanut cookies.
- ◆ *Some ways to add more energy foods to the child's diet.* Tell the mother to add one tablespoon of an oil (red palm oil, peanut oil,) to the child's food each day. Or tell her to mix 1 tablespoon of dripping (tin gris) or coconut cream with the child's food 3 times a day. Encourage the mother to give the child more of her usual foods each day. Explain to the mother that the child needs three meals a day with snacks in between.
- ◆ *Treat any other illnesses the child has*, e.g. malaria, pneumonia, skin infections, anaemia, tuberculosis.
- ◆ Arrange with the parents for the child to come back regularly so you can be certain she improves.
- ◆ *If possible, visit the child's home.* You will see the problems that the



parents have, and your advice will be much more appropriate. You will not have time to do a home visit for every case. But it is worth finding time to do a few home visits to learn how children are looked after in the area where you are working.

- ◆ *Family planning.* Discuss with the mother and father the help they can receive for family planning. The malnourished child will get worse if the mother becomes pregnant and has another baby to look after and feed. Find out what method of family planning would suit the parents best. Then help the parents obtain this.
- ◆ *The Health Education Section has charts showing some foods.* These can be cut up and used as teaching aids. Contact your local Health Education Officer to get these. However, it is always better to use real foods for demonstration and teaching if you can.

### Severe cases (marasmus, kwashiorkor, marasmic-kwashiorkor)

These children look starved, with much loss of body fat and muscle (Marasmus). Or they may be swollen with oedema (Kwashiorkor). Or they may be unhappy and refuse to eat. These children are severely ill and may die. They must be admitted with their mothers or guardians to hospital or health centre.

Children with severe malnutrition require full nursing care. They are at risk of:

- ◆ Hypothermia: even in warm parts of the country this can occur, and especially during the night
- ◆ Hypoglycaemia: low blood sugar may be fatal, or which may cause permanent damage to the brain
- ◆ Infections
  - i. Prevent hypothermia by making sure the child is well covered, particularly in the night.
  - ii. Prevent hypoglycaemia by feeding the child
  - iii. Treat infection
  - iv. Diet

If you are working in a provincial hospital you will probably have access to special milks called F75 and F100. The 75 and 100 refers to the amount of calories in the milk. These milks also contain added vitamins and minerals. But ordinary full cream powdered milk contains almost as many calories as F75 and Milk Oil Formula (MOF) contains the same amount of calories as F100. If you don't have the special milks use ordinary milk and make MOF and give the vitamins and minerals separately

If the child is severely wasted or has kwashiorkor it is probably best to start feeds with F75 or ordinary milk for the first 2-3 days. When the child is tolerating this and is stabilised, change to F100 or MOF

### Making Milk Oil Formula (MOF)

To make up MOF for use in the ward

- ◆ Mix one big cup full of full cream instant milk powder with three big cups full of cool, previously boiled water. If instant milk powder is unavailable follow instructions on the can. Add 50 ml of edible oil (e.g. peanut oil) and 1 heaped 50ml cup (medicine cup) of sugar.

Frequency and amount of feeds.

- ◆ Give 30ml/kg feeds six times a day (6 am, 9 am, noon, 3 pm, 6 pm, 9 pm) by nasogastric tube.
- ◆ Continue feeding by nasogastric tube until the child is able to drink all the milk by cup himself
- ◆ Instead of using 30 ml x weight in kg as number of ml each feed, you can use the following amounts:
  - i. If child weighs 3 - 5 kg give 120 ml 6 times a day.
  - ii. If child weighs 6 - 9 kg give 240 ml 6 times a day.
  - iii. If child weighs 10-14 kg give 300 ml 6 times a day.

**Vitamins.** Remember to give the child 0.6 ml (24 drops using the dropper provided) of multi-vitamins (Pentavite or Abdec) daily.

**If the child has severe diarrhoea and becomes dehydrated.**

- ◆ It is safer to rehydrate children with severe malnutrition by nasogastric tube than by intravenous drip. If it is available give the special oral rehydration solution for malnutrition (ReSoMal). If not use the ordinary Oral Rehydration Solution. Give 50-100mls in-

between each feed if the child is less than 10Kg or 100mls in between feeds if the child is more than 10Kg. If the child does not improve, or if there are signs of severe dehydration you will need to give intravenous fluids - but change to oral or nasogastric fluid as soon as the child improves.

- ◆ If watery diarrhoea persists, check the child's perianal area. If it is red and sore, the child might have lactose intolerance. Change the oral feeds to oral rehydration solution for 2 or 3 days only. Then change back to F100 or MOF *not available*.

**Add in solid foods** as soon as the child will take them. As the child continues to improve, his appetite returns, and he smiles and becomes happy again. He should now be eating more and not drinking as much liquid milk.

Protein foods like beans, fish, milk powder or ground-up roasted peanuts are added to his diet. Two level tablespoons of milk powder should be added to his food twice a day. An egg, if available, should be given each day.

These protein foods can be mashed up with ripe bananas or well-cooked sweet potato. Mix in edible oil with the child's food. Also give some fruit and dark green leafy vegetables.

**Feeding programme for child with PEM.**

*When not drinking or eating:* Give F100 or MOF six times a day by nasogastric tube. It is a good idea to splint the elbows of children being fed by



nasogastric tube to prevent them pulling the tube out splint his elbows.

When improved and able to eat and drink:

- ◆ 3 meals a day, plus
- ◆ 3 snacks a day, plus
- ◆ MOF 3 times a day

Meals - 6 am, noon, 6pm

- ◆ Staple (kau-kau, taro, yam, sago or rice)
- ◆ Plus, tin meat or tin fish or fresh fish or beans or peanuts.
- ◆ Plus dark green leafy vegetables (kumu, aibika, tulip, ferns, pumpkin tops, sweet potato tops).
- ◆ Plus 1 spoonful of dripping.
- ◆ Plus coconut if available.
- ◆ Feed the child his food on his own plate.

Snacks - 9 am, 3 pm, 9 pm

- ◆ Banana, pawpaw, avocado, peanut paste, powdered milk ball, egg, cheese.

MOF - 9 am, 3 pm, 9 pm

If you are working at a provincial hospital, you might have access to Ready to Use Therapeutic Food (RTUTF). This is usually made from peanuts and oil and is a way of giving calories and protein in a ready packaged form. But it is not necessary. A good diet based on locally available foodstuffs is just as good.

### Education of Parents

- ◆ As you increase the foods given to the child keep teaching the parents about correct feeding. Teach the mother to prepare the food and mix the foods and to feed the child herself. Teach the mother to give the child his food on his own plate.
- ◆ Use foods and cooking things that the mother has at home. Encourage the mother to feel that she herself can feed the child.
- ◆ Do not blame the mother for the child's malnutrition. Remember that she does not understand about nutrition. She loves her child and wants to do the best for him. You must make the mother want to help you improve the child's diet. This can only be done if you are friendly and respectful to the mother. If you get cross with her she is unlikely to do what you tell her when she goes home.
- ◆ Do not forget the father. The mother is unlikely to be able to improve the child's diet without her husband's agreement and support. Talk with the father and explain why the child needs a mixture of foods.
- ◆ Remember to involve the grandmother also, if she is living with the family.
- ◆ Parents do not understand about words like protein, calories, joules, kilograms, grams and malnutrition. So do not use these words when talking to them. Use words that they understand. Make sure the foods you tell them to use are available and culturally acceptable.

### Drugs

- ◆ Vitamin multiple liquid (Pentavite or Abdec). 0.6ml (24 drops using dropper provided) of vitamin multiple liquid should be given daily.
- ◆ *Folic acid*. Give one tablet once a day for one month.
- ◆ *Antimalarials*. A full oral treatment dose should be given. Then prophylactic antimalarials each week.
- ◆ *Albendazole*. Children with PEM often have worm infections, so give Albendazole. If child weighs under 10 kg give 1 tablet once. If child weighs 10 kg or more give 2 tablets once. If oedema is present, give Albendazole daily for 3 days.
- ◆ *Cotrimoxazole* (Bactrim or Septrin). Most children with severe PEM also have a chest, urine or skin infection. Give cotrimoxazole (Septrin) twice a day for one week.

Dose of Cotrimoxazole (Septrin):

Weight	Dose
3 – 5kg	2 ½ ml twice a day
6 -9kg	5ml twice a day or ¼ tab twice a day
10-14kg	7 ½ ml twice a day or ½ tab twice a day
15-19kg	10 ml twice a day or 1 tab twice a day
20-29kg	1 ½ tabs twice a day
30kg and over	2 tabs twice a day

It is better to use cotrimoxazole (Septrin) rather than injections of penicillin in very malnourished children. These children have little muscle or subcutaneous fat. Penicillin injections easily give these children an injection abscess.

- ◆ *Tinidazole*. Give once daily for three days.

Dose of Tinidazole:

Weight	Dose
3 – 5kg	¼ tab daily
6 -9kg	½ tab daily
10-14kg	1 tab daily
15-19kg	1 ½ tabs daily
20-29kg	2 tabs daily
30-39kg	3 tabs daily

Disease interactions

- ◆ *Measles-Rubella vaccine*. Measles is a dangerous disease in a child with severe PEM. It makes the malnutrition worse and the child may die. For this reason, you must try to prevent a child with severe PEM catching measles.
- ◆ *Vitamin A concentrated solution*. You must look at the eyes of every malnourished child. To treat or prevent Vitamin A deficiency give Vitamin A daily for 2 days, and a third dose one week later.
  - i. Use capsules (200,000 units) of Vitamin A concentrated solution (or tablets) for children less than 1 year of

age. Give 100 000 units of Vitamin A each day for 3 days.

- ii. Cut a capsule of Vitamin A containing 200 000 U open. Squeeze out 3 drops onto the tongue. The 3 drops will provide 100 000 U. of Vitamin A. Do not give more than 3 doses of Vitamin A concentrated solution.

- ◆ *Iron*. Start iron supplements after one week of treatment of the malnutrition. This should continue daily orally for 8 weeks. Give Fefol tablets to older children, and ferrous fumarate suspension to infants (see Standard Treatment Manual: Anaemia). Tell the mother when the child is on iron his stools will become black. Instruct the mother to clean the child's teeth after giving iron to avoid staining the teeth. And tell the mother to keep the Iron tablets out of reach of the child, as too much iron can be very toxic.
- ◆ *Other diseases*. The child may also have other diseases like scabies, thrush, diarrhoea, pneumonia, otitis media, urinary tract infection, tuberculosis, HIV or other chronic condition. These will need to be diagnosed and treated.

#### Investigations:

- ◆ **Weigh the child at least twice a week on** the most accurate scales you have. Record the weight on the child's chart. Each month put the child's weight on the weight chart in the child's Health Record Book. Show the mother his weight line,

which should go upwards with treatment.

- ◆ *Haemoglobin.* Check the Hb to see if the child is anaemic.
- ◆ *Check the blood glucose.* Children with PEM are at risk of hypoglycaemia (low blood glucose), especially overnight. The best treatment is to initiate feeding early.
- ◆ *Blood slide* for malaria parasites if the child has a fever.
- ◆ *Stool for ova, cysts and parasites.* Check the stools for *Strongyloides* if the child has oedema.
- ◆ *Test the urine for protein* if the child has oedema. Large amounts of protein in the urine indicate a problem with the kidneys and the child should be referred.
- ◆ *Urine microscopy and culture.* Children with PEM often have a urine infection. So send a sample of urine for microscopy and culture, if possible.
- ◆ *Chest x-ray.* A very malnourished child should always have a chest x-ray done if possible. This may show pneumonia or tuberculosis.
- ◆ *Gastric aspiration for acid fast bacilli (AFB).* Do at least 3 gastric aspirations early in the morning, before the child has eaten or drunk, if you suspect tuberculosis.
- ◆ *Screen household contacts for tuberculosis* if you suspect the child to have tuberculosis.
- ◆ It is a good rule to test all children with severe malnutrition for HIV infection. This should only be done after pre-test counselling of the parents and with their approval. It is important to understand that a

positive HIV test in a child less than 18 months does not always indicate HIV infection. The test may be measuring the mother's antibodies. But if the test is positive the child should be referred if possible and the parents themselves should be tested after counselling.

**General nursing care.** Great care and a lot of time must be taken in caring for children with PEM. At first the child is unhappy and not interested. He often has to be tube fed. His skin and mouth must be properly looked after.

Keep a careful record of what fluid and food he takes. Keep a record of his stools, so that you know if diarrhoea occurs.

His mother or guardian should stay with him because:

- ◆ This helps him feel happier.
- ◆ He will eat better and recover more quickly.
- ◆ His mother can help feed him and take care of him.
- ◆ She must learn how to feed him properly when he goes home.
- ◆ She helps keep him warm at night.

A child with PEM may not be able to keep his body temperature normal. If outside temperature falls she will get cold (hypothermia). This hypothermia can kill her. It is important to keep the child at the same temperature all the time, between 36 and 37.5 degrees. Care must be taken at night, especially in the Highlands, where the temperature falls a lot. The child must be kept away from cold air. She should

not be placed by an open window or door, nor put under a fan. She should sleep curled up beside his mother at night. The mother's body will help keep the child warm.

Initiate feeding early to prevent hypoglycaemia (low blood glucose level). Especially give an overnight feed to the child with PEM in the first week of treatment. Night is the time they are most at risk of hypothermia and hypoglycaemia.

The child does not should not stay in bed all the time. She will be happier and less likely to get pneumonia if she sits on his mother's lap or is carried around by her.

**Progress.** After one week of treatment the child should be improving. He should be eating and drinking by himself, and no longer needing to be tube fed. His weight should start to go up, unless he had oedema. If he had oedema his weight will go down at first as the oedema disappears. Then the weight will start going up.

If the child is not showing signs of improvement after one week of treatment you must check that he really is eating his food and drinking his milk. Often the food and milk is brought to him, but he does not take it because he has lost his appetite. This is why MOF is usually given by nasogastric tube at the start of treatment. If you see the child drink his MOF himself, he does not need a nasogastric tube. But if he does not drink the MOF you must give it to him by nasogastric tube.

If you are sure the child has actually had his milk and food, but he is not starting to improve after one week of treatment, you must refer him to a doctor. Children who have taken their milk and food, but who do not start to improve after one week have some other cause, e.g. tuberculosis as well as poor diet, for their PEM. These children will need further investigations in a hospital.

#### Follow-up.

The child can be discharged home when:

- ◆ He is eating well,
- ◆ He is happy,
- ◆ He has lost his oedema, and
- ◆ His mother has learnt how to feed him.

You or a nurse should see him regularly after discharge from hospital or health centre to make sure he continues to improve. Also you will need to encourage the mother to continue feeding him as you taught her. You will need to go on educating her.

Try to visit in their homes some children who have been discharged after treatment for PEM. Seeing the home condition is very valuable to you in deciding the best kind of teaching to give other mothers in the ward. It also allows you to give the parents nutrition advice in their home using their own foods and cooking things as examples.

## Government measures to prevent PEM

The prevention of PEM needs the help of many departments, not only the Health Department.

- ◆ *Primary Industry (Agriculture).* Improved kinds of food, varied crops, fertilizers, and knowledge of improved methods of growing foods are important factors. So are transport facilities that allow people to reach markets and sell food for cheaper prices.
- ◆ *Education.* People need some knowledge about food, and its importance for growth. This education should be given in schools to children themselves, in public meetings, churches and community groups.
- ◆ *Community and Family Services.* Malnutrition is a community disease, so the community must be involved.
- ◆ *Economics.* As the local economy improves so usually will the nutrition, but it is important to educate families who have money not to spend it on junk food, which is highly processed and nutritionally poor.
- ◆ *Law and order.* These are very necessary for good nutrition of a community.

## What health workers can do to prevent PEM

### Health education

- ◆ You have to work with people so that they want to change

their habits. You must provide them with the knowledge as well as the wish to make this change. You will need to know the customs and beliefs of the people where you work so that your advice will be practical and based on what is possible. Aim your health education at the village leaders and women leaders. If they change their behaviour, then others will probably copy them.

- ◆ Educate the school children also. They will be parents in the future, and even as older children or adolescents they may care for younger siblings. Educate the parents of children with PEM. When their children are cured they are likely to tell their friends and neighbours and become health educators themselves. Educate parents so that their children will not suffer from PEM.
- ◆ Remember that "what you do" speaks louder than "what you say". So set a good example yourself, because people will copy you. You should look after your children the way you tell others to look after their children.
- ◆ Remember the growth chart. If children grow properly they will not get PEM. So monitor the growth of all the children in your catchment area regularly, include growth monitoring whenever you give vaccines, or whenever the child comes to the health centre with a parent.

Encourage the mother to bring the child once a month for growth monitoring. Try to keep children growing properly.

#### Show people

- ◆ How to prepare protein foods like mashed beans, ground-up roasted peanuts or boiled mashed peanuts, scraped meat, scraped fish, eggs, mashed dark green leaves. Do this in a way that the people can do in their homes and that is suitable for small children. Use local foods to demonstrate. Pictures of foods obtained from health education charts can be used but demonstrating with real foods is better.
- ◆ How to mix in edible oil, coconut cream or dripping with the child's food.
- ◆ How to put the child's portions of good foods like fish, meat, beans, dark green leaves on his own plate (or banana leaf) so that he gets his proper share of the good foods.
- ◆ The child's growth chart. Emphasise that the chart should keep going upwards. Encourage the mother to bring the child once a month for growth monitoring, and at the same time the child can also receive vaccines that are due, and the mother can receive family planning, and health education.
- ◆ School lunches. See if you can co-operate with the teachers and parents in providing good food for the children while they are at school.

#### Protection from disease.

Immunizations, clean water supplies close to every house and correct disposal of faeces and rubbish will all help to keep the child healthy. This will prevent him getting PEM.

#### Food Supplements.

- ◆ It is dangerous to start a system of handing out foods, e.g. milk powder, free to all children. This will never solve the problem. Instead it will build up the problem of dependency. A change in people's behaviour is needed.
- ◆ However, it is sometimes necessary to give edible oil, milk powder or other foods to some mothers, e.g. to those mothers whose children have stopped growing or who have other signs of PEM and who do not improve with nutrition education. But always first try to get the parents to use locally available foods.
- ◆ Occasionally in a famine situation or a refugee camp, it may be necessary to hand out foods at the start.
- ◆ Never give out milk for drinking to breast fed babies. This will encourage artificial feeding and lead to PEM.

**Family Planning.** This is important to prevent PEM. If another baby is born too soon, the older one is likely to become malnourished. This is because the mother no longer breastfeeds the older child and does not have enough



time to look after him properly. To prevent malnutrition children should be spaced 3 years apart. Discuss with mothers and fathers the benefits of family planning. Tell them about the different methods (see page 253).

*Co-operation with other departments and agencies.*

P.E.M. involves many departments. You should know what other departments and agencies (e.g. churches and voluntary groups) are doing about nutrition and community development in the area where you are working. Try to make sure that you and other workers co-operate with each other and teach the same things to the villagers.

*Teach people especially about these things:*

- ◆ Breast milk is best milk
- ◆ Start giving babies mashed up soft clean food by 4-6 months of age
- ◆ Children need three meals a day
- ◆ Feed your children cooked and ground up peanuts, or beans or fish every day
- ◆ Mix in a spoonful of dripping (tin gris), peanut oil, coconut cream or other edible oil, with the food each meal
- ◆ A mixed diet is a good diet
- ◆ Continue breastfeeding as long as possible
- ◆ Child's growth chart should keep going upwards
- ◆ Bottles are dangerous
- ◆ Keep food utensils clean
- ◆ Immunizations are important
- ◆ Space children 3 years apart
- ◆ Children should attend community health clinics each month in the

first year of life, then regularly thereafter, for growth monitoring, immunisations, and the mother and father can receive family planning and advice on signs of illness to look out for, and when to seek care.



## Chapter 5: Care of newborn babies

Most babies are born normally and don't need much help from health staff. Your main function is to prevent normal babies getting sick, and to treat those babies who have something wrong with them.

Getting ready to care for a newborn baby

When a baby is born, you may have to work fast to do all the things needed to help the mother and baby. You must have all the equipment ready. If the foetus shows sign of hypoxia (lack of oxygen) before delivery (slowing of heart rate, meconium in the amniotic fluid) get someone to help you who has had experience at resuscitating newborn babies.

### Care at birth

#### Care of the airway and breathing

When a baby is born, first make sure he is breathing, and note the exact time of delivery. Hold him with his head a little lower than his legs, so that the fluid drains out of his respiratory tract, then quickly and gently put him on a dry cloth draped over his mother's abdomen or arms. Start drying the baby within 5 seconds after birth – wipe eyes, face, head, trunk, back, arms and legs thoroughly. Remove the wet cloth to start skin to skin contact with the mother. Cover the baby with a clean dry cloth.

A normal baby will breathe and cry. If he does not breathe and cry, gently smack the bottom of his feet. Listen to his heart with a stethoscope. Count his heart rate. If he is not breathing one minute after he is born, or if the heart rate is less than 100 per minute, he urgently needs bag-mask ventilation.

Do not separate the baby from the mother for at least 60 minutes, unless in severe respiratory distress or because of a maternal emergency. It is best if the baby is in skin-to-skin contact with the mother at all times in the first hours of life.

#### Cutting the cord

Delay clamping the cord for 2-3 minutes after delivery so that more blood will go into the baby from the placenta. When the cord has stopped pulsating, clamp it with two sterile artery forceps. Cut the cord between the two clamps with sterile scissors. Apply a sterile cord clamp about 3 cm from the umbilicus. Apply 1% acriflavine in spirits or chlorhexidine to the cord to prevent infection.

#### Breast feed the baby in the first hour of life if possible.

Encourage the mother to put the baby on her breasts, and breast feed when the baby is alert and interested in feeding. The colostrum is very good for the baby. All babies who do not require special attention should be fed by the time they are one-hour old.

### Keep the baby warm

Dry the baby immediately after birth but do not wipe off the vernix if present. Do not bath the baby in the first 24 hours, this makes her cold. Skin-to-skin contact with the mother is the best way to keep a baby warm. After the first 6 hours of skin-to-skin contact, dress the baby or wrap in a soft, dry, clean cloth. If she sleeps by himself, she will get cold, a newborn baby is unable to keep her temperature normal by herself so she should sleep with the mother. This will also encourage breast feeding. If a thermometer is available, make sure the baby's temperature is 36-37 C. If a thermometer is not available, assess warmth every 4 hours by touching the baby's feet. If the feet are cold, use skin-to-skin contact, add extra blankets and reassess.

### Breast feed the baby

Keep the baby in the room with the mother, on her bed or within easy reach; do not separate them. Encourage the mother to put the baby on her breasts for exclusive breast feeding on demand.

If a baby is too weak to suck, he is too weak to swallow. These babies need expressed milk (EBM.) by nasogastric tube. Use EBM either from the baby's own mother, or from another mother who has plenty of breast milk. All babies should be fed by the time they are two hours old.



Figure 13 – Continue breast feeding as long as possible

### Prevent infection

Infections can easily harm newborn babies. Less infection will occur if the mother looks after her own baby in the ward. Other people should touch the baby as little as possible. They must always wash their hands before touching a baby. People with skin infections, colds or diarrhoea must not touch babies.

Key message: Wash your hands before touching a newborn baby.

### Care of eyes

Clean his eyes from the nose outwards with a gauze swab. Put some tetracycline eye ointment into his eyes. This will prevent gonococcal conjunctivitis.

### Prevent bleeding

Give the baby an I.M. injection of 1 mg (1 ml) phytonadione (Vitamin K). This is to prevent bleeding. Use the ampoule that has 1 mg in 1 ml. Do not use the 10 mg in 1 ml vial.

### Label the baby

Tie a label around the baby's wrist with his mother's name on it. Then he will not get mixed up with any other baby.

### Prevention of other problems

- ◆ Prevent tetanus. Immunize the mother during pregnancy with tetanus toxoid if you can.
- ◆ Prevent neonatal infection. If the baby was born more than 12 hours after rupture of the membranes, or if the amniotic fluid is infected (smells), give prophylactic (preventive) antibiotics, using ampicillin (or benzyl penicillin) and gentamicin. (see page 54).

The best ways to prevent infection are:

- i. Do not separate the baby from the mother,
  - ii. Exclusive breast feeding,
  - iii. Avoid hypothermia by ensuring skin-to-skin contact
  - iv. Avoid low blood sugar (hypoglycaemia) by breast feeding,
  - v. Avoid other people apart from the mother handling the baby,
  - vi. Always wash hands before and after touching the baby.
- ◆ Prevent pethidine or morphine poisoning of babies. If possible, don't give morphine or pethidine to a mother if she is likely to deliver her baby in the next 4 hours. If a baby is born within 4 hours of the mother receiving an injection of pethidine or morphine, and if he is not breathing well, give him naloxone (Narcan). (see page 272 in this edition for dose).
  - ◆ Prevent infection of the umbilical cord. Each day apply 1% acriflavine in spirits, or 1% crystal violet (gentian violet) or chlorhexidine to the cord.
  - ◆ Breastfeeding helps prevent infection in the newborn.
  - ◆ Give BCG and Hepatitis B vaccine

## Examination of newborn

Immediately after birth the baby is examined for:

- ◆ General condition
  - i. Airway and breathing: breathing should be regular and not obstructed
  - ii. Crying: the baby should cry when stimulated
  - iii. Heart rate: should be above 100/min.
  - iv. Colour: should be pink.
  - v. Muscle tone: should not be floppy. The limbs should be in a flexed posture and move actively. Preterm or sick babies are floppy or have an extended posture.

If some, or all, of these things are abnormal, treat the baby for asphyxia (see page 50).

- ◆ Sex – is the baby a boy or a girl?
- ◆ *Congenital abnormalities* don't forget to check that the anus is patent.
- ◆ *Umbilicus* - check that it is not bleeding.

Full examination some hours later

Every baby must be examined fully some hours later, after giving the baby time to recover from the birth.

This includes examination of:

- ◆ Infant as a whole. The normal baby lies in the flexed (bent up) position. She may stretch or yawn. She is pink. She cries. Respirations are regular. She makes a normal startle

response if she is suddenly disturbed (throws her arms outwards and forwards as if reaching out to hold some one). This is called the Moro reflex.

- ◆ The head
  - i. Measure the head circumference. An abnormally large head is *hydrocephalus*. An abnormally small head is *microcephaly*. Average head circumference in a term baby is 35 cm.
  - ii. Feel the anterior fontanelle - it should not be bulging (swollen).
  - iii. Look in the mouth for *cleft lip* (hare lip) and *cleft palate*.
- ◆ The back. Spina bifida is an abnormality of the baby's spine. There is no bone, and sometimes no skin, covering the baby's spinal cord.
- ◆ The anus. Check that the anus is open and that meconium is passed. This makes sure the baby does not have an *imperforate anus*.
- ◆ The limbs
  - i. Check that the baby can move all his limbs. Failure to move a limb is usually due to bone fracture or nerve paralysis.
  - ii. Check for congenital dislocation of the hips by seeing whether the baby's hips can be fully flexed and abducted which is normal.
  - iii. Examine the ankles for club feet (*talipes*).
  - iv. Count the baby's fingers and toes. Sometimes a baby is born with 6 fingers or toes or webbing (joined together).

- ◆ The weight. Weigh the baby. Record the baby's weight and his date of birth in his Health Record Book.



Figure 14 – Wash your hands before touching a new born baby.

### Babies born before arrival (BBA)

Babies born outside of health centre or hospital have an increased risk of developing a serious infection, e.g. septicaemia, tetanus, pneumonia. Encourage mothers to attend the antenatal clinic during pregnancy. Encourage them to have the baby born at health centre or hospital.

If the baby is born at home and then brought to a health centre or hospital, give him:

- ◆ Phytomenadione (Vitamin K) 1 mg (1 ml) I.M. once. Do *not* use the 10 mg/ml vial.
- ◆ Tetracycline eye ointment to both eyes once.
- ◆ Acriflavine in spirits, or chlorhexidine to the umbilical cord daily.
- ◆ BCG and hepatitis B vaccine
- ◆ Ampicillin (or benzylpenicillin) and gentamycin if the baby has any signs of infection
  - Not feeding well
  - Vomiting or abdominal distension
  - Fever (temperature above 37.5° C) or hypothermia (below 35.5° C)
  - Deeply jaundiced, or jaundiced on the first day of life
  - Fitting or convulsions
  - No spontaneous movements
  - More than 2 or 3 skin pustules
  - Infected cord
  - Difficulty breathing, such as severe chest indrawing
  - Stopped breathing (apnoea)
  - Very irritable or crying too much despite being fed at the breast

If there are signs of infection refer the baby and mother to be seen by a paediatrician:

Ampicillin and Gentamicin should also be given for 3 days if the cord has been cut with a piece of bamboo or with a knife or, scissors that have not been properly cleaned or a used razor blade.

See page 54 for infections in the newborn.

### Corrections of congenital abnormalities

- ◆ Babies with serious abnormalities such as intestinal obstruction (vomiting green fluid) or imperforate anus should be sent urgently to a base hospital for surgery. Always pass a nasogastric tube, and keep the stomach aspirated (sucked out) when transferring babies with intestinal obstruction.
- ◆ Babies born with talipes should have this corrected as soon as possible by strapping (see page 291).
- ◆ Babies born with a cleft lip need surgery when they are 2 to 3 months old.
- ◆ Cleft palate is repaired when the baby is 12 - 18 months old.
- ◆ The mother is given the baby's Health Record Book which has been correctly filled in.
- ◆ The mother knows the time and place of the community health (Maternal and Child Health) clinic.
- ◆ The mother knows about the family planning services available.

### Before sending the baby home

Check that:

- ◆ She has no signs of infection (umbilicus, skin, eyes).
- ◆ She is fully breastfed and the mother is happy breast feeding
- ◆ She has been given B.C.G. vaccine. Make sure this is written in his Health Record Book. BCG will protect him against tuberculosis.
- ◆ She has been given the first dose of Hepatitis B vaccine and this is recorded in the Health Record Book

## Chapter 6. Disorders of newborn babies

### Danger signs in newborn babies

- ◆ Too sick to breastfeed
- ◆ Convulsions
- ◆ Drowsy or unconscious
- ◆ Respiratory rate less than 20/min or apnoea (cessation of breathing for >10 secs)
- ◆ Respiratory rate greater than 60/min
- ◆ Grunting breathing
- ◆ Severe chest indrawing
- ◆ Central cyanosis
- ◆ Severe abdominal distension
- ◆ Cold limbs

These danger signs tell you a baby is very unwell, they do not tell you what is wrong with her, but they tell you it is serious. These signs can occur in severe birth asphyxia or very low birth weight babies or severe infections or asphyxia or severe congenital problems.

Disorders of newborn babies may be divided into:

1. Disorders in the first 24 hours of life
2. Disorders after the first 24 hours of life

### Disorders in the first 24 hours of life

#### Failure to breathe after birth (asphyxia)

It is vital that babies start breathing as soon as they are born. This brings air

into their lungs, and lets oxygen get into the blood stream. The heart must be beating to pump blood carrying oxygen through the arteries to the brain and the rest of the body. If the baby does not begin to breathe well after birth and there is not enough oxygen in the blood the heart slows and stops.

#### Signs of Asphyxia

- ◆ Not breathing or slow irregular breathing
- ◆ Colour of body blue or pale
- ◆ No movement of limbs
- ◆ Does not cry or move after being stimulated (when pharynx is sucked out or soles of feet slapped)
- ◆ Heart rate below 100/minute

#### Management of asphyxia

- ◆ Dry the baby and make sure he is warm
- ◆ Remember the A.B.C.D of resuscitation

A = Airway

B = Breathing

C = Cardiac massage

D = Drugs



Table showing signs of asphyxia and health worker actions

To examine:	No asphyxia	Mild asphyxia	Severe asphyxia
Breathing	Regular	Slow or gasping	Not breathing at all
Colour	Pink	Blue	Pale
Movement	Active	Slight	None
Response to stimulation	Cries	Slight response	No response
Heart rate	More than 100 per minute	50-100 per minute	Less than 50 per minute
Action to be taken by health worker	Essential Newborn Care, baby skin-to-skin contact with mother, initiate breast feeding	Suck out pharynx Bag-mask ventilation, oxygen if colour does not improve and cyanosis resolve	Suck out pharynx CPR Urgent bag-mask ventilation, oxygen External cardiac massage (chest compression)



**Airway.** If the baby is not breathing at birth, clear the airway by gently sucking out the baby's nose, mouth and pharynx. This is especially important if the amniotic fluid contains meconium. If the baby *is* breathing, do not suction, as this can cause apnoea (baby stopping breathing).

Key message:  
Always keep the  
airways clean

**Breathing.** If the baby is not breathing well after you have cleared his airway, you must get oxygen into his lungs. This is done by (1) bag-mask ventilation if you have a resuscitation bag, (2) "frog breathing" or (3) mouth-to-mouth resuscitation.

#### 1) Bag-mask ventilation.

Choose a mask size that fits over the mouth and nose: size 1 for normal weight infants; size 0 for small (<2.5 kg) infants. Ventilate with bag and mask at 40-60 breaths per minute. Make sure the chest moves with each press of the bag; in a very small pre-term infant make sure the chest does not move too much (danger of causing a pneumothorax- a burst lung).

Almost all babies who have a heartbeat but who are not breathing at birth will respond to bag and mask breathing so it is important that this is

done well. An oxygen supply is not necessary.

#### 2) Frog breathing if you do not have a bag and mask. This method requires an oxygen supply.

Insert a nasal oxygen catheter (or a small feeding tube if you don't have an oxygen catheter) 2 cm into the baby's nose. Give oxygen at 2-4 litres/minute. Pinch his nostrils shut with one hand. With your other hand, lift his lower jaw forwards and upwards. Watch the chest expand, then release the baby's jaw. Repeat this 10 times. Then suck out the baby's pharynx. When the baby starts breathing, stop the "frog breathing", and turn the oxygen down to half a litre per minute.

#### 3) Mouth to mouth resuscitation

If the baby does not start breathing after you have given him "frog breathing", or if you have no oxygen you must do mouth to mouth resuscitation. Extend his head. Make sure the airway is clear. Put a small airway in his mouth. Cover his mouth and nose with your mouth and blow very gently. Blow from your cheeks only. Do not blow from your lungs. If you blow too hard you will burst (break) the baby's lungs. Blow in about 40 small breaths a minute. The baby's chest should move as you blow into his mouth.

#### Cardiac massage

If the baby has no heartbeat, you must give him external cardiac massage unless you are on your own. If you are

on your own, continue bag-mask ventilation. Call for help if you can. If there are 2 health care workers who can resuscitate: put your hand around the baby's chest, with your thumb over his sternum and your fingers behind his spine. Press your thumb down quickly 90 compressions per minute.

### Drugs

- ◆ Sometimes newborn babies don't breathe because the mother was given an injection of pethidine or morphine four hours or less before the baby was born. Some of the pethidine or morphine has crossed the placenta and is stopping the baby breathing. If a baby is born within 4 hours of the mother receiving pethidine or morphine and the baby is not breathing well, give  $\frac{1}{4}$  ml/kg naloxone (Narcan) injection to the baby. Inject naloxone IV or IM.

### Cyanosis (Blueness)

- ◆ Babies born with a breech presentation have blue bruised buttocks. Babies born with face presentation have a blue bruised face. These are not necessarily serious signs unless the baby shows other danger signs.
- ◆ Cyanosis just of the hands and feet may be due to poor blood flow. If the body, face and tongue are blue as well, this means there is a disease of the heart, lungs or brain. If the baby has rapid breathing with chest indrawing as well as cyanosis, he has disease of the lungs. You must treat him urgently.

### Treatment

- ◆ Keep the airway clear. Suck out the pharynx and lie the baby on his side or front (abdomen).
- ◆ Give oxygen by nasal catheter at half a litre per minute
- ◆ Tube feed the baby with expressed breast milk
- ◆ Give ampicillin (or penicillin) and gentamicin. The doses are given on page 54.

### Convulsions (Fits)

Fits cause short, sudden movements. The baby stops breathing for 20 - 40 seconds, he goes blue, and his eyes look up to the top of his head. Fits may be caused by

- ◆ Perinatal asphyxia (lack of oxygen before or at the time of birth)
- ◆ Birth trauma
- ◆ Hypoglycaemia (low blood sugar), more common in
  - i. small-for-dates babies
  - ii. babies of diabetic mothers
  - iii. babies who are sick and unable to feed well
- ◆ Meningitis, or severe neonatal septicaemia
- ◆ Bleeding in the brain (in preterm babies, vitamin K deficiency or birth trauma)
- ◆ Congenital brain problems

Fits are different from the spasms of tetanus. The spasms of tetanus often start when the baby hears a loud noise or someone touches him. This does not happen with fits.

### Treatment

1. Keep the airway clear
2. Give oxygen if necessary
3. Check the blood glucose if you can; if blood glucose <2mmol/L give glucose by NG tube or IV. If you cannot check blood glucose, give glucose anyway.
4. Give paraldehyde I.M.

Dose of paraldehyde: 0.2 ml/kg

Weight (kg)	Dose (ml)
Under 2kg	¼ ml
2 – 3.4kg	½ ml
3.5kg and over	¾ ml

5. Do a lumbar puncture if have been taught how to do it safely. If you are not able to do a lumbar puncture safely, treat the baby for meningitis as shown below. If you can do the Lumbar Puncture safely:
  - i. If the cerebrospinal fluid (C.S.F.) is cloudy or you cannot get any CSF, or the CSF is blood stained, treat for meningitis with IV or I.M. ceftriaxone as well as ampicillin (or penicillin) and gentamicin (see page 54).
  - ii. If the CSF is clear, give ampicillin (or penicillin) and gentamicin (see page 54).
  - iii. Do a Rapid diagnostic test for Malaria and if positive treat for malaria.

6. Give expressed breast milk (EBM) by mouth or nasogastric tube.

### Apnoea (Not breathing)

Some small babies, especially pre-term babies, have times when they stop breathing (episodes of apnoea). They may stop breathing for so long that their brain does not get enough oxygen and their heart stops. Then they die.

If you find a baby not breathing, remember the A.B.C.D of resuscitation.

Clear the baby's airway. If this does not make him start breathing, you must give him bag-mask ventilation, oxygen and "frog breathing", or mouth-to-mouth resuscitation. If you cannot feel or hear any heartbeat, give him cardiac massage as well.

Usually the baby will start to breathe again when you stimulate him by sucking out his pharynx, or by putting the oxygen catheter into his nostril.

When the baby starts to breathe again:

1. Give oxygen by nasal catheter at half a litre/minute.
2. Give ampicillin (or penicillin) and gentamicin (see page 54)
3. Give EBM by nasogastric tube.
4. Tell the mother or other relative to watch the baby all the time. Show this person how to stimulate the baby by gently picking up the baby's foot and slapping the sole of the foot once. Tell this person to call you or a nurse at once if the

baby does not start breathing again after stimulation.

5. Small preterm babies have very floppy airways. If their neck is flexed the airway may become squeezed shut. It is important to make sure the baby's head does not fall forward onto their chest

### Pallor

### Haemorrhage (bleeding)

Babies may bleed from the umbilical cord if it is not tied correctly. Severe blood loss will make the baby pale with a rapid weak pulse. The baby is restless and may have gasping respirations.

### Treatment

- ◆ Give Oxygen. Check the umbilical cord. Clamp the cord with an artery forceps and tie the cord again if there is any bleeding from the cord. If the baby is shocked from loss of blood, he needs a blood transfusion urgently. Give him 40 ml/kg of whole blood. If you cannot get blood for the baby quickly, give Normal saline 20ml/kg over half an hour. If the baby is still shocked after this give another 20ml/kg of normal saline. A transfusion of packed red blood cells can be given slowly later

### Perinatal asphyxia

### Post resuscitation signs and symptoms

- ◆ A baby may have lacked oxygen in the uterus, during a prolonged labour or delivery, or may have been injured during delivery.

Babies with perinatal asphyxia may have cyanosis, irregular breathing, pallor, be floppy (very weak), inactive and not sucking. Fits may occur. He may be very irritable and constantly crying.

### Treatment

1. Give oxygen if the baby is cyanosed, or has hypoxaemia using pulse oximetry ( $SpO_2 < 90\%$ )
2. Give EBM by nasogastric tube if he cannot suck on the mother's breast
3. Keep the airway clear
4. If the baby is having fits or convulsions give paraldehyde  $\frac{1}{2}$  ml IM immediately. Give a loading dose of phenobarbitone IM and then oral maintenance (See P??)
5. Disturb the baby as little as possible

### Vomiting

- ◆ A baby may vomit blood, amniotic fluid, meconium, or mucus, which he swallowed during birth. This is not serious and soon stops.
- ◆ If the baby vomits green (bile stained) fluid, it means he may have an intestinal obstruction. Aspirate (suck out) his stomach and send him urgently to a paediatrician or surgeon.

Key message: Green (bile) stained vomiting in the newborn means intestinal obstruction

### Constipation (failure to pass meconium)

- ◆ If meconium is not passed during the first 24 hours after birth, check the anus again for imperforate anus.
- ◆ Watch carefully for bile stained vomiting or abdominal distension (swelling). If either of these occur the baby probably has an intestinal obstruction. Keep the stomach aspirated (sucked out) and send him urgently to a paediatrician or surgeon.

### Jaundice

- ◆ Any baby who becomes jaundiced (yellow) during the first 24 hours of life has some kind of breakdown of his red blood cells (haemolysis) or a severe infection. Send him to a larger hospital.

## Disorders after first 24 hours of life

### Infections

A newborn baby, especially if born too early, has little resistance to infection.

### Septicaemia

- ◆ Infection enters the body through the skin, umbilicus, intestinal tract or lungs. It then spreads to the blood stream causing septicaemia.
- ◆ The baby looks sick. She may be pale or cyanosed or jaundiced. She does not suck strongly at the breast

and does not gain weight. She may vomit or have abdominal distension.

- ◆ She may have a fever (temperature  $>37.5^{\circ}\text{C}$ ), or she may have a very low temperature, below  $35.5^{\circ}\text{C}$  (hypothermia).

### Treatment

1. A lumbar puncture, blood culture and urine culture are done if possible.
2. If the CSF is cloudy or blood stained or you cannot get any CSF, give ceftriaxone, ampicillin (or benzyl penicillin) and gentamicin. Transfer immediately to hospital. Neonatal meningitis needs 3 weeks treatment with antibiotics.

### Dose of ceftriaxone for the newborn

- ◆ 1g vial mix with 9.6ml of sterile water to give 1g / 10ml.
- ◆ Give once daily dose (100 mg / kg IM). Transfer to hospital all newborns with suspected meningitis or severe septicaemia.

Weight (kg)	Dose once per day
1 – 1.5 kg	1.5 ml IM
1.5 – 2 kg	2 ml IM
2 - 2.5 kg	2.5 ml IM
2.5 kg and over	3 ml IM

Should we still be advising chloramphenicol at all for neonates?

- ◆ If the CSF is clear, give ampicillin (or benzyl (crystalline) penicillin) and gentamicin for 2 weeks.

Dose of Ampicillin for the newborn:

- ◆ Add 1 ml sterile water to 250mg vial of ampicillin.
- ◆ This dose is given twice a day for babies less than 7 days old IM. Babies who are 7 days or older are given this dose 4 times a day.

Weight (kg)	Dose
Under 2.5kg	60mg ( $\frac{1}{4}$ ml)
2.5kg and over	125mg ( $\frac{1}{2}$ ml)

Dose of benzyl (crystalline) penicillin for the newborn:

- ◆ Add 2 ml sterile water to 600 mg (1 000 000 units) vial

Weight (kg)	Dose
Under 2.5kg	125,000 units ( $\frac{1}{4}$ ml) I.M. 3 times a day

2.5kg and over	250,000 units ( $\frac{1}{2}$ ml) I.M. 3 times a day
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Dose of gentamicin for the newborn:

- ◆ Use the 20mg/2 ml ampoule, do *not* use the 80 mg/2 ml ampoule.

Weight (kg)	Dose
Under 2kg	2.5mg ( $\frac{1}{4}$ ml) I.M. twice a day
2 - 2.9kg	5mg ( $\frac{1}{2}$ ml) I.M. twice a day
3 - 3.4kg	7.5mg ( $\frac{3}{4}$ ml) I.M. twice a day
3.5kg and over	10 mg (1 ml) twice a day

### Initial management

1. Nasogastric feed with EBM if the baby is not sucking well
2. Do a blood slide or rapid diagnostic test for malaria and treat with Artesunate if positive (see Malaria, below)
3. Oxygen if the baby is cyanosed or has hypoxaemia on pulse oximetry ( $SpO_2 < 90\%$ )
4. Transfer the baby to hospital if he does not improve after 2 days of treatment

### Skin infection

- ◆ This may be mild with just a few skin pustules. Or it may be severe with large blisters and surrounding redness. All babies with infections should be isolated with their mothers, and special care taken. Staff must wash their hands after touching these babies.
- ◆ This will prevent infection spreading to healthy babies. The skin lesions (affected places) should have a swab taken to find out the bacteria (usually staphylococcus or streptococcus), if pathology services are available. The skin lesions are painted with one percent gentian violet (GV paint).
- ◆ Flucloxacillin (or cloxacillin) and gentamicin are used if there is surrounding redness of the lesion, or if there are signs of septicaemia. If an abscess develops, it should be incised and drained when fluctuant, and antibiotics given. The baby should be washed daily for a few days with hexachlorophene emulsion (Phisohex) if available. An antibacterial soap like protex can be used.

### Conjunctivitis

- ◆ Many babies have a mild conjunctivitis which starts after the third day. There is only a little discharge, with slight or no redness. This is often called "sticky eye". **Treatment of sticky eye.** Gently remove the discharge from the eye with a wet sterile gauze swab or wet cotton wool. Pull down the baby's lower eyelids and put tetracycline eye ointment into each eye. Show the mother how to do

this and tell her to do it 3 times a day until there is no more discharge.

- ◆ Severe conjunctivitis in the first two weeks of life suggests gonococcal conjunctivitis. The eyelids are very swollen and there is a lot of discharge from the eyes. If the baby is not treated quickly, he may become blind

### Treatment of gonococcal conjunctivitis

1. If you have a pathology laboratory service, take a swab from the eye. Put it in Stuart transport medium and send it to the laboratory for gram stain and culture.
2. Transport Medium
3. Clean the eyes. Rinse the pus out of the eyes with sterile saline.
4. Put tetracycline eye ointment into the eyes after rinsing the pus out. Do this every 6 hours for 5 days.
5. Give ceftriaxone IM single dose 100mg/kg, or benzyl (crystalline) penicillin IM 3 times a day for 5 days.
6. Treat the mother and father for gonorrhoea.

Refer any patient with conjunctivitis to hospital if there is no improvement after 2 days of treatment.

Key message:  
Suspect gonococcal  
conjunctivitis in any  
newborn who has  
severe  
conjunctivitis



### Umbilical infection

- ◆ A baby's cord can easily get infected. This is why you apply acriflavine in spirit, chlorhexidine or crystal (gentian) violet in spirits to the cord each day.
- ◆ If the umbilicus discharges pus, or the skin around the umbilicus becomes red, treat the baby with flucloxacillin (cloxacillin) and gentamicin.
- ◆ Apply antibiotic compound powder or ointment to the cord daily.

### Neonatal tetanus

- ◆ A baby's umbilical stump can become infected with tetanus bacteria. Tetanus bacteria come from animal faeces and live in the soil and dust. They can get into the cord if it is cut by a dirty razor blade or knife, or if the cord is contaminated by dirt.
- ◆ The tetanus bacteria make a toxin (poison) which causes muscles to contract very strongly, especially if stimulated (tetanus spasms). The baby is well and sucking normally until about the age of 3-10 days. Then he stops sucking because of the tightness of his jaw muscles (trismus). Spasms of the face muscles pull the eyebrows up and the corner of the mouth outwards and downwards. This produces a nasty looking grin called *risus sardonicus*.
- ◆ Generalised spasms affect the whole body and the back arches (bends backwards). This is called opisthotonus. Most babies who get



tetanus die. It is important to prevent neonatal tetanus.

### Prevention

1. Give tetanus toxoid to pregnant mothers
2. Cut the cord at birth with a sterile pair of scissors, or sterile razor blade, swab with chlorhexidine and put a clean dressing on the cord

### Treatment

1. Paraldehyde  $\frac{1}{2}$  ml IM immediately
2. Tetanus immunoglobulin 500 units IM if available.

This means you must give either 2 ampoules containing 250 units (3 ml) in each ampoule, or 8 ampoules if the ampoule contains only 60 units ( $\frac{1}{2}$  ml).

3. Gentle nursing care - disturb the baby as little as possible to prevent spasms.
4. Suck out the baby's airway as necessary
5. Turn him from one side to the other every 3 hours. Turn him after his dose of sedative.
6. Sedation. Use chlorpromazine (Largactil) and diazepam (Valium) or phenobarbitone.
7. Chlorpromazine (Largactil). Crush up a quarter of a 25 mg tablet of chlorpromazine. This is 6.25 mg. Give this crushed up  $\frac{1}{4}$  tablet by nasogastric tube every 6 hours. You may have to increase the dose to half a tablet (12.5 mg) every 6 hours.
8. Diazepam (Valium). Crush up a quarter of a 5 mg tablet of diazepam. This is 1.25 mg. Give this



Figure 15 – Every mother should be immunized against tetanus during pregnancy.

crushed up  $\frac{1}{4}$  tablet by nasogastric tube every 6 hours.

Space the doses of chlorpromazine and diazepam, so that you give a dose of one drug three hours after you have given a dose of the other drug, e.g. Give one drug at 6, 12, 6, 12, and the other drug at 3, 9, 3, 9. This means you are giving the baby sedation every 3 hours.

9. Phenobarbitone. If you have no diazepam (Valium) you must use phenobarbitone instead. Give 1 tablet (30 mg) immediately. Then give  $\frac{1}{2}$  tab (15 mg) once a day.
10. Paraldehyde. Give  $\frac{1}{2}$  ml paraldehyde IM if the spasms are not controlled by chlorpromazine and diazepam or phenobarbitone. Repeat this dose of paraldehyde once, after 10 minutes, if the spasms are still not controlled.

Paraldehyde can be given every 6 hours if necessary. You can give it by I.M.I., or mixed with the milk feed, by nasogastric tube.

11. Nasogastric tube feeds. Pass a nasogastric tube a few minutes after giving the first injection of

paraldehyde. Feed the baby 60 ml of EBM every 3 hours by nasogastric tube.

12. Ampicillin (or benzyl penicillin) (see page 54).
13. Send the baby urgently to hospital. He needs a lot of careful nursing. There are not enough staff at health centres to provide the amount of nursing care that is needed.

### Thrush

- ◆ Caused by a fungus called *Candida*. Appears as white spots on the tongue and inside the cheeks. It is not usually serious, but it can be uncomfortable and it may cause difficulties with feeding. Occasionally it may spread to the intestines or lungs.
- ◆ Apply one percent gentian violet to the mouth four times a day. Look to see if the mother has thrush on her nipples and treat it with GV or nystatin if she has.

### Cold or upper respiratory tract infection

- ◆ Nose obstruction with secretions from a cold is common and may interfere with feeding.
- ◆ If causing problems with feeding use ½ per cent ephedrine nasal drops, one drop in each nostril before feeds. Do not use longer than 3 days.

### Pneumonia

- ◆ Pneumonia in neonates is serious. It can occur following aspiration of infected amniotic fluid, or because of bacteria acquired at the time of birth, or after birth.
- ◆ The signs of pneumonia in newborns are fast and difficult breathing, but many babies show this by poor feeding, sleeping too much, apnoea (stopping breathing) and cyanosis.
- ◆ Newborns with pneumonia often have fever or hypothermia (temperature <35° C), and will often have hypoxaemia (SpO<sub>2</sub> <90%) when checked using pulse oximetry.
- ◆ Treat pneumonia in newborns with ampicillin (or penicillin) and gentamicin (see page 54). Give oxygen if hypoxaemia, or cyanosis, or apnoea. Give EBM by nasogastric tube if the baby does not suck well.

### Diarrhoea

- ◆ Diarrhoea in neonates can indicate a gastrointestinal infection, such as viral gastroenteritis, or it can indicate a systemic infection such as septicaemia, urinary tract infection or malaria. If the baby is showing danger signs of serious illness, such as apnoea, lethargy, poor feeding, hypothermia or high fever, or abdominal distension, do a blood culture, urine analysis, full blood examination and blood slide or rapid diagnostic test for malaria if you can, and treat as sepsis (and malaria if there is fever and blood RDT or blood slide positive).

- ◆ Diarrhoea can also occur after exposure to antibiotics, because of over-growth in the bowel with diarrhoea-causing bacteria. Stop the antibiotics if it is safe to do so, and continue breast milk feeding.
- ◆ Outbreaks sometimes occur in newborn nurseries. Stools become watery and green. The baby may vomit. Treatment is to isolate the baby with mother and give plenty of fluid. Encourage the mother to continue breastfeeding the baby. Give oral rehydration solution if the baby is dehydrated. It may be necessary to give intravenous rehydration if the baby does not improve with ORS.
- ◆ Prevent the spread of diarrhoea infection to other babies by always washing your hands before and after touching any baby.

## Malaria

Sometimes malaria parasites cross the placenta and infect the baby just before birth. After several days the baby has a fever. He may not suck well. Often he is pale or jaundiced. He often has an enlarged liver and spleen.

Treatment. Take a blood slide or do a Rapid Diagnostic Test- and if positive give antimalarials.

Artesunate	Days and doses	Weight <3 kg	Weight >3 kg
Formulation 60mg in 3ml	Day 1 and 2 (12 hours after first dose)	0.3 ml	0.5 ml
	Day 2 onwards	0.3 ml	0.5 ml

**N.B.** You must treat the baby for septicaemia if the blood slide or RDT is negative, **or you cannot do test.**

## Non infectious disorders after first 24 hours of life

### Bleeding

- ◆ The blood of some newborn babies does not clot properly. These babies may bleed from the umbilicus, or bowel, or into the brain. This disease is called *haemorrhagic disease of the newborn*, it is due to vitamin K deficiency. It usually occurs when the baby is 3-6 days old.
- ◆ Sometimes vitamin K (phytomenadione) 1 mg (1 ml) I.M. may stop the bleeding in a few hours.
- ◆ Often the bleeding continues and blood transfusion is necessary. 40 ml/kg of fresh whole blood is needed. This disease can be prevented by giving an injection of vitamin K (phytomenadione) to every baby soon after birth.

## Jaundice

- ◆ Mild jaundice is normal in a healthy baby after the first 24 hours. Most babies have only mild jaundice that goes away after a few days. The baby remains well and sucks strongly and does not need any treatment.
- ◆ In severe jaundice, the yellow colour has reached the feet. When you press your thumb over the dorsum of the baby's foot and let go, you see the colour is yellow and not white. Severe jaundice can be dangerous, as it may cause brain damage. Jaundice can also be a sign of infection in the newborn, e.g. septicaemia or malaria.
- ◆ If the baby has jaundice and a fever, take a blood slide or RDT for malaria parasites, and examine the baby carefully for signs of infection. Jaundice starts in the eyes (sclera) and face. Then it slowly goes further down the body - chest, arms, abdomen, thighs, legs and feet. In mild jaundice, only the upper part of the baby's body looks yellow. In moderate jaundice, the yellow colour has reached the legs, but not the feet.

### Treatment of moderate jaundice

1. Give extra fluids. Give 30 ml of 5 per cent glucose or sugar water every 3 hours. Encourage the mother to breast feed the baby as much as possible.
2. Examine the baby carefully for signs of infection and treat if present.

3. Take a blood slide or RDT and if positive give Artesunate (as above).
4. Put the baby in the lightest part of the room, near a window, so he can get some sunlight. In hospital the jaundiced baby is nursed under fluorescent lights (phototherapy).

If the jaundice is severe (the baby's feet are yellow) give ampicillin (or penicillin) and gentamicin (see page 54) as well as the above and send to a hospital. If he does not suck well you will have to feed him by nasogastric tube.

Jaundice is serious if:

- ◆ It starts too early - during the first 24 hours of life; or
- ◆ It is too much - severe jaundice, making the baby's feet yellow; or
- ◆ It lasts too long - more than 10 days; or
- ◆ The baby looks sick, has a fever or danger signs, is not active, or does not suck strongly.

### Treatment of serious jaundice

1. Extra fluids, by nasogastric tube if he does not suck well.
2. Ampicillin (or penicillin) and gentamicin
3. Take a blood slide or RDT and if positive and give Artesunate (as above)
4. Keep him in the lightest place
5. Send him as quickly as possible to hospital

Key message:  
Jaundiced babies  
need more light and  
more fluid

### Vomiting

Many babies bring up a small amount of milk (possetting) after a big breast feed, however they will remain well without danger signs, and will be gaining weight. This needs no treatment, but regular weighing.

Certain signs indicate a more serious problem:

- ◆ The baby vomits everything
- ◆ Not gaining weight, or losing weight
- ◆ The vomit is projectile (forceful)
- ◆ The vomit is green (bile stained)
- ◆ There is severe abdominal distension

These signs indicate a serious condition like pyloric stenosis or bowel obstruction. If the baby has any of these signs, send urgently to a paediatrician or surgeon and keep the stomach aspirated (sucked out).

### Mastitis

- ◆ Breasts of newborn babies often enlarge, and a little milk may be formed. This is caused by the mother's milk-forming hormones passing across the placenta before birth. It is normal.
- ◆ Leave the breast alone. Do not squeeze the baby's breasts, as this

will cause infection (breast abscess).

- ◆ If breast abscess occurs, give flucloxacillin, cloxacillin or benzyl penicillin for five days. Incision and drainage of the abscess is needed if the abscess is fluctuant.
- ◆ Make sure the incision is made in a line pointing outwards from the nipple, and do not cut through the nipple.

### Vaginal bleeding

Sometimes a baby girl passes a few spots of blood from her vagina and mothers often get very concerned by this. This is caused by hormones in the mother's blood passing across the placenta before birth. This slight bleeding soon stops and needs no treatment, and mothers can be reassured that this is normal.

is it worth mentioning neonatal urticaria or erythema toxicum? i guess the danger may be that a child with pustules may not get treated whilst a child with erythema toxicum may get treated with antibiotics.

### Birth injuries

Injury or trauma to the brain at birth may be caused by:

1. Bleeding inside the skull causing pressure on the brain; or
2. Lack of oxygen which causes the brain to swell.

This may happen in babies whose delivery was either:

- ◆ Difficult; or

- ◆ Took too long; or
- ◆ Was very quick.

### Signs

- ◆ The baby looks sick and pale, or may be cyanosed
- ◆ He is weak, has a weak cry, and does not suck strongly
- ◆ He does not sleep, is irritable (cross) and often keeps his eyes wide open
- ◆ He may vomit
- ◆ There may be twitching (sudden little movements) of the limbs, or convulsions
- ◆ Pulse and breathing are slow
- ◆ The baby may be floppy and inactive
- ◆ The fontanelle may bulge

### Treatment

1. Do not handle the baby more than necessary.
2. Give expressed breast milk (EBM) by nasogastric tube if he won't suck.
3. Sedate with chloral hydrate elixir or phenobarbitone (see page 53) if necessary.
4. Keep the airway clear.
5. Give oxygen if cyanosed.
6. Give paraldehyde if convulsions occur (see page 52).

### Cephalhaematoma

- ◆ This is a haemorrhage under the membrane (periosteum) covering one of the skull bones. This causes a rounded swelling called cephalhaematoma. It occurs on one side of the skull. The swelling will

disappear after some weeks as the blood gets reabsorbed.

- ◆ A large cephalhaematoma may cause jaundice or anaemia. Do *not* aspirate it. This will introduce infection.

### Caput succedaneum

This is the swollen soft tissue over the part of the baby's head that comes out first during birth. The swelling goes away after a few days and needs no treatment.

### Fractures

- ◆ The clavicle, humerus, femur or skull may be fractured during birth.
- ◆ These fractures heal very fast in the newborn baby. Careful reduction is not necessary. No treatment is needed for fractured clavicle.
- ◆ A fractured arm is bandaged to the side for two weeks. A fractured thigh is bandaged to a light splint for two weeks.

### Nerve damage

- ◆ The facial nerve may be pressed on and damaged during birth, especially if forceps have been used. The baby is unable to move one side of his face. The weakness slowly disappears and no treatment is needed.
- ◆ The brachial plexus (the big bundle of nerves in the axilla) may be injured, especially if the arm is pulled on during delivery. The arm or hand may be paralysed, (unable to move). If no improvement occurs after one month the baby should

be sent to a doctor.

Key message:  
Handle babies  
gently



## Chapter 7. Low birth weight babies

Babies who are born weighing less than 2500 grams are low birth weight babies. There are two reasons why a baby is born with a low birth weight:

1. The baby is born too early - before the 37<sup>th</sup> week of gestation (pregnancy).

This is a *pre-term* baby

2. The baby is born weighing less than he should for his period of gestation. This is a *small for gestational age* baby (sometimes called "small for dates"). The reason why the baby weighs less than usual is because he has not had enough nutrition while in the uterus.

Sometimes a small for gestational age baby is pre-term as well.

These two kinds of low birth weight babies - pre-term babies and small for gestational age babies - have different problems and some of the treatments are different. It is important to distinguish between small for gestational age and pre-term babies.

You can tell the difference between pre-term babies and small for gestational age babies by:

- ◆ Looking at the creases (lines) on the soles of their feet
- ◆ Feeling their ears for cartilage

- ◆ Feeling their breasts for a breast lump

In pre-term babies

- ◆ The soles of the feet have only a few, or no creases
- ◆ The ears are soft and have no cartilage
- ◆ The breast lump is very small or absent

In Small for gestational age babies who are born at or near to term

- ◆ The soles of the feet have many creases
- ◆ The ears are stiff as they have cartilage
- ◆ The breast lump is easily felt and is over 5 mm in size

### Problems of pre-term babies

These babies are born too soon. They are not ready for living outside the mother's uterus. They are weak and suck poorly. They have trouble with breathing because their lungs are immature. They often have apnoea (stopping breathing). They may have trouble with swallowing and trouble digesting milk. They have difficulty keeping warm. They easily catch infections. They are likely to become jaundiced. They are likely to become anaemic as they did not get enough iron from their mother as they were born too soon. They may bleed easily if not given Vitamin K (phytomenadione).

### Problems of babies who are small for gestational age

- ◆ These babies are often thin but long. They often have dry skin, which may peel. They may have difficulty breathing at birth (asphyxia), however unlike pre-term babies, babies who are small for gestational age are less likely to have severe lung disease. They are still prone to infections like pneumonia.
- ◆ Small for gestational age babies have not had enough nutrition inside the mother's uterus. They were starved in the uterus. Unlike pre-term babies, SGA babies have more mature suckling reflex, and even small for gestational age babies as small as 1.5 kg can often attempt suckling on the mother's nipple. So it is important that they stay with the mother if possible, and are not separated from her.
- ◆ Because they have been starved of nutrition inside the uterus small for gestational age babies are at risk of hypoglycaemia (low blood sugar). Signs of hypoglycaemia include drowsiness (sleepiness), twitching, convulsions and periods of not breathing (apnoea). These babies need to have their blood sugar checked and observed for signs of hypoglycaemia. They need extra milk, which ideally comes from the mother.

### Causes of low birth weight

Most of the low birth weight babies in Papua New Guinea are small for gestational age. However, some are pre-term babies. Others are *both* pre-term *and* small for gestational age.

The main reasons why so many babies in Papua New Guinea have low birth weight are:

- ◆ Poor nutrition in the mother
- ◆ Malaria infection in the mother

There are many other causes of low birth weight, but maternal nutrition and malaria are the most important. Other causes include multiple births (twins), chronic illnesses in the mother such as tuberculosis or HIV, congenital abnormalities (e.g. Down syndrome), obstetric complications (pre-eclampsia, antepartum haemorrhage), and if mothers smoke cigarettes during pregnancy.

### Management of low birth weight babies

**In the labour room**, for a mother whose baby in the uterus seems small:

- ◆ Only give drugs to the mother during labour if they are absolutely necessary.
- ◆ Tie the cord carefully (it often slips)
- ◆ Make sure the baby is suctioned if he is not breathing, but if the baby is breathing do not suction as this can stimulate apnoea.
- ◆ If the baby has respiratory difficulties, give oxygen at half a litre per minute through a nasal catheter, and monitor the oxygen saturation by pulse oximeter (SpO<sub>2</sub>) if you can.
- ◆ Remember to give the baby Vitamin K (phytomenadione) 1 mg in 1 ml IM.

### Location of care of low birth weight babies

- ◆ If possible the mother and baby should stay together. Separating the mother and baby increases the risk of poor feeding, hypothermia, and reduces opportunity for mother-infant bonding.
- ◆ Babies that have danger signs, particularly apnoea, hypoxaemia as measured by pulse oximetry ( $\text{SpO}_2 < 90\%$ ) or obvious respiratory distress, or not feeding, and babies weighing less than 1.5 kg generally need to be under observation in the Special Care Nursery until they are stable. But the mother should be close by, and if at all possible sleep next to the baby's cot.
- ◆ A baby over 1.6 kg who is suckling and without danger signs is usually able to be with the mother, but still requires close observation and monitoring of feeding and weight change.

### Keep the baby warm

- ◆ Skin to skin contact with the mother is best, as it promotes breast feeding and natural warmth. Wrap the baby up, lying cuddled up to the mother or in skin to skin contact. "Kangaroo Mother Care" is a very good way to provide skin to skin contact and keep the baby warm. The baby is placed between the mother's breast and held in place with a nappy or cloth. In hot humid climates incubators or

humidicribs are not necessary, and they only lead to separation of the baby from the mother.

- ◆ Clothe the baby and avoid coverings that will cover the head or obstruct breathing. In the Highlands, where the temperature falls very low at night, and where humidity is also low, great care is needed to keep the baby warm. In those circumstances, an incubator, if available, may be useful.

**N.B.** If using hot water bags make sure they are not placed next to the baby's skin, and that they are not too hot.

### Save the baby's energy

- ◆ Handle the baby as little as possible. Do not bath. Dirt can be removed with liquid paraffin or other oil. Nurse the baby on her side, lying flat (head not raised or low). Weigh the baby, and record her weight, each day.

## Feeds

- ◆ Start feeds as soon as possible and always before the baby is two hours old. Many low birth weight babies, especially those who are small for gestational age, are able to suck strongly from their mother's breasts. If the baby sucks strongly from the breast, encourage the mother to breastfeed the baby. You may have to give the baby extra milk for the first 2 days, until the mother gets plenty of breast milk. Use expressed breast milk (E.B.M) from another mother or half strength full cream milk (sugar-milk).
- ◆ If the baby cannot suck strongly, he will need to have EBM given by nasogastric tube. Try to use the mother's own breast milk. If the mother does not produce enough milk, try to use some EBM from another mother. If no EBM is available, you will have to use half strength full cream milk (sugar-milk) to feed the baby (see page 24).
- ◆ The baby needs to be fed every three hours, 8 times a day.

Key message: Express the mother's breasts regularly if the baby is too weak to suck.

Amount of milk (ml) to give each 3-hourly feed, 8 times per day, for low birth weight babies who are not breast feeding.

Birth Weight	Day of life							
	1	2	3	4	5	6	7	8+
Under 1.5 kg	8	10	15	20	25	30	30	35
1.5 – 1.9 kg	10	15	20	25	30	40	45	50
2 – 2.4 kg	15	20	30	35	40	50	55	65

- ◆ The amount of milk needed each feed depends on the baby's birth weight, the age in days, and whether they are small for gestational age or pre-term.
- ◆ Bigger babies need more milk than smaller babies. Small for gestational age babies tolerate more milk than pre-term babies. If low birth weight babies show signs of not tolerating feeds the feed volume should be reduced for a day or so, then increased slowly. Each day the baby needs more milk until she reaches the maximum amount by about 8 days of age.
- ◆ This amount of milk must be given every three hours, which is eight times a day. Small for gestational age babies usually have no problems with the feeds. They need plenty of milk early because they were starved inside the uterus. Pre-term babies sometimes have feeding problems: they may suckle poorly because they cannot coordinate a suck or swallow, and they may tolerate feeds poorly because their bowel is also immature; this can lead to abdominal distension or regurgitation (spill up) of feeds. If the baby starts to regurgitate some of her feeds, reduce the amount of feed to the previous day's amount. Some pre-term babies take more than 8 days to establish full feeding.
- ◆ If possible, babies weighing under 1.5 kg who are being fed by nasogastric tube should be given smaller amounts hourly or second

hourly. The total daily amount should however be the same as shown in the table.

- ◆ As soon as the baby starts to suck, tell the mother to begin breastfeeding her baby. Until the baby sucks strongly he will still need EBM as well as the milk he gets when he breast feeds. Give the EBM now by cup and spoon instead of by nasogastric tube. Do not bottle-feed the baby.

#### Weigh the baby each day.

- ◆ For the first few days, the baby will lose weight. She should have regained her birth weight by the time she is 7-10 days old. Many small for gestational age babies will have regained their birth weight several days earlier than this. After regaining her birth weight the baby should gain weight each day. After the first week a low birth weight baby should gain about 150 g.
- ◆ When the baby is sucking well on the breast and gaining weight, slowly reduce the amount of EBM you give her by cup and spoon.

#### Extra vitamins

Low birth weight babies need extra vitamins. Give 0.6 ml (24 drops using the dropper provided) vitamin drops – vitamin multiple liquid (Pentavite or Abdec) daily.

#### Prevention of infection

- ◆ Keep away from other babies
- ◆ The mother should be the main person giving nursing care for the

baby, if she is well enough, and she must learn to wash her hands before and after touching the baby

- ◆ Keep other relatives from handling a low birth weight baby until the baby is stable
- ◆ Do not allow any staff or relatives with skin infections, colds, or diarrhoea to touch the baby
- ◆ Everyone should wash their hands before and after touching any baby

Key message: Most cross infection is caused by medical and nursing staff

### Discharge home

The low birth weight baby is ready to go home when:

- ◆ She is fully breast fed, and
- ◆ She is gaining weight, and over 2 kg, and
- ◆ She can keep her body temperature normal herself, and
- ◆ She has no signs of infection, and
- ◆ Her mother feels able to look after her at home.

Before discharging the baby, check that:

- ◆ She has been given BCG and Hepatitis B vaccines.
- ◆ The mother has been given the baby's Health Record Book, correctly filled in and with the baby's weight chart plotted.

- ◆ The mother knows the time and place of the MCH clinics
- ◆ The mother knows the danger signs to look out for and when to return
- ◆ The mother knows about the family planning services available.

### Follow up of low birth weight babies

- ◆ Low birth weight babies need follow up to ensure they remain healthy, and to identify problems early. See them each month, assess weight, length, feeding, activity and development. Check for infections and give the immunizations that are due.
- ◆ Low birth weight babies are at risk of malnutrition because of their low birth weight, difficult feeding, and mothers may have limited milk supply. They need their weight plotted every month. Low birth weight babies are likely to develop anaemia because they did not receive enough iron from their mothers in the final trimester of pregnancy. So low birth weight babies should be on Fefol once they are stable. They are at increased risk of infections in the first year of life, including pneumonia, bronchiolitis and diarrhoea. Breast feeding and immunization helps protect against these infections. For low birth weight babies daily multi-vitamins and zinc are also helpful in reducing infection risk.
- ◆ Some low birth weight babies will develop neurological and development complications, including cerebral palsy, or visual and hearing problems. The risk is much greater if the child is

malnourished. Low birth weight babies should have their growth *and* development monitored each month. If their weight is not following an upward trend on the growth chart, they need to see a paediatrician. If their development is showing signs of being delayed, or if the parents are concerned about their development, including hearing or vision, then they should be referred to a paediatrician for assessment.

## Chapter 8: Care of ill children in the outpatient clinic

### Steps in caring for children in the clinic

1. Triage: Look for Emergency signs and give Emergency treatment if needed
  - a. Obstructed breathing
  - b. Severe respiratory distress
  - c. Signs of shock
  - d. Coma
  - e. Convulsing
  - f. Severe dehydration
2. Weigh the child and plot the weight on the growth chart
3. Take a history (see below)
4. Examine the child (see below)
5. Special tests, e.g. blood slide or Rapid Diagnostic Test (RDT), haemoglobin, chest x-ray.
6. Make a diagnosis and consider other diagnoses that may be present - make a problem list (see below)
7. Management - deciding what is to be done with the child. e.g. treat as out-patient, admit to ward, show to doctor
8. Treatment such as Oral Rehydration Solution, antibiotics, antimalarials paracetamol, if indicated
9. Supportive care and monitoring – if managing as an outpatient consider fluids, feeding.
10. Explanation and education. Explain:
  - a. what you think is wrong with the child, and tell them why
  - b. any tests you want to do

- c. the treatment the child needs
- d. what you are going to do and why, e.g. injections, drip, , nasogastric tube
- e. explain about the child's illness, how to give oral medicine, what danger signs to look out for

11. Immunizations and Family planning

12. Recording and reporting

13. Follow-up and reassessment

### Ten steps in taking a history

1. Make friends. Say "Hello" and smile
2. Find out the main complaint (what is the presenting problem)
3. Then find out
  - a. How much?
  - b. How long?
  - c. What is it like?
4. e.g. What is the main complaint? Diarrhoea.  
How much? Plenty of diarrhoea, 4 times during night, many times yesterday.  
How long? 2 days.  
What is it like? Very watery. No blood.
5. What other symptoms. Always ask about fever, cough, vomiting, diarrhoea, convulsions, appetite, fluid intake, and activity
6. What treatment has already been given?
7. Past illnesses
8. Birth history and development history (for babies and young children)
9. Immunization history
10. Nutrition history and weight chart
11. Family history of illnesses, e.g. tuberculosis



12. 10. Social and environment history
13. Housing
14. Water supply
15. Sanitation
16. Father's job
17. Family problems
18. Family planning

**N.B.** Items 4 - 7 can usually be found out about by looking at the child's Health Record Book. So always ask the mother to show you the Health Record Book.

### Examination

- ◆ The child should already have been weighed, note the weight
- ◆ Take the temperature while asking the mother questions in the history.
- ◆ Ask the mother to take off the child's shirt or dress.
- ◆ Start the examination by looking (inspection).
- ◆ Then go on to feeling (palpation).
- ◆ Then listen with your stethoscope (auscultation).
- ◆ Then do the parts that may make the child cry - percussion, examination of the ears, mouth and throat. Finally, test the urine.

### Fifteen steps in examination

**N.B.** The child has already been weighed and had her temperature taken.

1. General appearance, e.g. drowsy or alert, sunken eyes, colour of hair, Nutrition
  - a. Put weight on weight chart
  - b. Measure mid upper arm circumference (MUAC)

2. Look at chest to see respiratory rate, and signs of respiratory distress: chest indrawing, nasal flaring, grunting breathing, head nodding
3. Look at colour of lips and eyes: pallor, cyanosis, jaundice
4. Look at skin for any rashes or spots
5. Look at and feel joints and limbs for any tenderness (pain), swelling, and loss of movement. Feel for lymph glands in axilla and groin.
6. Feel abdomen for tenderness, guarding, masses and large liver and spleen
7. Feel for neck stiffness, neck glands, and feel fontanelle
8. Test for hydration. Pick up skin on neck for skin elasticity
9. Listen with stethoscope to heart for heart rate and heart murmurs
10. Listen with stethoscope to chest for crepitations (crackling noises) and rhonchi (whistling noises or wheezes)
11. Percuss back of chest for dullness
12. Look at ear drums
13. Look at mouth for Koplik spots- early sign of Measles. Look at throat, examine urine. Look at colour (dark urine like tea means bile is present). Test urine for protein and sugar.

### Make a problem list

- ◆ After you have taken a history, done an examination, make a problem list. Sometimes there is just one simple problem, such as a cold. However, many children present with one complaint but have several diagnoses. Unless all diagnoses are identified and

treated a child may be sent home and deteriorate. For example, a child may have pneumonia and malnutrition, or diarrhoea and anaemia, or chronic cough and weight loss suggestive of tuberculosis. If you make a problem list you will identify all the problems and treat them.

- ◆ Make the clinic ready for children and their mothers, and the clinic child-friendly
- ◆ Try to make everything in the clinic easy for the child, her mother and yourself. Fig. 16 shows how you can do this. But each clinic is different, and you will have to choose the way which is best for your clinic. Make sure all waiting mothers have somewhere comfortable to sit. Always greet the mother and ask her to sit down before you talk to her. You cannot examine a child across a table or desk, so put her chair beside or in front of your chair. Don't let her sit on the other side of your table. Young children can be examined on their mother's knees. It is useful to have a couch or bed for older children. You cannot examine a child in the dark, so make sure there is plenty of light.
- ◆ Keep your auriscope, spatulas, thermometer, stethoscope and Standard Treatment Book close to you. Have spare Health Record Books in case the mother does not have one.
- ◆ If possible, each time a child comes to the clinic, the same health worker should see him. This is continuity of care (care by the same

person). This helps to build up a good relationship between the patient and the health worker. However, if the child is not improving, it is important that you ask someone else to assess the child with you.

Key message: Don't  
put table or desk  
between yourself  
and your patients.

### Follow-up and reassessment

- ◆ Follow-up and reassessment are very important. If the child has features that do not completely fit with a simple diagnosis, or if the child's illness does not improve as would be expected for a simpler diagnosis it is important that other diagnoses are considered and looked for.
- ◆ You should ask a doctor or paediatric nurse experienced in childhood illnesses to see the child if there is uncertainty about the diagnosis or correct treatment.

## Repeated presentations

- ◆ If a child presents on more than two occasions during an illness there should be serious consideration of hospital admission, even if you think the child does not look very unwell at the time.
- ◆ A doctor or paediatric nurse experienced in childhood illnesses should be involved in assessment and decision making.
- ◆ Repeated presentations may indicate that the parents are not coping with the care of their unwell child, or that the condition is fluctuating (appears to be better at times but then gets worse).
- ◆ Parents are not always able to explain the reasons for their concerns or why they come to the hospital. If the parents' concerns are not addressed with the health services there is a risk that they will not present again, even if there is serious deterioration in their child's condition.



Figure 16 – Make your clinic easy to work in.

## Chapter 9. Diarrhoea

The commonest type of diarrhoea is gastroenteritis. Diarrhoea and vomiting from gastroenteritis lead to the loss of water and salts from the body. This is called dehydration, which causes sickness and death in gastroenteritis. Dehydration in young babies is very dangerous and many die if they do not receive extra fluids. Deaths in young children from diarrhoea can be prevented by:

- ◆ Giving plenty of fluid to children who have diarrhoea, to prevent and treat dehydration.
- ◆ Health education, hand washing, sanitation, and raising the general standards of living to prevent diarrhoeal diseases.
- ◆ Improved nutrition in young children.

### Causes

There are many conditions which may cause diarrhoea in young children. The state of the young child's nutrition is important. Children who are not growing properly often get diarrhoea. When they get diarrhoea it is usually more severe than in children with good nutrition.

The main causes of diarrhoea are:

- ◆ Intestinal (bowel) infections with viruses, bacteria or parasites. If blood is present in the stool the disease is called dysentery.
- ◆ Any other infection, such as urinary tract infection, measles,

appendicitis or septicaemia can cause diarrhoea. Some infections such as tonsillitis, meningitis or otitis media often cause vomiting, but do not usually cause diarrhoea.

- ◆ Malaria is a frequent cause of diarrhoea and/or vomiting in children.
- ◆ Protein-energy malnutrition often causes diarrhoea. This is sometimes due to lactose intolerance (see page 76), or to bacterial or parasite infections of the bowel, or to a deficiency of zinc.
- ◆ Dietary - foods which irritate the bowel can cause diarrhoea
- ◆ Surgical conditions: acute appendicitis, sometimes pigbel, and intussusception also have diarrhoea. The differences between these surgical conditions and viral gastroenteritis are that children with acute appendicitis, pigbel, or intussusception or have severe abdominal pain, tenderness and often abdominal distension, and are 'toxic' (high fever, lethargic).

### Weanling diarrhoea

- ◆ Most children with diarrhoea are aged between 6 months and 2 years. This is the time during which the young child learns to eat food and drinks less breast milk (the weanling period). During this time the food the child eats, if not prepared properly, may contain many germs. This causes an intestinal infection, and the child gets diarrhoea.

- ◆ At the same time the child is not growing well because she does not eat enough food. This may be because she is sick and has a poor appetite, because her mother only feeds her twice a day, or food that is not prepared well or left in the heat and contains germs, or not a balanced (mixed) enough diet. It is also at this time a mother's milk supply may be less. Because the child is not eating well she becomes a bit malnourished. It is these two things, intestinal infection from food and malnutrition which makes diarrhoea such a common disease in children during the "weanling period", between 6 months and two years of age.
- ◆ Vicious circle of malnutrition and diarrhoea
- ◆ Diarrhoea is a good example of the vicious (bad) circle of malnutrition and infection – the infection being diarrhoea. Fig. 17 shows how diarrhoea makes malnutrition worse, and how malnutrition makes diarrhoea worse.

## Dehydration

- ◆ Dehydration is the loss of water and salts from the body
- ◆ Dehydration is the most common cause of death in diarrhoeal disease. It is important to recognise dehydration early.
- ◆ Dehydration is diagnosed by asking questions (history) and by looking and feeling (examination).

## Diagnosing dehydration

- ◆ First you ask
  - i. How much diarrhoea?
  - ii. How much vomiting?
  - iii. Is the child thirsty?
  - iv. Is he passing urine normally?
- ◆ Then you look at the child's
  - i. Mental state
  - ii. Eyes and tears
  - iii. Mouth, lips and tongue
  - iv. Breathing
- ◆ Then you feel the child's
  - i. Skin elasticity (feel for slack skin)
  - ii. Pulse
  - iii. Fontanelle (in babies)

## No dehydration

This is diagnosed by finding the following:

- ◆ Ask
  - i. The child has passed less than 4 loose stools in a day.
  - ii. He is not vomiting or has only vomited a little.
  - iii. He is not thirsty and is passing plenty of urine.
- ◆ Look
  - i. He is alert, his eyes are normal and tears are present and his mouth, lips and tongue are wet. His breathing is normal.
- ◆ Feel
  - i. When you pick up his skin and then let go, the skin goes back so quickly to its normal place that you cannot see it go back. This shows that his skin elasticity is normal.
  - ii. There is no slack skin. His pulse is normal and the fontanelle (in a baby) feels normal.

### Some dehydration

- ◆ A child with some dehydration will have 2 or more of the following (with at least one of those marked with a star (\*)).
- ◆ \*Restless, sunken eyes, absent tears, dry mouth, \*thirsty \*slack skin (skin pinch goes back slowly)

### Severe dehydration

- ◆ A child with severe dehydration will have 2 or more of the following (with at least one of those marked with a (\*star)): \*Drowsy, eyes very sunken, absent tears, mouth very dry, \*too weak to drink well, \*very slack skin (skin pinch goes back very slowly).
- ◆ In severe dehydration the pulse becomes faster and weaker. The breathing also becomes faster and deep (acidotic breathing). The child may pass little or no urine (anuria).

Note that:

1. Loss of skin elasticity (slack skin) and sunken eyes can also occur in marasmus (severe protein energy malnutrition).
2. Dry mouth, lips and tongue also occur if the child breathes through his mouth.

The child with diarrhoea who has no dehydration needs extra fluids and continued nutrition.

- ◆ The fluids can be anything the mother has available at home: breast milk is ideal, but also fresh fruit juice, weak tea, soup, rice water, coconut water, and

clean water. The child should continue to feed, regular healthy mixed food, they may eat less but should be encouraged to eat something if they can without vomiting.

- ◆ Soft drink (lolly water), bottle fruit juice, and Coca Cola should *not* be given, these are very dangerous in children with diarrhoea. They contain far too much sugar and will make the diarrhoea worse.
- ◆ The child should receive zinc 20 mg daily for 5 days.

The child with diarrhoea who has some dehydration needs to drink plenty of special mixture containing sugar and salts.

- ◆ This mixture is called Oral Rehydration (O.R.S.). O.R.S. is made up by mixing a packet of oral rehydration salts in a litre of clean water.
- ◆ Oral rehydration salts consist of the sugar glucose and four salts or electrolytes - sodium, potassium, chloride and either bicarbonate or citrate. It is especially made to replace the water and electrolyte losses caused by diarrhoea.
- ◆ The child with watery diarrhoea and some dehydration should receive zinc 20 mg daily for 5 days, and have continued breast feeding, and continued feeding when his appetite returns.
- ◆ The child with diarrhoea who has severe dehydration needs to have intravenous fluids as well as ORS.

Table showing assessment of dehydration

	No Dehydration	Some	Severe
Look at:			
Condition	Alert	Restless*	Lethargic*
Eyes	Normal	Sunken	Very sunken
Tears	Present	Absent	Absent
Mouth	Moist	Dry	Very dry
Thirst	Normal	Thirsty*	Weak
Feel:			
Skin pinch	Normal	Slow*	Very slow*
Decide:			
Dehydration	No	Some	Severe

Criteria: 2 or more signs (at least 1\*)

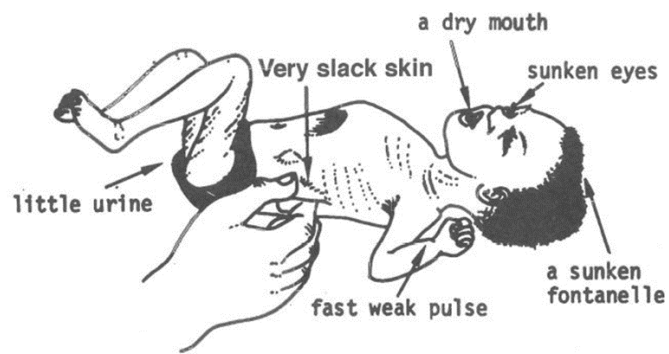


Figure 18 - The signs of severe dehydration.



## Treatment of diarrhoea

### Diarrhoea without dehydration

- ◆ The most important part of treatment of diarrhoea is to give the child plenty of fluids to drink as soon as the diarrhoea starts. This will prevent her becoming dehydrated. A child with diarrhoea who is dehydrated needs to be rehydrated in a hospital or health centre.
- ◆ Many children with diarrhoea in the early stages are not dehydrated. They can drink and the parents can look after the children at home. You must teach parents how to look after their children who have diarrhoea. The parents must give the children extra fluids.
- ◆ Food is also important. Remember the vicious circle of diarrhoea and malnutrition. Parents must be taught to go on giving food to their children when they have diarrhoea.

### Management at the Clinic or Outpatients of child with no dehydration

- ◆ Ask:
  - i. How many times the child has had diarrhoea?
  - ii. How many times the child has vomited?
  - iii. If the child is vomiting, what colour is the vomit
  - iv. How well the child is drinking?
- ◆ Look for Emergency signs of shock or severe dehydration: lethargy or

unconscious, cold peripheries, weak or fast pulses.

- ◆ *Look for signs of dehydration* - dry mouth, sunken eyes, sunken fontanelle, and loss of skin elasticity (slack skin). Weigh the child.
- ◆ *Examine the child for signs of other diseases* (otitis media, pneumonia, meningitis, malaria, malnutrition, anaemia) and treat these if present.
- ◆ *Carefully feel the abdomen* to see if he has any surgical cause of diarrhoea (appendicitis, pigbel, intussusception). Ask, look and feel for pain, tenderness, abdominal distension. Ask what colour the vomit is (green or black vomiting indicates a surgical cause).
- ◆ Mix a big cup of ORS in front of the mother. Give it to the child to drink.
- ◆ *Tell the parents to give the child extra fluids to drink in addition to breast feeds*, e.g. ORS, cooled boiled water (clean water), weak tea, coconut water, soups, rice water, fresh fruit juices.

The fluid given depends on what is available to the parents. Tell the parents to give one cup of this fluid after every loose stool. It should be given everyone to three hours (at least six times during the day)

- ◆ *Tell the mother to continue breastfeeding* the child, and to continue giving him food.
- ◆ Give antimalarials if there is any fever (see page 92).
- ◆ *Antibiotics should **not** be given* unless the child has another illness,

e.g. pneumonia, otitis media, or unless there is blood or pus in the



**Figure 19 – Children with diarrhoea need extra fluids.**

stool.

- ◆ *Anti-diarrhoea medicines, e.g. kaolin, Lomotil, should not be given.*
- ◆ Tell the parents to return at once if:
  - i. The diarrhoea becomes worse; or
  - ii. The child vomits; or
  - iii. He refuses to drink; or
  - iv. He develops any signs of dehydration; or
  - v. The diarrhoea is not better after two days.
- ◆ *Tell the parents to give an extra meal each day for 2 weeks after the diarrhoea stops, which is 4 meals a day, plus snacks in between.*

#### Summary of watery diarrhoea with no dehydration

- ◆ Show parents how to make up ORS
- ◆ Teach parents to give extra fluids
- ◆ Continue breast feeding
- ◆ Continue giving food
- ◆ Give zinc 20mg daily for 5 days

- ◆ Don't give kaolin, or antibiotics

#### Diarrhoea with some dehydration

- ◆ A child with diarrhoea who has some dehydration needs to be rehydrated with Oral Rehydration Solution (O.R.S.). Dissolve one packet of the oral rehydration salts in one litre (1000 ml) of clean water. It is most important that ORS is made up in the right strength i.e. one packet dissolved in one litre of water. It is dangerous to make it too strong. Encourage the child to drink as much ORS as she can. She should drink a large cup of ORS every 2 to 3 hours- but more if she wants. If the child vomits, wait 10 minutes and then start giving her ORS again. The ORS should be made up fresh each day. Each day any ORS left over from the previous day should be thrown away. The container it is made up in must be washed out well each day before being used again.
- ◆ The child should continue breastfeeding as well as drinking ORS. If the child is not breast fed, every third drink given should be other fluids, i.e. 2 lots of ORS to one lot of other fluids. Stop giving ORS when the child no longer looks dehydrated, and the diarrhoea has stopped.
- ◆ Puffiness of the eyelids is a sign of over-hydration.
- ◆ If the eyes look puffy you must stop giving ORS

- ◆ The mother should continue giving the child food and breast milk as well as ORS.
- ◆ If the child with some dehydration is not drinking well, the ORS can be given by nasogastric tube or by nasogastric drip. Make sure the nasogastric tube is in the stomach by aspirating gastric (stomach) fluid and pushing some air into the tube and listening over the stomach. If the “whooshing” sound of air is heard over the chest, the NG tube may be in the wrong place and should be replaced. If the child is coughing or gagging, the NG tube may be in the airways or lungs and should be taken out. Splint the child's elbows.
- ◆ Give 20 ml per kilo of body weight straight away, and then give 10-20 ml per kilo of body weight every hour until the signs of dehydration have gone or the child is able to drink well.

Amount of ORS per kilo of body weight

Weight (kg)	Amount of O.R.S. (ml/hour)
3 - 5 kg	50 ml/hour
6 - 9 kg	100 ml/hour
10 kg or more	150 ml/hour

- ◆ If a child being treated with ORS becomes more dehydrated, or if there is no improvement after 4

hours of ORS, you must give intravenous fluids.

- ◆ If you do not have any of the packets of ORS you can make up your own ORS. Mix half a level teaspoon of salt in one litre (1000 ml) of clean drinking water. Taste the solution to make sure it is not too salty. It should not taste more salty than tears. Then mix in 6 level teaspoons of sugar. Some fresh fruit juice can be squeezed into the solution, or some coconut water added, to improve the taste and add potassium.
- ◆ This sugar salt solution provides the three most important ingredients of ORS - sugar, salt and water. Ordinary sugar (sucrose) is broken down in the gut to glucose. The glucose carries the sodium, which is in common salt (sodium chloride), across the bowel wall and into the blood. When the sodium has crossed the bowel wall it pulls water through after it.
- ◆ Potassium can be provided by giving the child two mashed up large ripe bananas every day. Other foods high in potassium are coconut water, fresh orange juice, pawpaw and ripe tomatoes. If you do not have a container that measures one litre you can use three S.P. beer bottles full of water. Each beer bottle holds one-third of a litre, so three beer bottles full of water will be one litre. Clean the bottles first!

**Diarrhoea with severe dehydration**

A child with severe dehydration, or with some dehydration that does not improve with ORS, or who has a swollen abdomen needs to have intravenous rehydration as well as oral rehydration.

#### Intravenous fluids

Use 2.5 per cent dextrose (glucose) in half strength Darrow's solution or Hartmann's solution. This is the best fluid. If this is not available, then use 4.3 per cent dextrose (glucose) in 1/5 normal (0.18%) saline (glucose-saline). If glucose-saline is used because no half strength Darrow's solution is available, add three quarters of an ampoule of potassium chloride (1.5G or 6 ml of 25% potassium chloride solution) to each litre (1000 ml) of glucose-saline.

Amount of I.V. fluid to give:

- ◆ Give 20 ml/kg I. V. fluid fast
- ◆ Weight in kg x 20 equals the number of ml to be given fast

Weight (kg)	Amount of I.V. fluids (ml)
3 - 5 kg	Give 100 ml fast
6 - 9 kg	Give 150 ml fast
10 - 14 kg	Give 250 ml fast
15 - 19 kg	Give 350 ml fast

20 - 29 kg	Give 500 ml fast
30 - 49 kg	Give 700 ml fast

**Review the child.** If the child still looks severely dehydrated, repeat the amount of fluid given fast. If the child is improving, slow down the drip.

Slow down the drip:

Weight (kg)	Amount I.V. fluids
3 - 5 kg	Give 25 ml/hour (7 drops/minutes)
6-9 kg	Give 50 ml/hour (13 drops/minutes)
10 - 14 kg	Give 75 ml/hour (20 drops/minute)
15 - 29 kg	Give 100 ml/hour (25 drops/minute)
30 - 49 kg	Give 150 ml/hour (40 drops/minute)

Do not use (and waste) a paediatric measuring burette. Mark on the I. V. flask the level for each hour. Then every hour check that the fluid has fallen to the level of the mark. You must often look at the child's

hydration - at least every 4 hours.  
Make sure he is not becoming more dehydrated or being given too much fluid.

Further amounts of fluids, as in (1) above, are given fast if dehydration remains severe. The drip must be removed at once if over-hydration occurs (i.e. too much I.V. fluid given). This is shown by swelling of the eyelids.

The child's hydration should be assessed every 4 hours and recorded on a chart. The chart should include the number of loose stools, the amount of vomiting, the number of times urine has been passed, how well the child is drinking, her mental state, her eyes (sunken, normal or puffy), her mouth and tongue, her breathing, skin elasticity, pulse and fontanelle (in babies).

The intravenous fluids are stopped when the child is drinking well, not vomiting and has no signs of dehydration. Intravenous fluids are also stopped if there are signs of over-hydration such as puffiness of the eyes.

#### Other ways of rehydration

- ◆ If you are unable to give intravenous fluids, give O.R.S. by nasogastric drip (see page 288).
- ◆ Give 20 ml/kg every hour until the child is able to drink or no longer looks dehydrated. Stop the nasogastric drip if the eyelids become puffy.
- ◆ Send the child to hospital if he does not quickly improve.

- ◆ In a dehydrated child give fluids by nasogastric drip if you cannot insert an intravenous drip.
- ◆ Intraperitoneal drip (see page 284) is occasionally helpful if you cannot insert an I. V. drip and the child vomits the fluid given by nasogastric drip.
- ◆ Oral fluids. As soon as the child can drink you should start giving her ORS as well as the intravenous fluids. Encourage her to drink as much as she can. She should drink at least half to one cupful of ORS for each loose stool she passes.

#### Amount of ORS to give

Weight (kg)	Amount O.R.S.
Under 5 kg	50 ml O.R.S. for each loose stool.
5 - 14 kg	100 ml O.R.S. for each loose stool
15- 29 kg	200 ml O.R.S. for each loose stool
30-49 kg	300 ml O.R.S. for each loose stool

#### Diagnosis of cause of diarrhoea

You must examine every child with diarrhoea for other diseases, e.g. measles, otitis media, pneumonia, meningitis, tonsillitis, urinary tract

infection. In malarious area a blood slide must be examined for malaria parasites.

If there is dysentery (blood in the stool) the stool should be cultured if possible for bacteria (e.g. shigella) and a fresh sample examined for parasites (e.g. *Entamoeba histolytica*). If there is no blood in the stools, it is not routine to send the stool for bacteriology. However, if the diarrhoea does not improve, or if there is possibility that the diarrhoea may be due to cholera or food poisoning, stool should be sent for bacteriology. In every case of diarrhoea, you must palpate the abdomen to exclude pigbel (enteritis necroticans) and other rare surgical causes of diarrhoea such as appendicitis and intussusception.

### Antibiotics and other drugs

- ◆ Drugs are not given just for watery diarrhoea. The child with diarrhoea needs fluids and food, not drugs. However, sometimes a child with diarrhoea has other diseases as well. These other diseases may need drugs, e.g. artesunate or artemether-lumefantrine (Co-Artem) for malaria, amoxycillin for otitis media or pneumonia.
- ◆ In malarious areas, it is usual to give anti-malarials to children with diarrhoea who have fever and are dehydrated but do a blood slide or rapid diagnostic test (RDT) if you can. Give Artesunate IM twice a day (see page 93) if the child has fever and vomiting or severe diarrhoea until he is improved. Then give Artemether-lumefantrine three times a day for 3 days (see page 93).
- ◆ *Anti-diarrhoeal drugs, e.g. Lomotil, are dangerous in young children and must not be used.* Anti-emetic (anti-vomiting) drugs, e.g. prochlorperazine (or Stemetil and metoclopramide (or maxolon) are also dangerous in young children and must not be used. These drugs make children sleepy so they will not drink. This will cause more dehydration. The vomiting will stop when the child is rehydrated. The child needs rehydration fluids, either oral or intravenous, and not drugs.
- ◆ *Antibiotics are not usually needed for diarrhoea.* Antibiotics are only indicated if the child has dysentery (blood in the stool) with fever, or if the child looks septicaemic, or in suspected pigbel or other surgical conditions such as appendicitis. The best antibiotic for very ill children is ceftriaxone or benzylpenicillin and gentamicin.
- ◆ If the child has blood in the stool (dysentery) and fever, but does not look very sick, give cotrimoxazole, (Septrin) see page 267 for 5 - 7 days. The Shigella bacteria which causes dysentery is now more resistant to amoxycillin and Septin. If the bloody diarrhoea continues despite giving Septin, give ceftriaxone or ciprofloxacin. If the dysentery is not improving after 3 days you should send a sample of stool for culture and sensitivity
- ◆ Also give antimalarials and tinidazole once daily for 3 days (see page 278) and a stat dose of



albendazole (see page 263), and zinc.

## Food

Let the child start eating food as soon as she wants to. Her attack of diarrhoea will make her nutrition worse. She needs all the food she can get. So do not make his nutrition worse by starving her. After an attack of diarrhoea children need extra food to catch up on the food they missed during their illness. So, educate the parents to give the child an extra meal each day for two weeks after the diarrhoeal illness.

## Lactose (sugar) intolerance

- ◆ Lactose, the sugar present in milk, is normally broken down to glucose by an enzyme called lactase which is present in the intestinal cells. There is often not enough of this enzyme in the intestinal cells of young children who are malnourished, or in young children who have diarrhoea.
- ◆ If a child does not have enough of this enzyme lactase, the lactose is not broken down to glucose. It remains in the intestine and is not absorbed.
- ◆ When lactose remains in the intestine, and is not absorbed, it pulls water into the intestine by osmosis. This causes watery diarrhoea due to lactose (sugar) intolerance.
- ◆ You must think of sugar intolerance in any child with malnutrition who has watery stools. Also think of it in any child with diarrhoea whose stools remain watery after two days of treatment. If you think of sugar intolerance, the stools must be tested for sugar. Liquid stool is collected by putting a small tube into the child's rectum. The watery stool is tested for sugar in the same way as urine is tested for sugar (see page 290).
- ◆ **If sugar is present in the stools,** breastfeeding must stop for a few days. Ask the mother to keep her breast expressed. Explain to the mother that while the child is very sick, her milk is a little too strong. But she must start breast feeding again in two or three days when the diarrhoea is better. Give the baby ORS to drink if his nutrition is all right. If a child is shown to have diarrhoea due to lactose intolerance and he is malnourished he must be given milk that does not contain lactose. The name of the milk that does not contain lactose is Digestelact or Glucose Nutramigen or some other lactose-free milk. These milks are made up by adding 60 ml of water to each scoop of Digestelact or Nutramigen milk powder. Each tin of Digestelact or Nutramigen contains a scoop for measuring the milk powder.
- ◆ Another way of making up Digestelact or Nutramigen is to mix one 50 ml measuring cups full of milk powder with four 50 ml measuring cups full of cool previously boiled water.
- ◆ Remember to give the baby 0.6ml (or 24 drops using the dropper

supplied) vitamin drops (Abdec or Pentative) daily if you feed him with Digestelact or Nutramigen.

**Amount of fluid to give.** Give the O.R.S. or Digestelact every 3 hours, 6 times a day. Give 30 ml/kg each feed or give according to weight group.

Weight (kg)	Amount fluid (ml)
3 - 5 kg	120ml
6 - 9 kg	240 ml
10 - 14 kg	300ml

Remember that breast milk contains lactose. So if a child with diarrhoea has sugar in his stools, breast feeding must be stopped for a few days. It is most important that the mother's breasts are kept expressed during this time, so that her breast supply does not dry up. Allow the child to eat, but do not give him breast milk until the diarrhoea stops. Usually after a few days the child can return to breast feeding. After a few days let the child drink some breast milk. If the diarrhoea does not return it means the sugar intolerance has been cured.

### Chronic diarrhoea

Chronic diarrhoea means diarrhoea that has lasted more than 1 week or dysentery that has lasted more than one week. If a child has chronic diarrhoea you should admit him to hospital or health centre. His stools

should be examined under the microscope and sent for culture if possible.

### Treatment

1. Test the stools for sugar.
2. *Rehydrate.* Give O.R.S. or I.V. fluids if dehydrated. Extra oral fluids.
3. *Extra food.* Give an extra meal each day. Give foods high in potassium, e.g. 2 mashed up large ripe bananas each day.
4. *Treat other diseases present,* e.g. anaemia, scabies, thrush.
5. *If the chronic diarrhoea persists despite treatment,* assess the child for other diseases, including HIV. Referral to a paediatrician should be done if the child has persistent diarrhoea despite treatment, or other features of HIV, or is losing weight or failing to gain weight after treatment.

#### ◆ Tinidazole.

- i. Give once a day for 3 days.
- ii. One tablet of tinidazole contains 500 mg.

Weight (kg)	Dose
3 -5 kg	¼ tablet daily
6 - 9 kg	½ tablet daily
10 - 14 kg	1 tablet daily
15 - 19 kg	1 ½ tablets daily



20-29 kg	2 tablets daily
30-49 kg	2 ½ tablets daily

◆ Albendazole.

- i. If oedema is present, give Albendazole daily for 3 days.

Weight (kg)	Dose
Under 10 kg	1 tablet once.
10 kg and over	2 tablets once

## Prevention of diarrhoeal diseases

### Teach parents about:

1. The importance of breastfeeding
2. To use clean food and clean feeding things
3. To give young children food from the age of 4-6 months as well as breast milk
4. To have plenty of clean water close to the home
5. To use boiled water for drinking
6. Safe disposal of rubbish to prevent flies breeding
7. Clean latrines
8. Immunizations- measles vaccine

Many of these things depend on improving the general education, social and economic development and health standards of the community. These may take a long time to change,

or some families can make changes if they see the environment is unhealthy for their children.

What you can do now as a health worker is to teach people to give plenty of fluids and food to children when they have diarrhoea. Extra fluids should be given early, as soon as the child get diarrhoea. If this is done you can often prevent the child getting dehydrated.

Extra food is also needed after the attack of diarrhoea to stop the child becoming malnourished, and more at risk to further diarrhoea. Measles and pigbel cause diarrhoea. Measles can be prevented by immunizations, and pigbel can be prevented by proper cooking of meat.

## Chapter 10. Intestinal worms

Infection (or infestation) with intestinal worms is very common in Papua New Guinea. Many children are infected with intestinal worms. Intestinal worms live in the gut (intestines) and lay ova (eggs) which you can see in the faeces if a stool specimen is examined with a microscope. Worms can cause abdominal pain and loss of weight. Hookworms can cause anaemia because of blood loss. By themselves, worms do not cause fever. Antibiotics don't kill worms. To get rid of worms we give the patient a medicine that paralyses the worms. The gut then expels the worms alive in the stools.

The number of worms living in a person's gut is called the worm load. A heavy worm load usually causes symptoms. A light worm load does not usually cause any symptoms. We cannot always remove all the worms from the person's gut with treatment. But we can always remove most of the worms and cure the symptoms.

Intestinal worms are different from viruses and bacteria. One virus or one bacteria can infect a child and multiply into millions inside his or her body. Intestinal worms cannot do this. They multiply by passing eggs in the child's stool. When the stool is excreted onto the grounds, the eggs become ripe and can then infect a person again. This is called the worm's life cycle.

We can break the life cycle of worms by teaching children to use latrines

properly. Bad sanitation helps intestinal worm infections to spread.

### Hookworm (*Necator* or *Ankylostoma*)

- ◆ These worms, which are about one cm long when adult, infect the upper part of the small intestine. The worm's mouth is stuck into the wall of the intestine (the mucosal lining) by hooks. They feed by sucking blood and protein from the intestinal wall. The adult worms pass eggs (ova) which leave the body mixed in the faeces. If the faeces is left in warm, damp surroundings the eggs develop into larvae.
- ◆ These larvae move and are able to enter through human skin, typically through the skin of bare feet. The larvae of one of the hookworms, *Ankylostoma*, can also be swallowed and pass direct to the intestine wall. In these ways hookworms pass from person to person.
- ◆ After the larvae enter the body through the skin, they travel through the body including into the lungs. They are then coughed up and swallowed and reach the small intestine. Here they grow into adult worms.
- ◆ Sometimes, when the larvae are passing through the lungs, they irritate the lungs. This can cause cough and wheezing (asthma-like disease). Blood examination shows a raised eosinophil count of the white blood cells (eosinophilia).

The main trouble caused by hookworm infection depends on:

- ◆ The number of worms present (the worm load); and
- ◆ The child's nutrition.

A few hookworms in a well-nourished child cause no sickness. The small amount of blood lost can be replaced. Children who are malnourished, or who have many hookworms sucking away blood and protein, slowly become more and more anaemic. They become pale and weak. They may have swelling of the ankles.

Occasionally the anaemia is so severe that they have heart failure with generalised oedema. If there is oedema in hookworm infection this means a heavy worm load.

Diagnosis of hookworm disease

1. Symptoms of anaemia: tiredness, breathlessness, oedema, pallor, aching muscles
2. Anaemia (Hb less than 10g per dL)
3. Many hookworm eggs in stool

Hookworms cause iron deficiency anaemia

Treatment

1. *Deworm*. Give Albendazole

Weight (kg)	Dose
Under 10 kg	1 tablet once
10 kg and over	2 tablets once

If the child has oedema, give Albendazole daily for 3 days. Albendazole tablets should be crushed up or chewed. They should not be swallowed whole.

2. *Treat anaemia* if this is present (see page 101).
3. *Iron containing foods*. Educate on available diet. Encourage the eating of dark green leafy vegetables (e.g. pumpkin tips, sweet potato leaves, aibika), which contain iron.
4. *Health education*. It is not much good to deworm a child who will return to the same environment and get re-infected.

Prevention

- ◆ *Health education*. Teach mothers how the disease is spread. Then they will not allow children to pass faeces on the ground.
- ◆ *Latrines*. Much education is needed before these are properly used.
- ◆ Wearing of shoes
- ◆ *Deworming campaign* is no good by itself. Treatment needs to be combined with education and improved sanitation.

## Roundworms (Ascaris)

Adult roundworms are large, about 20 cm (8 inches) and look like small snakes. They live in the small intestine. Eggs are passed in the stools and may get into the ground or vegetables. The eggs stay alive best in damp shady soil. After the eggs have been on the ground for some days they are ready for the next stage of development. If a person swallows them they change

into larvae. These larvae go round the body including the lungs. They finally reach the small intestine where they grow into adult roundworms.

### Symptoms and Signs

- ◆ A few roundworms in a well fed child usually cause no trouble. Sometimes they may cause mild abdominal pain, loose stools or vomiting. Parents get worried if the child passes a worm in his stool or vomits one up.
- ◆ Intestinal obstruction is a serious problem. Heavy roundworm infections can cause bowel obstruction. This happens when the roundworms form a tangled ball in the intestine. The child will be ill with abdominal pain, constipation, vomiting, abdominal distension and sometimes an abdominal lump. Urgent surgery is needed if the worms are not passed after a dose of Albendazole.
- ◆ *Effect on nutrition.* Very heavy infections, especially in poorly nourished children, will lead to malnutrition. This is because the worms eat the child's food.
- ◆ *Asthma-like disease.* Like hookworm larvae, roundworm larvae may irritate the lungs as they pass through them, causing bronchospasm (narrowing of the airways) and increased secretions. This causes cough and wheeze, like asthma. There will be eosinophilia (increase of eosinophils on Full Blood Examination – F.B.E).

### Treatment

- ◆ Give Albendazole.
- ◆ If oedema is present, give Albendazole daily for 3 days.

Weight (kg)	Dose
Under 10 kg	1 tablet once
10 kg and over	2 tablet once

### Prevention depends on:

- ◆ Health education
- ◆ Proper disposal of faeces
- ◆ Washing of hands and uncooked food before eating
- ◆ Treatment of infected patients

### Threadworms (*Enterobius*)

- ◆ The adult threadworm is a small, thin, white threadlike worm. It can only just be seen. It lives in the caecum and appendix. The fertilised female worm goes down the large bowel and out of the anus at night. It lays its eggs on the skin around the anus. The eggs are spread by fingers from the skin around the anus or from bedclothes of the infected person.
- ◆ They spread either to his own mouth or someone else's mouth. The eggs hatch out in the intestine and grow into adult worms.

Threadworm infection may cause itching around the anus. Eggs are not usually found in the stool. They can be picked up by sticky paper (cello tape) placed over the skin around the anus in the early morning.

- ◆ Treatment is a single dose of Albendazole.
- ◆ The whole family needs to be treated, because threadworms usually affect the whole family. The single dose treatment should be repeated after one week. This will remove any worms which have hatched from eggs since the first dose was given.

### Whipworms (*Trichuris*)

- ◆ The adult whipworm lives in the large intestine and is about 4 cm in size. It is shaped like a small whip. Eggs of these worms are often found in stools. This worm does not usually cause any disease. However it may cause diarrhoea or dysentery if there is a heavy infection or if the child is malnourished. Occasionally whipworm may cause the rectum to come out of the anus (rectal prolapse).
- ◆ Treatment is Albendazole.

### Strongyloides

- ◆ The *Strongyloides* parasite has a life cycle similar to the hookworm parasite. Infective larvae enter the body through the skin and migrate through the tissues. Adult females live in the lining of the upper small intestine.

- ◆ In several areas of Papua New Guinea a species of *Strongyloides* has been found to be the cause of "Swollen Belly syndrome". This syndrome was first reported in babies aged 3 to 6 months old around Kanabea in Gulf Province. It was a fatal disease until its cause was discovered.

### Symptoms and Signs

- ◆ There is marked abdominal distension due to ascites (hence the name "swollen belly syndrome").
- ◆ In addition, there is cough and shortness of breath (suggesting pneumonia), diarrhoea, and oedema.

### Diagnosis

- ◆ Diagnosis is made by examining a specimen of faeces under the microscope. The stools contain large numbers of *Strongyloides* larvae.
- ◆ It is important to suspect the diagnosis and examine the stools in any child with oedema. The diagnosis is easily mistaken for pneumonia or septicaemia. Without correct treatment the disease is fatal.
- ◆ Treatment is albendazole daily for 3 days. A better but more toxic drug is Thiabendazole – a category C (specialist only) drug.



Figure 20 - Worms are a problem of bad sanitation.

Key message:  
Worms are a  
problem of bad  
sanitation.

This will wash off any worm eggs that might be on the food.

- ◆ We must also encourage children to wear shoes or sandals to reduce the worm larvae in the soil invading through the skin of their feet.
- ◆ Every health centre should have a clean latrine, clean running water and hand washing facilities.

## Prevention of intestinal worm infections

- ◆ Intestinal worms will remain a problem until sanitation improves. Teaching people, especially young children, to use latrines properly is difficult, but we must try.
- ◆ We must teach parents not to let their children play in places where faeces are passed. We must teach parents and children the importance of washing hands after passing faeces, and before eating.
- ◆ It is also important to wash fruit and vegetables before eating them.

## Chapter 11. Other gastrointestinal diseases

### Stomatitis

A common infection of the mouth sometimes caused by a fungus - thrush (candida). Stomatitis is also caused by viruses (often herpes, the cold sore virus) and bacteria (especially if the child has decayed teeth or inflamed and swollen gums).

#### Symptoms and Signs

- ◆ The child has a sore mouth, fever and loss of appetite.
- ◆ The mouth is swollen, red and has many white spots or ulcers. The ulcers are very painful and a young child may refuse to feed.

#### Treatment

1. Clean the mouth every six hours with saline.
2. Apply one-half percent gentian violet with a swab stick.
3. If severe, give penicillin.
4. Give plenty of fluids to prevent dehydration.

Babies with stomatitis refuse to drink because it is painful. If a baby has stomatitis and refuses to breast feed, tell the mother to express her milk by hand into a cup. Then she can feed the baby expressed breast milk by cup and spoon. Tube feeding is sometimes needed.

If the stomatitis is due to a virus (herpes, the cold sore virus), it will be

gone in 10 days, regardless of treatment.

If it is due to candida (fungus), it will not get better without treatment. If the candida is severe, such as involving the whole mouth, or if it does not get better with treatment, the child should be assessed for HIV. Candida stomatitis in HIV infection may involve the throat and oesophagus making swallowing very difficult. In severe candida oral thrush, ketoconazole or fluconazole is the treatment.

### Pyloric stenosis

A congenital thickening of the end part of the stomach (pylorus).

#### Symptoms and Signs

- ◆ An uncommon condition which occurs in small babies. It usually affects boys aged between two and eight weeks of age. The pylorus is thickened. This prevents milk from leaving the stomach. The stomach overfills with milk and the baby vomits the milk up strongly (projectile vomiting).
- ◆ The diagnosis is made by feeling a small lump in the right upper area of the abdomen. The movements of the stomach are often seen going from left to right, across the abdomen.

#### Treatment

- ◆ All babies with suspected pyloric stenosis need to be assessed by a paediatrician or surgeon. Send all suspected cases to a base hospital.



- ◆ Most babies with pyloric stenosis need an operation to relieve the obstruction. It is a simple operation and the child is healthy afterwards.

## Intussusception

One part of the bowel pushes up into another part of the bowel. This causes intestinal obstruction.

### Symptoms and Signs

- ◆ The child has severe colicky, abdominal pain which comes and goes. It makes him pull his legs up and scream loudly for a few minutes. He is then quiet until the next pain comes.
- ◆ Signs of intestinal obstruction- vomiting, constipation and abdominal distension (swelling).

**N.B.** Sometimes the child has diarrhoea early in the disease.

- ◆ Red blood and mucus is often found on the gloved finger if a rectal examination (P.R.) is done. Intussusception may be wrongly diagnosed as dysentery, so you should always think of this condition in young children presenting with dysentery and a history of severe colicky abdominal pain.
- ◆ A lump (mass) may be felt in the abdomen

A child with intussusception needs urgent surgery. Send him to a base hospital. Rehydrate him with I.V. fluids and keep his stomach empty by

passing a nasogastric tube and allow it to drain freely (or aspirate intermittently).

## Other causes of a lump in the abdomen

- ◆ Enlarged spleen- usually due to malaria
- ◆ Enlarged liver
- ◆ Lumps of hard faeces due to constipation
- ◆ Roundworms
- ◆ Pigbel
- ◆ Abscess inside the abdomen, such as a perforated appendix
- ◆ Tuberculosis inside the abdomen
- ◆ Tumour or malignancy inside the abdomen, e.g. Wilms tumour of kidney or Burkitt lymphoma (see page 159)

## Pigbel (Enteritis necroticans)

A disease caused by eating pork (pig meat) or other meat. It is caused by bacteria (Clostridium). The disease is seen mainly in the Highlands. A few hours to 5 days after eating pork, there is severe upper abdominal pain, vomiting and sometimes slight diarrhoea with blood.

A tender lump is felt in the abdomen. The abdomen, especially the upper abdomen becomes distended (swollen) and painful. The vomit and gastric aspirate has black spots due to old blood. The patient may become shocked and dehydrated. Antibiotics and intravenous fluids can treat some cases, but urgent surgery is sometimes



needed. Many people who get this disease die.

#### Treatment

- ◆ Assess each case of pigbel as mild or severe.
- ◆ *In mild pigbel* there is abdominal pain but no (or only slight) abdominal distension (swelling). The child does not look sick, and there are no black spots in the vomit. Mild cases can be treated at the health centre.
- ◆ *In severe pigbel* there is severe abdominal pain and a lot of abdominal distension (swelling). The child looks sick or toxic with fever, and may have signs of shock: a fast pulse, cold skin or poor pulses. There are black spots in the vomit. Children with severe pigbel should be sent to hospital as quickly as possible.

#### Treatment of mild pigbel

1. Stop all food and drink by mouth
2. Pass a nasogastric tube into the stomach. Aspirate (suck out) the stomach. Then leave the tube on free drainage. Splint the arms.
3. Give I.V. fluids using 2.5% dextrose in half strength Darrow's solution or Hartmann's solution.
4. Give benzyl (crystalline) penicillin intravenously
5. Give a single dose of Albendazole
6. Give a single dose of Tinidazole if the child is malnourished

Weight (kg)	Dose
3 - 5 kg	25 ml/hour (7 drops/min)
6 - 9 kg	50 ml/hour (13 drops/min)
10 - 14 kg	75 ml/hour (20 drops/min)
15 kg and over	100 ml/hour (25 drops/min)

Table. Intravenous fluid rate for shock in pigbel

Send the child to hospital at once if he gets sicker, or if there is no improvement after 2 days. Start treatment with I.V. chloramphenicol if he gets worse.

**As the child improves** the abdominal pain and swelling becomes less. There is no vomiting. The child feels hungry and has bowel motions.

- ◆ After 24 hours of improvement, stop the I.V. fluids, remove the nasogastric tube and give oral rehydration solution (O.R.S.).
- ◆ After another 24 hours of improvement, give full strength full cream milk. Then after 24 hours allow the child to eat soft food.

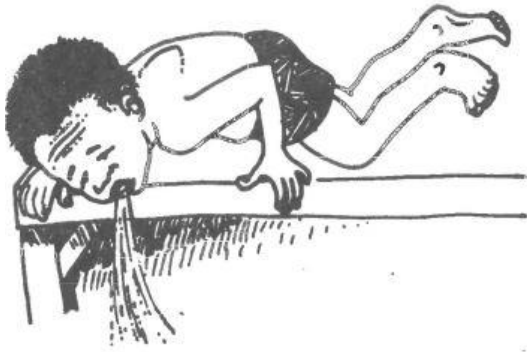


Figure 21 - Think of acute abdomen if a child has abdominal pain and vomiting.

The amount of O.R.S. or milk given as the child improves is 30 ml/kg every 3 hours, or according to weight group:

Weight (kg)	Dose
3 - 5 kg	120 ml, 3 hourly
6 - 9 kg	240 ml, 3 hourly
10- 14 kg	300 ml, 3 hourly
15 - 19 kg	350 ml, 3 hourly
20 - 29 kg	400 ml, 3 hourly

#### Treatment of severe pigbel

Patients with severe pigbel need to be sent urgently to hospital. They often need surgery. Treat them as an acute abdomen (see below). Do not give Albendazole or Tinidazole to patients with severe pigbel.

## Acute abdomen

An acute abdomen means a serious disease inside the abdomen that has come on quickly.

Usually it is an infection inside the abdomen, e.g. appendicitis, severe pigbel, or a bowel obstruction, e.g. intussusception, or an injury, e.g. ruptured spleen. Correct treatment, which usually includes surgery, is very important. If the acute abdomen is not diagnosed and treated correctly the child will probably die.

The signs of acute abdomen are:

- ◆ Abdominal pain and tenderness
- ◆ Vomiting
- ◆ Abdominal distension (swelling)

### Abdominal Pain and Tenderness.

- ◆ The abdomen is tender (painful) in the same place each time you feel it. Pressing on the abdomen causes pain. The muscles of the child's abdomen become tight. This is called guarding. The abdomen is always tender each time you feel it, and not only sometimes. So, examine the abdomen every half hour for one or two hours if you are not certain. In real abdominal tenderness the abdomen will be tender every time (tenderness is constant). Abdominal tenderness that is *constant in time (always there) and place* (always in the same place) means real abdominal tenderness.

- ◆ Another important sign of acute abdomen is rebound tenderness. If you take your hand away quickly from the tender place, the child feels extra pain. Watch how the child with abdominal pain behaves. Most children who have an acute abdomen lie still (quietly), and do not move about. The pain becomes worse if they sit up or turn over.
- ◆ Abdominal pain is common in young children. It is not usually caused by acute abdomen. But it is important to examine the abdomen carefully to exclude acute abdomen.
- ◆ Common causes of abdominal pain in children include constipation, indigestion (e.g. after eating green mangoes), worms, otitis media, tonsillitis, urinary infection, pneumonia. Always examine a child with abdominal pain carefully all over. Do not just examine his abdomen.
- ◆ Examine the ears, throat, chest, and urine of children who have abdominal pain

**Vomiting.** Most children with acute abdomen vomit. In serious cases the vomit will be green or brown or black.

**Abdominal distension (swelling).** Most children with acute abdomen have abdominal distension.

**Bowel motion.** In acute abdomen the bowel motions vary. There may be complete constipation, or bowel motions may be normal. Sometimes there may be slight diarrhoea.

## Treatment of Acute abdomen.

If you suspect a child has acute abdomen:

1. Stop all food and drink by mouth
2. Pass a nasogastric tube into the stomach
3. Aspirate the stomach, and leave the tube on free drainage
4. Give I.V. fluids
5. Give I.V. amoxicillin (or ampicillin) and Gentamicin if you can or if you do not have this, give IV penicillin and I.V. chloramphenicol
6. Send urgently to base hospital

## Abdominal swelling (distension)

A child's abdomen normally bulges out more than the abdomen of a young adult. As a child grows older his abdomen becomes flatter.

### Acute abdominal swelling

- ◆ If a child's abdomen suddenly becomes swollen (acute abdominal distension) during a few hours or days he needs urgent attention.
- ◆ The commonest cause of acute abdominal swelling is severe diarrhoea. The child will be dehydrated. This abdominal swelling associated with severe diarrhoea and dehydration is caused by a loss of potassium from the body in the watery stools. The loss of potassium causes a low serum potassium level (hypokalaemia). This causes the intestines to dilate (paralytic ileus), and produces abdominal swelling.

- ◆ The most serious cause of acute abdominal swelling is bowel (gut) obstruction. When this happens, stool and gas (air) cannot pass through the bowel to the rectum. So, the abdomen swells up. The child has colicky abdominal pain and vomits bile stained (green) or brown fluid. Any child who has acute abdominal swelling and vomits green or brown fluid has an acute abdomen (see page 85). He needs urgent referral to a base hospital.

### Chronic abdominal swelling

- ◆ Children with malnutrition often have chronic abdominal swelling. The abdomen swells up slowly over several weeks or months. Malnutrition causes the child's abdominal muscles to become thin and weak. The weak abdominal muscles are not able to keep the abdomen flat, so his abdomen bulges out. A large infection of roundworms can also cause chronic abdominal swelling. So can chronic constipation or a large liver or spleen.
- ◆ Occasionally, a swollen abdomen is full of fluid (ascites). This can be caused by abdominal tuberculosis (see page 127), nephrotic syndrome (see page 153), or a tumour (see page 159).

## Chapter 12. Fever

Fever is the normal response of the body to infection. In many ways it is a useful response and helps the body fight the infection. When someone has a fever we need to find out why. What infection has the person got? So, we must take a history and examine the person carefully all over to try and find the cause of the fever and treat the cause (if we can), and the fever will go.

Malaria is a common cause of fever. Everyone with fever should have a rapid diagnostic test or blood slide taken and be given the correct dose of antimalarial medicine if the test is positive. In addition they should be carefully examined for some other cause of fever. If you are working in an area where there is a lot of malaria, and if you cannot do a test for malaria, it is reasonable to give antimalarial treatment if there is no other cause for the fever (such as an URTI)

Examine a child with fever carefully all over. In young children a slight fever is very common with all infections. A slight fever itself needs no special treatment provided the cause of the fever is found and treated.

A child's body burns energy foods to keep her temperature at 37°C. If she gets too hot she sweats. As her sweat dries, it takes heat out of her and cools her. When she is hot, more blood goes through her skin. She loses heat from her skin and becomes cooler. When she is cold, less blood goes through her skin. Her skin seems cold, but she saves heat and keeps warm inside. If

an older child gets very cold, her muscles contract and she shivers (shakes). Contracting muscles burn more energy food and make more heat, so this keeps her warm.

A child with a fever sometimes feels cold. He sits in the sun and shivers - he is having a rigor. This is a sign that his body is making heat, and that the temperature is going up. When he feels that he is hot and he sweats, his body is losing heat, and his temperature is going down. A temperature of more than 39°C is dangerous. A child who is as hot as this has hyperpyrexia (a very high fever). It may cause fits and harm his brain. So if you find a child who is as hot as this, cool him quickly.

Sometimes a child with an infection is so sick that his body cannot make enough heat to cause a fever. If he is very sick, very young, or very malnourished his body cannot make enough heat to keep warm. So he gets cold. A temperature a little below 36°C is not serious. But, a temperature below 35°C is called hypothermia and is very dangerous. Hypothermia is the opposite of hyperpyrexia. If you find a hypothermic child warm him up to a normal temperature (36-37 °C).

Young children cannot keep a normal temperature as easily as older children and adults. Newborn babies, especially low birthweight babies, cannot warm themselves by shivering. They become hypothermic very easily.

## Common causes of fever

Most diseases can cause fever. A careful history and examination will usually suggest the right diagnosis. You need to try to make a diagnosis, and identify if the child is very sick or not too sick

1. *Always think of malaria.* Take a blood slide or do a Rapid Diagnostic Test for malaria and give an antimalarial if the test is positive. If you are working in an area where malaria is common but the tests are not available it is reasonable to give an antimalarial if there is no other cause for the fever.
2. If the child has a fever and cough, think of upper respiratory tract infection (URTI), otitis media, tonsillitis, influenza, bronchitis, and pneumonia. Look at his ears and throat.
3. Watch his breathing carefully, count his respirations to see if he has pneumonia. Check for cyanosis to see if he is lacking oxygen (hypoxaemia)
4. If he has sore eyes as well as a fever and cough, think of measles. Look in his mouth for Koplik spots and examine his skin for a red rash.
5. If he has a fever and cough for more than two weeks think of tuberculosis and whooping cough as well as pneumonia.
6. If he looks dehydrated, think of gastroenteritis. Ask if he has had any diarrhoea or vomiting.
7. If he looks dehydrated, but has had no diarrhoea and vomiting, it means he has not been drinking.

Find out why he has not been drinking.

8. If he looks sleepy, or has had a convulsion, think of meningitis, cerebral malaria, septicaemia, or febrile convulsion. Convulsions and lethargy (sleepiness) are Emergency signs and require urgent treatment.
9. If he has a fever and a stiff neck, think of meningitis.
10. If he has a painful swelling, think of abscess, lymphadenitis, pyomyositis (deep muscle abscess), osteomyelitis, or arthritis
11. If she has joint pains or a heart murmur think of Rheumatic fever.

Most fevers are caused by an infection somewhere in the body. Do a careful history and examination. Think of the common causes of fever.

- ◆ Malaria
- ◆ Upper respiratory infections (URTI, tonsillitis)
- ◆ Otitis media
- ◆ Pneumonia
- ◆ COVID-19
- ◆ Measles
- ◆ Gastro-enteritis
- ◆ Abscess
- ◆ Meningitis
- ◆ Urinary infection
- ◆ Bone and joint infection
- ◆ Tuberculosis
- ◆ Rheumatic fever
- ◆ Dengue fever

## Examine the child carefully all over

1. Check for Emergency signs (severe respiratory distress, cyanosis, stridor, signs of shock: fast and

weak pulse, cold extremities, and capillary refill longer than 3 s; lethargy or unconsciousness, severe dehydration). If any Emergency signs are present, treat these immediately.

2. Look at his ears: otitis media
3. Look at his throat - tonsillitis
4. Watch his breathing and count his respirations: pneumonia
5. Feel his abdomen for any tenderness or lumps: acute abdomen
6. See if his neck is stiff or if his fontanelle is bulging: meningitis
7. Listen to his heart for any murmurs: rheumatic fever
8. Look at his skin for any sores or rashes: abscess, measles, chicken pox
9. Feel his joints for any tenderness or swelling: arthritis
10. Feel his muscles for any tenderness or swelling: muscle abscess (pyomyositis)
11. Feel his bones for any tenderness: osteomyelitis
12. Look at his eyes to see if they are yellow (jaundice): hepatitis
13. Look at his urine - cloudy urine suggests urinary infection. Dark urine suggests blood or bile present in the urine: malaria,

#### Other causes of fever

- ◆ *Hot surroundings*, especially in a young baby, can cause a fever.
- ◆ *Immunizations*. Many babies get a fever a few hours after an injection of pentavalent vaccine
- ◆ *Sometimes no cause for the fever can be found*. If the fever goes away after a few days and the child

becomes well again the fever was most likely caused by some virus infection.

*If the fever does not go away after a few days*, you should send the child to a doctor. He may have tuberculosis or some other serious illness like typhoid.

#### Treatment of fever

1. Find and treat the cause of the fever.
2. Take a Rapid Diagnostic Test or blood slide and give antimalarials.
3. Give paracetamol if the temperature is over 38°C or if the child has any pain or discomfort.
4. Show the parents how to cool sponge the child if there is hyperpyrexia (temperature over 39°C). Put the child under a fan.
5. Give the child plenty to drink.

#### Antipyretics

Drugs like paracetamol and aspirin which reduce fever are called antipyretics. Because fever is a normal and useful response of the body to infection we should not treat every fever with an antipyretic. But these drugs are used if the fever is high to prevent the child having a febrile convulsion or brain damage from hyperpyrexia.

Babies under 3 months of age do not have febrile convulsions. These babies should never be given antipyretics. A



high fever in a baby is reduced by cool sponging.

Very often a high fever is accompanied by pain, e.g. headache or earache. In these circumstances a drug that relieves pain is very helpful. This kind of drug is called an analgesic. Paracetamol and aspirin are both antipyretics and analgesics.

**Do not give aspirin** routinely to young children under 10 years of age as it can easily cause poisoning in young children. (Aspirin in children below the age of 10 is only used for those with severe arthritis).

Dose of paracetamol elixir: (120 mg/5 ml)

Under 3 months: Do not give.

Over 3 months:

Weight (kg)	Dose
Under 10 kg	2.5 ml, 4 times a day
10 - 14 kg	5 ml, 4 times a day
15 - 19 kg	7.5 ml, 4 times a day
20 - 29 kg	10 ml, 4 times a day

**Dose of aspirin** (only for children 10 years or older):

Weight (kg)	Dose
20 - 29 kg	300 mg (1 tab), 4 times a day
30 - 39 kg	450 mg (1 ½ tab), 4 times a day
40 kg and over	600 mg (2 tab), 4 times a day

No analgesics to children under 3 months.

If the child looks very sick and you cannot make a diagnosis:

1. Check for Emergency signs and treat these
2. Admit the child to health centre or hospital
3. Give treatment for fever
4. Start I.M. ceftriaxone as for meningitis, or IM chloramphenicol (see page 137).
5. Start I.M. Artesunate as for cerebral malaria (see page 93).
6. Send the child quickly to a doctor

If you cannot make a diagnosis, but the child does not look sick:



1. Give paracetamol treatment if the temperature is high.
2. Think of the causes of fever and examine the child carefully all over.
3. Watch the child during the next few days. Examine her carefully all over again to see if you can find the cause of his fever.
4. If the child gets worse, or the fever continues for more than four days without your finding a cause to treat, send the child to a doctor.

If the child has had fever for more than one week before coming to you and has had antimalarials and penicillin at a community health post or clinic and you cannot find a cause, send the child to a doctor.

## Chapter 13. Malaria and other vector-borne diseases

### Malaria

Malaria is common in most parts of Papua New Guinea. It is caused by very small parasites which live part of their lives in red blood cells. Malaria parasites are spread from person to person by the bites of female *Anopheles* mosquitoes.

When a person is bitten by a mosquito infected with malaria parasites, some of the parasites enter his body. After a few days, the parasites begin growing inside some red blood cells. Soon the red cells burst, and the parasites infect

more red cells which are also destroyed.

If a patient has malaria, you can see malaria parasites when you examine a drop of blood with a microscope.

There are four kinds of malaria parasites. *Plasmodium falciparum* (*P. falciparum*) is the most dangerous kind and can kill people. *Plasmodium vivax* (*P. vivax*) causes a more chronic malaria, as one form of the parasite can avoid the effects of many antimalarial drugs by hiding in the liver. Although it is often milder than *falciparum* malaria *P. vivax* can also cause severe malaria and anaemia in children. The other two kinds of malaria parasites (*P. malariae* and *P. ovale*) are less common. Sometimes a malaria infection can be with more than one kind of malaria parasite.

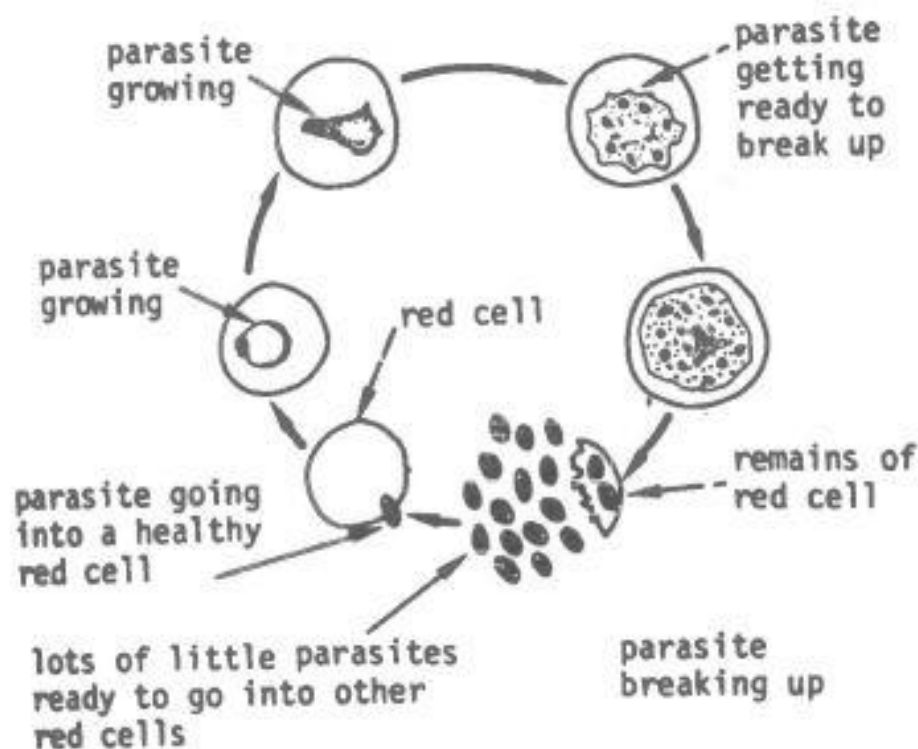


Figure 22 - How malaria parasites destroy red cells.

## Signs and symptoms

- ◆ Malaria parasites cause fever. They destroy many red cells (haemolysis) and cause anaemia. The spleen removes the haemolysed or damaged blood cells and malaria parasites from the blood. Removing many malaria parasites makes the spleen grow large. So a large spleen is usually a sign that a child has malaria now or had malaria in the past.
- ◆ Where malaria is common, it usually attacks children between the ages of three months to ten years. An acute attack of malaria can be mild or severe. A mild attack causes slight fever only. A severe attack causes high fever, convulsions, coma, severe anaemia and even death.
- ◆ If a child with suspected malaria has any Emergency signs: severe respiratory distress, cyanosis, stridor, signs of shock: fast and weak pulse, cold extremities, and capillary refill longer than 3seconds; lethargy or unconsciousness, severe dehydration, treat immediately and transfer to hospital.

## Cerebral (brain) malaria

- ◆ In *P. falciparum* malaria, the parasites can block the small blood vessels in the brain. This causes cerebral malaria. The child has a fever, irritability, may have convulsions, and sometimes goes into a coma.
- ◆ A child with these symptoms may have either cerebral malaria or meningitis. Check the child carefully for neck stiffness. If neck stiffness is present give I.M Artesunate for malaria *and* treat for meningitis with ceftriaxone, or if you don't have ceftriaxone give chloramphenicol.
- ◆ **N.B.** Children may have both cerebral malaria and meningitis.
- ◆ **Malaria often makes children anaemic.** If the anaemia is sudden or severe the child should be transferred urgently to hospital for blood transfusion. Children should also be transferred to hospital if they develop other severe complications of malaria, such as coma, passing very little or no urine (renal failure) or passing dark urine (*black water fever*).

## Malaria and other infections

- ◆ At one time, antimalarial drugs were given to all children with fever. Many children with fever who did not have malaria received antimalarials. Unfortunately, this contributed to the development of resistance of the malaria parasites to the antimalarials used (chloroquine and amodiaquine). New antimalarial drugs were introduced, but it was realised that they needed to be 'protected' and only used if the diagnosis of malaria was confirmed. Rapid Diagnostic Tests (RDTs) were introduced to help in making an accurate diagnosis.
- ◆ In areas where there is a lot of malaria, it is a common cause of fever. But always check for other

diseases that may cause fever (see page 87).

- ◆ Check for malaria with the rapid diagnostic strip test (RDT) if it is available. If it is positive, the child has malaria and should be treated for malaria. But check for other infections as well. If the RDT is negative malaria is unlikely to be the cause of the fever, and you should only give antimalarial treatment if the child is very ill. Look for other infections (such as upper respiratory tract infection, otitis media or pneumonia) and treat these as indicated in the Standard Treatment Book.
- ◆ Sometimes the RDTs are not available and you have to make a decision about whether or not to give the antimalarial treatment based on your clinical judgement.
- ◆ If there is another obvious cause of fever, and the child is not very sick, you may decide not to give the antimalarial. But if you are not sure, or if the child is very sick then give antimalarial in addition to other treatment.

### Immunity

- ◆ An attack of malaria makes a child partly immune. But, unlike measles, it is not a complete immunity for the rest of her life. She may get malaria again, but her next attack may not be as severe.
- ◆ The age when a child becomes infected depends on how much malaria there is in her district. In districts which have malaria for only a part of the year, people do not usually develop strong

immunity. Children at any age may get severe malaria. In districts which have malaria all the year, adults have strong immunity. An immune mother passes some of her protecting antibodies through the placenta to her foetus. This protects the newborn baby for the first three months of his life. The immunity soon becomes weaker and by the time he is six months old, all his immunity has gone. In these districts, children less than three months old do not usually get malaria. After this age they get many attacks. They often become anaemic and some of them die.

- ◆ The children who do not die from malaria become immune by the time they are about five to eight years old. These older children have a few malaria parasites in their blood. They sometimes have fever, but they are not ill.
- ◆ But, if a child gets another disease, such as pneumonia, the malaria parasites inside him may start multiplying again. This may make him more ill.
- ◆ In a very malarious area, a child is in the greatest danger between the ages of three months and five years.
- ◆ Usually, there is no malaria in mountain districts. The weather is so cold that the types of mosquitos (Anopheles) that are infected by the malaria parasites are not present. There is only a little malaria in some towns and small islands. People living in these places usually do not get malaria so they do not become immune. But if

they visit a malarious area, they may get severe malaria, so they are in special danger.

#### Inadequately treated malaria

- ◆ Most children with malaria rapidly improve when treated for 3 days with the correct dose of Artemether-Lumefantrine (MALAM, Coartem).
- ◆ If a child does not improve after treatment check that she has actually taken all the medication and not vomited or spat it out. Check for other causes of fever.
- ◆ If you are not sure if the child got the correct treatment with Artemether-Lumefantrine and if she is not very sick, then give her another 3 days treatment with Artemether-Lumefantrine and make sure that she swallows it and does not vomit it out. But if she is getting worse or does not improve, admit her to health centre or hospital. Malaria parasite resistance to Artemether-Lumefantrine is extremely rare.

#### Treatment of malaria

When it is possible confirm the diagnosis of malaria with an RDT before treating

1. Children who have fever and who have a positive RDT but who are not very sick
  - i. Give Artemether-Lumefantrine 20/120mg combination tab (AL = Coartem, MALA) 2mg/kg/dose (Artemether)
  - ii. plus 12mg/kg/dose (Lumefantrine).

- iii. Give 6 doses of the combination tablet over 3 days given at 0h, 8h, 24h, 36h, 48h & 60h.

Artemether-Lumefantrine is best taken with fatty or oily food or breast milk.

		Amount of A-L 20/120mg combination tab according to weight (kg)					
Day	Timing of doses	<2.5	2.5-4.9	5-14.9	15-24.9	25-34.9	>34
Day 1	1 <sup>st</sup> dose at 0 hours	1/4	1/2	1	2	3	4
	2 <sup>nd</sup> dose after 8 hours	1/4	1/2	1	2	3	4
Day 2	3 <sup>rd</sup> dose after 24 hours	1/4	1/2	1	2	3	4
	4 <sup>th</sup> dose after 36 hours	1/4	1/2	1	2	3	4
Day 3	5 <sup>th</sup> dose after 48 hours	1/4	1/2	1	2	3	4
	6 <sup>th</sup> dose after 60 hours	1/4	1/2	1	2	3	4

2. Children who are very sick, unconscious, or convulsing.
  - i. Treat these children for cerebral malaria with Artesunate. If neck stiffness is present treat for meningitis as well.
  - ii. Nurse the child on the side and clear the child's airway regularly.
  - iii. Give oxygen if cyanosis, severe respiratory distress, severe pallor or oxygen saturation (SpO<sub>2</sub>) <92%, or other Emergency signs.
  - iv. If the child is still unconscious 6 hours after starting treatment give nasogastric feeds as for a patient with meningitis (see page 279).
  - v. Refer to base hospital if the child is not better in 3 days.

### Primaquine

To kill *P. vivax* parasites hiding in the liver

- ◆ Aremether-Lumefantrine does not kill the vivax malaria parasites that are hiding in the patient's liver. These malaria parasites can come out of the liver after some months and cause another attack (relapse) of vivax malaria. To kill the vivax malaria parasites hiding in the liver, and prevent relapses of vivax malaria, Primaquine must be given each day for 2 weeks.
- ◆ Doses of Primaquine to kill vivax malaria parasites hiding in the liver. Use 7.5 mg tablets of Primaquine.

Give the same dose each day for 2 weeks.

Weight (kg)	Dose
3 - 9 kg	¼ tab (1.8 mg)
10 - 19 kg	½ tab (3.75 mg)
20 - 29 kg	1 tab (7.5 mg)
30 - 49 kg	1 ½ tab (11.25 mg)

- ◆ **Side effects of Primaquine.** Some people get severe reactions with a two week course of Primaquine. They can get severe anaemia, jaundice, abdominal pain, or cyanosis. So only use Primaquine when told to do so.

## Malaria prophylaxis

Given once a week, on the same day each week.

Amodiaquine (Infant Camoquin):

Children living in malarial areas need malaria prophylaxis if they have:

- a) Severe malnutrition
- b) Anaemia
- c) A very large spleen (at or below the umbilicus).

Weight (kg)	Dose
3- 5 kg	25 mg (¼ tab) Amodiaquine (Infant Camoquin)
6 - 9kg	50 mg (½ tab) Amodiaquine (Infant Camoquin)
10 - 19 kg	100 mg (1 tab) Amodiaquine (Infant Camoquin)
20 - 29 kg	150 mg (1½ tab) Amodiaquine
30- 49 kg	200 mg (2tabs) Amodiaquine

## Giving antimalarials to children

It is very important that children get the correct dose of antimalarials. The method of giving tablets to young children is described on page 297.

When a child needs an antimalarial:

1. Give the tablets to the child before giving any injection, if it is needed. This is because all injections are painful to some extent. A child may not swallow tablets after receiving an injection.
2. Repeat the dose if the child spits out the tablet, or if the child vomits the tablet.
3. If the child has coma or convulsions, is very sick or vomiting, give I.M. Artesunate
4. For all other symptoms and signs of malaria, give oral Artemether-Lumefantrine. Give it with breast milk to infants who are breast feeding.
5. If the child will not swallow the tablets or is unconscious and cannot swallow give the crushed tablets by nasogastric tube (see page 287).



[illegible]

## Controlling transmission of malaria

- ◆ When malaria parasites have stayed in the body for a few weeks, they form a new stage of parasite called *gametocytes*.
- ◆ Gametocytes look different to the usual malaria parasites (which are called *trophozoites*).
- ◆ Gametocytes do not cause any illness to the patient.
- ◆ But if an Anopheles mosquito bites the patient, the gametocytes will infect the mosquito. The gametocytes grow inside the mosquito. Then, after 7-10 days, the mosquito is infectious to other people.
- ◆ If the mosquito now bites another person, the new malaria parasites go inside him and may cause a new attack of malaria. This is the way malaria spreads from person to person.
- ◆ The best way to prevent malaria is to avoid being in contact with mosquitoes. This can be done by wearing protective clothing, especially at dusk, always sleeping under an insecticide-treated bed-net, using mosquito repellent, and preventing the breeding of mosquitoes by making sure there are no collections of water (eg in tins, coconut shells, tyres,) around the home.

## Other vector-borne diseases

Diseases which are transmitted (carried or borne) from one person to another or an animal to a person by a

mosquito or another type of insect are called vector-borne diseases. The mosquito which transmits the disease is the vector (carrier of the disease). The vector in the spread of malaria is the Anopheles mosquito.

Malaria is, therefore, a vector-borne disease. Several other diseases are also spread from person to person by mosquitoes. These diseases are also vector-borne diseases.

## Filariasis

Filariasis is a disease caused by infection with filarial worms (*Wucheria bancrofti*).

Life cycle and clinical features.

- ◆ Filariasis used to be very common in coastal areas of Papua New Guinea. Control programmes have resulted in a reduction in incidence, but it still occurs and causes serious problems. It mainly affects older children and adults. It often causes a fever. The filarial worms live in the lymphatics and lymph nodes of the infected person. At first, they cause inflammation of the lymphatics (lymphangitis) and lymph nodes (lymphadenitis), especially in the inguinal region.
- ◆ After some years, if infection is heavy and repeated, the lymphatics become blocked. The affected part, which is usually the leg (but occasionally the arm, scrotum, vulva or breast), enlarges. This is because the lymph flow in that part of the body is blocked (lymphoedema). Occasionally, in severe cases there is massive

enlargement of the part with thickening of the skin (elephantiasis).

- ◆ The adult filarial worms produce larvae called microfilariae. These microfilariae are carried around the blood. They circulate in the blood close to the skin, between 10 pm and 2 am at night. This is the time that the mosquitoes which are the vectors of the disease are likely to bite people. If the vector mosquito takes up the microfilariae in its blood meal, the microfilariae will develop in the mosquito. The mosquito will then pass on the infective filaria larvae to the next person it bites.
- ◆ Filariasis is diagnosed by finding microfilariae in blood films collected at nighttime, between 10 pm and 2 am. The vectors for filariasis in Papua New Guinea include the same mosquitoes that transmit malaria (Anopheles mosquitoes). Some other mosquitoes can also transmit filariasis.

## Treatment

### Acute lymphangitis or lymphadenitis

1. Rest and elevate the affected part.
2. Relieve pain with paracetamol, or aspirin in older children
3. Cloxacillin or flucloxacillin or amoxicillin is usually given for 5 to 7 days in case it is a bacterial infection.

### After the acute symptoms have gone

1. Give diethylcarbamazine (Hetrazan or Banocide) to kill the

microfilariae. The dose is 2 mg/kg, 3 times a day for 3 weeks.

Weight (kg)	Dose
10 - 19 kg	25 mg (½ tab) tds.
20 - 29 kg	50 mg (1 tab) tds.
30 - 49 kg	75 mg (1 ½ tab) tds.
50 kg and over	100 mg (2 tab) tds.

2. Diphenhydramine (Benadryl) or promethazine (Phenergan) is usually given at the same time as the diethylcarbamazine during the first week. This is to prevent allergic reactions from the killed microfilariae.

## Prevention

- ◆ Mosquito control
- ◆ Protective clothing and bed nets at night.
- ◆ Mass drug administration.

In areas where filariasis is common, as in the OK Tedi region and parts of the Sepik, the whole population can be given a single dose of diethylcarbamazine (6 mg/kg) every 6 months. This reduces the number of microfilariae in the people's blood and

will therefore reduce transmission of the disease.

Sometimes other drugs can be used to treat and prevent filariasis

### Dengue fever

There are 4 dengue viruses (dengue 1, 2, 3 and 4). Any one of these 4 dengue viruses can cause dengue fever.

Dengue fever is transmitted by the urban mosquito *Aedes aegypti*. The incubation period is 5-8 days. It occurs more commonly in urban than in rural settings. Occasionally, it occurs in epidemics.

#### Symptoms and signs

- ◆ The disease may be mild (benign) or severe. Young children with dengue fever often have a mild febrile illness lasting 1-3 days. Sometimes there is a rash and fever. This mild form of dengue fever is usually diagnosed (wrongly) as malaria or thought to be a mild unknown viral illness.
- ◆ Older children and adults usually have a longer and more severe illness when they have dengue fever. In addition to fever and rash, they have severe headache, eyeball pain, muscle, joint and bone pains. Loss of appetite, nausea and vomiting are also common in older children who have dengue fever.

#### Dengue haemorrhagic fever (DHF)

- ◆ DHF occurs when a person is infected with a second dengue virus several months after recovering from an earlier infection

with a different dengue virus. The second infection causes an intense immunological reaction in the person's body. This results in plasma leaking into the tissue spaces and the person's blood becomes thicker and more concentrated.

- ◆ In DHF there is fever, bleeding and enlarged liver (hepatomegaly). The bleeding is usually into the skin (purpura). Often there is also bleeding from the mouth or nose (epistaxis) or from vein puncture sites. In very severe cases, there is internal bleeding (e.g. haematemesis, melaena). An outbreak of DHF occurred in PNG in 2014 and cases are still being reported.
- ◆ **Tourniquet test.** If you suspect that a child might have dengue you can do a tourniquet test. Put a blood pressure (BP) cuff around the child's arm. Inflate the cuff to half way between systolic and diastolic blood pressure. Keep the cuff inflated at this pressure on the arm for 5 minutes. After deflating the cuff, look at the forearm. A fine rash on the forearm, below where the cuff has been, means that the tourniquet test is positive. The fine rash is lots of little bleeding spots in the skin (petechiae).

#### Dengue shock syndrome (DSS)

- ◆ In severe DHF the child goes into shock (rapid weak pulse, low blood pressure, cold sweaty skin). This is called dengue shock syndrome.

#### Laboratory findings in DHF

1. Low platelets (thrombocytopenia).
2. Raised haemoglobin or raised haematocrit. This is caused by the blood becoming more concentrated as the plasma leaks into the tissue spaces.
3. Antibodies to dengue virus are found in the patient's blood. There is now a rapid diagnostic strip test for dengue.

#### Treatment of DHF and DSS

1. Give paracetamol for fever if necessary. Do NOT use aspirin. Aspirin will make the bleeding worse.
2. Hartmann's solution, intravenously, is the best fluid to restore blood volume and prevent or treat shock. Use normal saline if you do not have Hartmann's solution.
3. When treated correctly, recovery occurs within 48 hours. There is then reabsorption of fluid from the tissue spaces. This means that IV fluids must be given very carefully after the first 24 hours. If too much fluid is given IV after 24 hours, the child may die from circulatory overload.

#### Prevention

- ◆ Mosquito control
- ◆ Sleeping under insecticide-treated bed-nets
- ◆ Eliminate breeding sites for *Aedes aegypti* mosquitoes

#### Ross River Fever

The virus that causes Ross River fever is spread by a mosquito. There is fever, polyarthrititis (several joints inflamed)

and a rash. The disease often occurs in an epidemic. It is sometimes called epidemic polyarthrititis.

#### Murray Valley Encephalitis

Murray Valley encephalitis is another virus infection that is transmitted by a mosquito. See virus encephalitis (page 140).

#### Japanese encephalitis

This viral disease is also transmitted by Mosquitoes and has been reported from several locations in PNG.

## Chapter 14. Anaemia

Blood is red because it contains red cells. Red blood cells contain a red substance called haemoglobin.

Haemoglobin takes oxygen from the air that reaches the lungs and carries it in the blood to other parts of the body.

Haemoglobin in the capillaries makes a child's lips, tongue, and conjunctiva look red or pink. If a child has too little haemoglobin in her blood, these parts of her body become pale (less red than normal). She has pallor and is anaemic. Anaemia, like malnutrition, makes a child less able to fight diseases, such as diarrhoea and pneumonia.

Infections also make anaemia worse.

Anaemia, which comes on slowly, does not usually cause any symptoms or signs until the haemoglobin level is very low. If anaemia comes on quickly it causes symptoms when the haemoglobin is only a bit low. Anaemia makes a child's skin and mucous membranes pale.

Occasionally, a mother says her child's lips are pale. Usually, you only diagnose anaemia when a child comes with some other symptoms.

Remember to examine every sick child for anaemia. A severely anaemic child is pale with a fast pulse, swollen feet and fast or difficult breathing. She may die of the severe anaemia.

Examining a child for pallor

- ◆ The parts of a child's body where you will best detect anaemia are the palms of the hands, the lining

inside the eyelids (conjunctiva), and the tongue or lower lip. Look at the palms of his hands. Pull down her lower lip, and one of her lower eyelids. If she is older, ask her to put out her tongue. Look to see if these parts of his body are paler than normal. If you examine many children you will learn what colour the tongue, or lips, conjunctiva, and palms normally are. You can diagnose moderate or severe anaemia like this. But, you can only diagnose mild anaemia by measuring the haemoglobin.

- ◆ Examine every sick child for pallor.

Measuring anaemia

- ◆ Paleness (or pallor) of the lips, tongue, conjunctiva, and hands are useful signs of anaemia, but they are not enough by themselves. We must measure the haemoglobin (Hb). There are several ways of doing this (see page 284). We measure the number of grams of haemoglobin in a decilitre (100 ml) of blood. We write this as g/dl (or g%). Healthy men have between 14 and 16 g/dl of haemoglobin in their blood. Healthy women have between 12 and 14 g/dl.
- ◆ A child is born with about 18 g/dl, but her haemoglobin soon falls, and it is only about 11 g/dl by the time she is two months old. Then it rises slowly until she is an adult.
- ◆ A child is anaemic if her haemoglobin is less than 10 g/dl (or 10 g%). If it is between 8 and 10 g/dl, she is mildly anaemic. If it is between 5 and 8 g/dl, she is moderately anaemic. If it is less

than 5 g/dl, she is severely anaemic.

- ◆ If the haemoglobin cannot be measured, the severity of the anaemia has to be guessed. This is done by looking to see how pale the child is. If the mucous membrane looks very pale, the Hb is probably less than 5 g/dl, and the child is severely anaemic.
- ◆ If the mucous membrane looks pale, but not very pale, the Hb is probably between 5 and 8 g/dl, and the child is moderately anaemic.

#### The life of the red cell

- ◆ Bone marrow makes red blood cells from iron, folic acid, vitamins, and protein. The marrow then releases the red cells into the blood stream.
- ◆ Healthy red cells live for 4 months. When they are old or injured, they are removed from the circulation by the spleen. The iron from the old red cells is sent from the spleen to the bone marrow where it is re-used to make more haemoglobin.

#### Causes of anaemia

The commonest causes of anaemia in PNG are malaria and iron deficiency. Often a child is anaemic for both these reasons. Therefore, most children with anaemia get treatment for malaria and iron deficiency. Less commonly, anaemia is caused by chronic infection. The other causes of anaemia are uncommon.

#### Iron deficiency anaemia

- ◆ The bone marrow needs iron to make red cells. If the body is short

of iron, the marrow cannot make enough haemoglobin, and the child becomes anaemic.

- ◆ A child can get iron deficiency anaemia in three ways.
  - i. He may not eat enough iron in his food.
  - ii. He may be born with too small a store of iron in his body.
  - iii. He may bleed from his gut such as from hookworm infestation, or from an injury. Sometimes he has several of these causes at the same time.

#### Not enough iron in the diet

- ◆ Breast milk contains just enough iron for a baby in the first 6 months of life. After this the child needs to eat food which contains iron to keep her haemoglobin from falling. There is iron in meat, fish, eggs and dark green leafy vegetables (pumpkin tops, aibika). In the first two years of life, a child may not eat enough of these foods and so she gets iron deficiency anaemia.

#### Too small an iron store

- ◆ A normally healthy mother gives her baby a good store of iron before she is born. The iron is passed from the mother to the foetus through the placenta. The newborn baby needs this iron store because milk does not contain much iron. If she is born too early (pre-term baby), or if the mother is anaemic, she may not get this store of iron. Also, many babies start to eat food too late. So, a baby's first year is a dangerous time for iron



deficiency anaemia. Prevent it. Teach mothers to start giving their babies foods which contain iron when they are six months old.

#### Loss of iron in hookworm infestation

- ◆ Hookworms are a common cause of iron deficiency anaemia in children who are old enough to walk. They become infected by coming into contact with hookworm larvae on the ground. Hookworms live in the small gut and bite its wall with their mouths. From the bite of each worm a child loses about one drop of blood each day.
- ◆ A few hookworms cause very little bleeding, and no anaemia. The child's body can easily make a little more blood. But a child with a large load of hundreds of worms may lose more iron in the blood than she takes in by eating iron containing foods. So she gets iron deficiency anaemia. Well-nourished children eat plenty of iron in their food. So hookworms cause anaemia more easily in malnourished children. To find out how many hookworms a child has we can count the hookworm eggs (ova) in stools (faeces).

#### Anaemia caused by malaria

- ◆ Malaria destroys red cells. The anaemia may occur quickly (during a few days) in an acute attack of malaria with fever. In chronic malaria, the anaemia comes slowly over many weeks or months and the child usually does not have a fever. If the anaemia occurs quickly

or is severe, the child may require blood transfusion, as well as the other treatment for anaemia and malaria.



Figure 24 - Hookworm larvae going into a child's foot.

#### Anaemia caused by chronic infection

- ◆ Chronic infections are those that continue for many weeks or months. Chronic chest infections, tuberculosis, chronic urinary infections, osteomyelitis, and chronic diarrhoea are infections that may cause anaemia.

#### Treatment

##### Place of treatment

- ◆ Children with anaemia can usually be treated as outpatients. Only admit to health centre or hospital if the child:
  - i. looks very sick
  - ii. looks very pale
  - iii. has oedema
  - iv. feels dizzy when standing up
  - v. has some other illness that needs inpatient treatment.

##### Investigations



Whenever possible do:

1. Haemoglobin blood slide or rapid diagnostic test (RDT) for malaria
2. Stool for hookworm ova

#### Antimalarials

1. Give a full 3 days treatment course of antimalarials (see page 92).
2. Then give malaria prophylaxis each week (see page 94) for the next 3 months. This will give the child's body time to get back to normal.

#### Iron

- ◆ **Oral iron.** Iron and Folic Acid (Fefol) tablets should be given daily for 4 weeks. This will give enough iron for the child's haemoglobin and iron stores to return to normal

#### Dose of oral iron (Fefol Tablets)

Weight	
5-9.9Kg	1/4
10-19.9Kg	1/2
20-39.9Kg	1
40-49.9Kg	1 1/2

- ◆ Tell the parents to keep the tablets locked away. If a child swallows a lot of iron tablets at one time she could kill herself

#### Hookworm treatment

#### Albendazole

Weight (kg)	Dose
Under 10kg	1 tab once
10kg and over	2 tab once

If oedema is present, give Albendazole daily for 3 days.

#### Diet

- ◆ Encourage the mother to give protein foods (e.g. meat, fish, peanuts, wing bean) and protective foods (e.g. dark green leafy vegetables and fruit).

#### Blood transfusion

- ◆ Transfuse any child with a haemoglobin less than 3g/dl,
- ◆ Transfuse a child with a haemoglobin of 3-6 g/dl if she has:
  - i. Severe infection: severe pneumonia, severe acute malaria, meningitis, osteomyelitis or tuberculosis
  - ii. Or Heart failure (fast breathing, big liver and pulse rate over 160 per minute)
  - iii. Or Hypoxaemia (SpO<sub>2</sub> <90% measured by pulse oximetry)
  - iv. Or Kwashiorkor
- ◆ Remember: Even if you give a blood transfusion, you must still give antimalarials, Albendazole, and Fefol tablets (in dose shown on table on p. 103) after you have given the transfusion.

### Notes on Blood Transfusion:

- ◆ Give frusemide (Lasix) IV or IM at the beginning of the transfusion.
- ◆ Only use blood that has been properly grouped and cross-matched.
- ◆ Make certain the correct bag of blood is given to the patient, always check that the blood has been cross matched for that particular patient. Check the labels before taking the bag of blood from the blood Bank and before giving it to the child. It is always best to check that the bag is the correct one with a colleague.
- ◆ When giving blood at 20 ml or 25 ml/hour, try to use a paediatric measuring burette (Medical Stores Catalogue No. 5277) to measure the rate of the transfusion.
- ◆ Only remove a bag of blood from the Blood Bank refrigerator when you can start transfusing it immediately.
- ◆ Never put a bag of blood into the ward refrigerator.
- ◆ Never transfuse blood that has been out of the Blood Bank refrigerator for more than 6 hours.
- ◆ All patients receiving blood transfusions should receive antimalarials.

If the patient develops fever, skin rash or becomes ill:

- ◆ stop blood transfusion, and
- ◆ give promethazine IM, and
- ◆ contact a doctor.

You must follow all these instructions when giving a blood transfusion. The

patient may die if the transfusion is given incorrectly.

Table of blood transfusion:  
Frusemide dose and dose of Imferon

Weight	Volume packed cells	Rate of transfusion			Dose of IV Frusemide	Dose of IM Imferon ***
		ml/hour	Drops/min when using adult burette	Drops/min when using paediatric burette		
3 – 5kg	100ml *	20	5	20	½ ml (5mg)	1ml
6 – 9kg	150ml *	25	7	25	¾ ml (7.5mg)	2ml
10 – 14kg	250ml *	50	15	50	1ml (10mg)	3ml
15 – 19kg	400ml **	75	20	75	1 ½ ml (15mg)	4ml
20 – 29kg	500ml **	100	25	100	2ml (20mg)	6ml

\* Cross match 1 unit of packed cells

\*\* Cross match 2 units of packed cells

\*\*\* Give after the blood transfusion

## Response to anaemia treatment

After one month of the above treatment, the child's anaemia should have improved. She should not look pale and her haemoglobin should have increased. If the child's anaemia has not improved after one month of treatment, it means that either:

- ◆ The child has not received the correct treatment; or
- ◆ The child has an underlying infection, e.g. TB; or
- ◆ The child has an uncommon cause of anaemia.

If you are sure the child has been taking his medicine, but his anaemia does not improve after one month, then send her to hospital for further investigations.

## Some uncommon causes of anaemia

### Thalassaemia

- ◆ Thalassaemia is a chronic anaemia due to an inherited (genetic) abnormality of haemoglobin. It occurs most commonly in the children of parents who were born in the coastal provinces.
- ◆ The spleen is usually very large and the child has a bulging forehead with flattened facial features. These children will die of severe anaemia unless they get repeated blood transfusions. The body has no way of excreting iron. Every blood transfusion contains some iron.
- ◆ Children with thalassaemia require a great many transfusions to correct their anaemia. Each

transfusion puts extra iron into the child with thalassaemia.

- ◆ Too much iron is harmful to the body. Many children with thalassaemia die at the age of 10-15 years from iron poisoning, which affects their liver and heart. **Do not give iron medicines to a child with thalassaemia**, because he has already got enough iron.
- ◆ Give him weekly malaria prophylaxis and folic acid.

### Aplastic anaemia

- ◆ The bone marrow stops working and the blood cells are not made.
- ◆ Very occasionally, aplastic anaemia can be caused by chloramphenicol. So, chloramphenicol must only be used to treat people who really need it

### Leukaemia

- ◆ Cancer of the blood cells. The child usually has enlarged lymph glands, large liver and spleen, and bruises easily, as well as having anaemia.
- ◆ The child may have pain in the limbs, thickened discoloured gums, and look sick.

These uncommon causes of anaemia are not likely to be the cause of anaemia in the children you see. Usually, anaemia is caused by malaria, lack of iron in the diet, hookworms and infections. But if the child seems sick in any other way, consider these causes and try to discuss them with a medical officer.

## Chapter 15: Respiratory disease

Viruses and bacteria often infect a child's respiratory tract (system). Infections of the upper part of the respiratory tract are common but are usually not serious. Infections of the lower part of the respiratory tract are less common, but they can be very dangerous. More children, especially babies and young children die from lower respiratory infections than from any other disease.

Most children with an upper respiratory tract infection have cough as their most important symptom. Infection of the lower respiratory tract causes several other signs such as fast breathing and chest indrawing. All mothers can recognise a cough, but they may not recognise these other signs so easily.

In adults and children, TB is an important cause of a chronic cough. Other important symptoms of TB in children include losing weight, being less active than usual and being generally ill. These symptoms may be more important than chronic cough. This is why there is a special chapter for TB (chapter 17).

Lower respiratory infections are the most common cause of death in children.

### The respiratory system

When a child breathes, air goes from his nose into spaces inside his head called his nasal cavities. These make the air warm and wet (humidification). The air then goes into his **pharynx**, which is the back part of his mouth. If you ask an older child to open his mouth, and say "Ah", you can see his pharynx (throat). Below his pharynx is his **larynx (voice box)**. This is a narrow space through which air passes from pharynx to his lungs, and the larynx contains the vocal cords that move in and out and allow us to talk. From the outside the larynx is at the top of the front of the neck. There is a large tube below the larynx. This tube has strong walls made partly of cartilage and is called the **trachea** (windpipe). It takes air to the lungs. The **lungs** are two organs filled with air, one on each side of the chest. In the middle of the chest the trachea divides into two short thick tubes called the **right and left main bronchi**. One of the main bronchi goes to each lung and joins many smaller tubes called the smaller bronchi. The smaller bronchi join onto very small tubes called the **bronchioles**.

There is **smooth muscle** around the walls of the smaller bronchi and bronchioles. This smooth muscle can contract and make them narrower, or dilate to make them wider. The bronchioles take air to millions of small thin-walled sacs called alveoli, which are covered with capillaries (small blood vessels).

The tubes of the respiratory system are covered inside by thin wet tissue

called **mucosa**. Another kind of mucosa covers the inside of the mouth and the nose. The mucosa keeps itself wet by making mucus. The heart and lungs lie in a cage made of many curved bones called the ribs. Across the bottom of this cage there is a thin flat muscle called the **diaphragm**. The diaphragm is fixed to the inside of the lower ribs. It makes a wall across the body between the thorax (chest) and the abdomen.

There are two major types of breathing muscles that move the chest in and out: the **intercostal muscles** between the ribs, and the diaphragm. Each time a child breathes in (inspires) his intercostal muscles contract and ribs move outwards and this makes his

chest wider and the space inside his chest bigger. His diaphragm moves downwards at the same time, like the plunger of a syringe. A syringe sucks in air when you pull the plunger out. In the same way, as the ribs move up and out, and the diaphragm moves down, fresh air is sucked into the lungs. When the breathing muscles relax and a child breathes out (expires), his ribs move in, and his diaphragm goes up. The space inside his thorax gets smaller, and this pushes out waste air from his lungs. Normally we breathe in for a slightly longer time than we breathe out with each cycle of breathing – the breathing muscles contract and use energy to breathe in and relax to breathe out. That is why it usually takes a bit longer to breathe in than

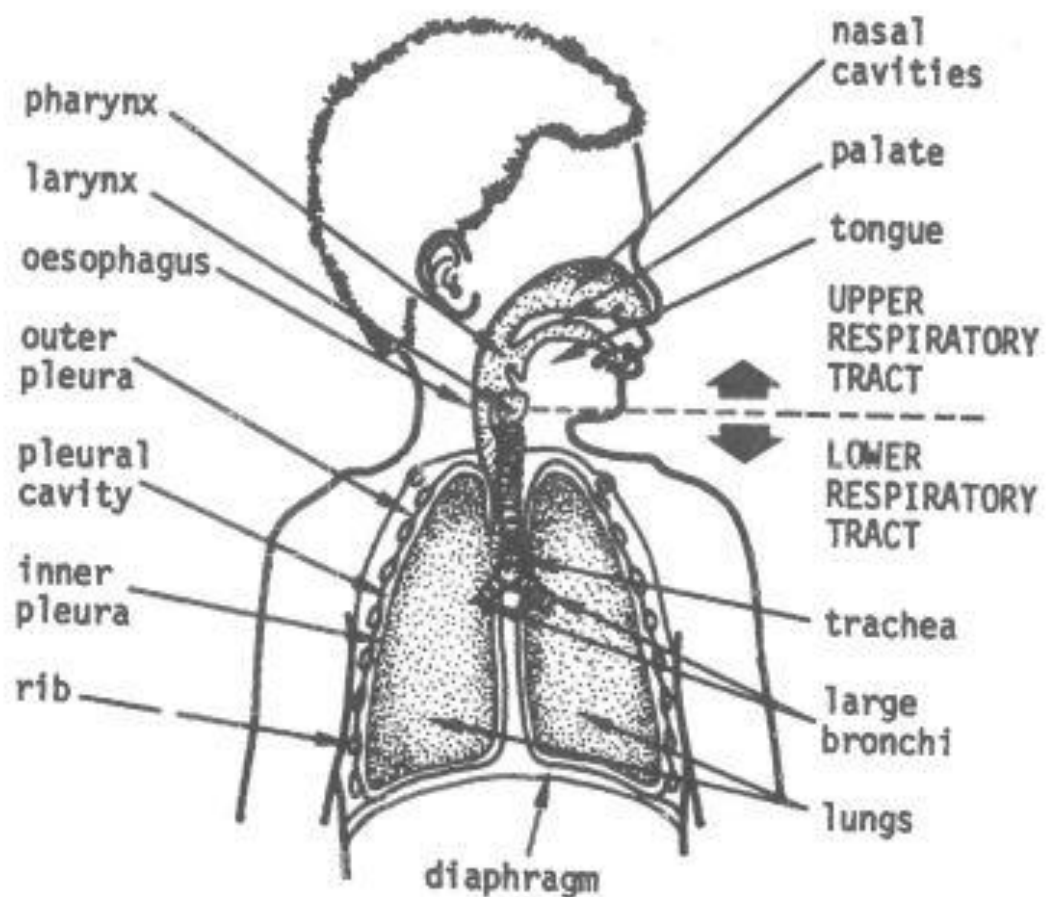


Fig 25 - The Respiratory System

breathe out. In some respiratory diseases it is the opposite, the child takes longer to breathe out than to breathe in.

The lungs are covered with very thin smooth tissue called the **pleura**. More of this tissue covers the inside of the ribs. The pleura around each of the lungs touches and slides over the pleura inside the ribs. The narrow space between these two layers of pleura is called the **pleural cavity**. There are two pleural cavities, one round each lung. They are empty, except for a few drops of fluid. Occasionally, when a lung is diseased, the pleural cavity around it fills with **pus (empyema)**, or with **clear fluid (pleural effusion)**.

#### Gases and blood in the respiratory system

- ◆ One of the gases in air is called oxygen. This makes up 21% (about 1/5) of the air we breathe. A child's body needs oxygen for every function of all his organs and cells. This gives her energy. She needs this energy to move and keep warm and for the proper functioning of all her organs.
- ◆ When her body cells turn food and oxygen into energy, another gas called carbon dioxide is made, which she breathes out. Oxygen goes into the blood and carbon dioxide goes out through the alveoli of the lungs. The walls of the alveoli are very thin. So the blood in the capillaries around the alveoli is very close to the air inside the alveoli. So oxygen in the air can

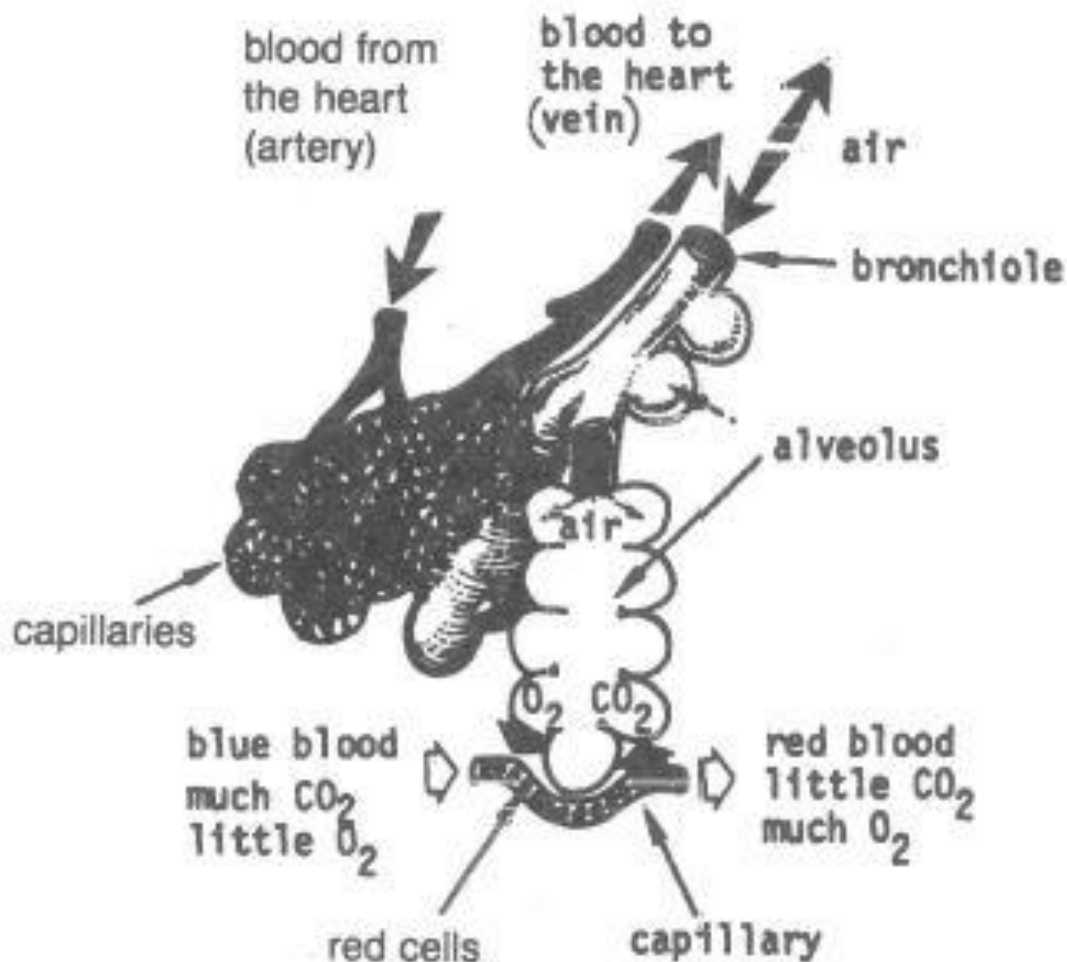
easily go into the blood. Carbon dioxide can easily go out of the blood in the air in the alveoli, and then up the bronchioles, bronchi and trachea through the larynx and pharynx to be breathed out (exhaled). Therefore, the air we breathe in contains oxygen (essential for all body energy), and the air we breathe out contains carbon dioxide (waste).

- ◆ Blood coming to the lungs is more blue because it has little oxygen. After it has been through the capillaries of the lungs it has plenty of oxygen, and it is red. If blood does not get enough oxygen while it goes through the lungs it stays blue. In many respiratory diseases because the alveoli are full of fluid or pus, not enough oxygen can get from the airways to the blood going away from the lungs, and this can make the child blue (cyanosed) and make the oxygen saturation ( $\text{SpO}_2$ ) low.
- ◆ Blood in the blood vessels makes some parts of the child's body pink or red. A healthy child has red lips, a red tongue, and red conjunctivae. The skin under his fingernails is also red, and the palms of his hands are pink. If his blood is more blue than normal, then those parts of his body, which should be red, become blue. He is cyanosed (blue).
- ◆ Cyanosis is a sign of hypoxaemia (not enough oxygen in the blood). The two important signs of hypoxaemia are cyanosis and restlessness (not lying quietly). Hypoxaemia can be measured using a pulse oximeter, a small machine



that measures the percentage (amount) of oxygen attached to haemoglobin in the arterial (red) blood (the  $SpO_2$ ).

- ◆ The  $SpO_2$  stands for the Saturation (%) of Oxygen ( $O_2$ ) in pulsed blood through small arteries. A small probe (clip) is attached to the child's finger and this can tell if a child is hypoxemic. The normal  $SpO_2$  is 97-100%, and in children with hypoxaemia the  $SpO_2$  is less than 92%. If the  $SpO_2$  is less than 90% they should receive oxygen.



**Figure 26 - How oxygen goes into the blood and carbon dioxide comes out**



Hypoxaemia usually happens because:

- ◆ Obstruction in the air passages prevents oxygen going into the alveoli, or Many of the alveoli are filled with pus (pneumonia) and have no air in them. Occasionally, cyanosis is caused by the heart not working well.

Cyanosis and hypoxaemia (low SpO<sub>2</sub>) is a very serious sign.

- ◆ Cyanosis and hypoxaemia shows that the heart or respiratory system are not working properly. Extra oxygen will help the child.

### How infections harm the respiratory system.

Viruses cause most respiratory infections. They infect the mucosa of the nose, trachea and bronchi. These primary (first) virus infections cause the mucosa to swell and make much mucus. The swelling of the mucosa and the extra mucus obstruct the flow of air through the tubes of the respiratory tract. Coughing is a sign that a child's lungs are trying to push out the mucus and clear the tubes. Bacteria grow more easily in mucosa which has already been harmed by viruses. This secondary bacterial infection causes pus to form and makes the disease worse. Unfortunately we have no drugs to treat a primary virus infection. But we have antibiotics to treat bacterial infection.

### How respiratory infections spread.

- ◆ When a patient with respiratory disease coughs, he spreads little drops of sputum into the air. The people who are very close to the patient breathe in this air which is not clean. This is how respiratory infections spread to other people. People, especially children, should not be allowed too close to patients who are coughing.
- ◆ Respiratory diseases spread by coughing and spitting. Do not cough or sit near other people.

### Infections of the upper and lower respiratory tract

- ◆ The upper respiratory tract is the part above the larynx. The lower respiratory tract is everything below the larynx. Diseases of the larynx and lower respiratory tract are dangerous because the tubes are narrower, and more easily blocked (obstructed).
- ◆ If the child's nose is obstructed, he can breathe through his mouth. But if his larynx, bronchi and bronchioles are obstructed, air cannot get into his alveoli. This makes him seriously ill.
- ◆ All the tubes in a baby's respiratory system are very narrow so respiratory infections are especially dangerous in babies. Low respiratory infections are especially dangerous in babies.

### Upper respiratory tract infections (URTI)

- ◆ Upper respiratory tract infections are common. They are usually caused by viruses. They spread from person to person. They cause fever, cough, running nose and a sore throat. The child may stop eating. URTIs usually last for a few days and get better without treatment.
- ◆ Sometimes, infection spreads below the larynx and causes pneumonia. Sometimes infection spreads to the middle ear and causes otitis media.
- ◆ Check every child with URTI for signs of pneumonia and otitis media.
- ◆ Both measles (see page 163) and pertussis (see page 160) may start with the signs of cough, fever and running nose.
- ◆ If there is no fever, explain to the mother that the cough gets rid of rubbish from the chest and throat.
- ◆ If the child has a high fever, treat for fever (see page 87). Examine the ears for otitis media, and treat this if it is present (see page 121).
- ◆ Immunisation. Remember to check to see if the child is due for immunizations. Measles vaccine should always be given if it is due even if there is a high temperature. Other vaccines, however, should not be given if the temperature is above 38°C. They should be given when the child is better.
- ◆ Health Education. Explain to the parents that they should come back if the child becomes short of breath or stops feeding or has a high fever.
- ◆ **Antibiotics should not usually be given** for a cold because they do not kill the viruses that cause colds. But if the nose discharge becomes thick and yellow or green and this thick mucus, cough *and* the child has a fever and all these symptoms last more than 3 days you can treat the child with amoxicillin for 5 days. If it is only thin discharge or slight yellow discoloration of mucus, or no fever or short duration, DO NOT give antibiotics. Viruses can last for 7-10 days, so often simple cough and nasal secretions can last that long and will get better without antibiotics.
- ◆ Clear secretions from the nose. Sometimes small babies may have difficulty feeding when the nose is blocked with secretions. If the secretions are watery, they may be gently absorbed on rolled up tissue

### The common cold

- ◆ Colds are quite common diseases in children. It is common for some children to have five or six colds each year.
- ◆ There is a watery discharge from the nose, sore throat, headache, and sometimes slight fever. The disease usually lasts 2-3 days.
- ◆ Often the nasal discharge becomes thick and yellow (purulent) and this may last for one week or more. Blocked nose due to a cold can cause a lot of trouble in young babies because they cannot breathe through the mouth.

### Treatment

paper applied to the nostrils. If the secretions are hard and crusted a cotton bud can be moistened with water and used to gently remove them.

## Influenza

Influenza is a virus. It is usually spread by infected droplets when an infected person coughs. Influenza often occurs in epidemics.

Symptoms and signs.

- ◆ Fever, malaise (feeling unwell), nausea (feeling like about to vomit), headache, vomiting, sore throat, sore eyes, muscle pains, cough and a watery nasal discharge.
- ◆ Influenza may last from three to ten days.
- ◆ Influenza sometimes causes pneumonia.

Treatment

Antibiotics are usually not needed as they do not kill viruses. But it is important to give antibiotic if pneumonia occurs.

1. Paracetamol or aspirin in children over 10 years of age
2. Plenty of oral fluids
3. Antibiotic if there is any sign of pneumonia. If there is an epidemic of influenza, teams of health workers go to villages and give antibiotic to everyone with influenza who has signs of pneumonia.

## Tonsillitis

Tonsillitis is an infection of the tonsils, which are lymph glands in the pharynx are at the back of the throat.

It can be caused by a number of different bacteria and viruses. Sometimes the Streptococcus bacteria is the cause of tonsillitis. This is why tonsillitis must be treated for 5 days with benzyl (crystalline) penicillin or oral amoxycillin. A 5 day course of penicillin or oral amoxycillin is needed to kill the streptococci.

This will prevent the child getting rheumatic fever (see page 155), or acute nephritis (see page 153).

Symptoms and signs

- ◆ The child with tonsillitis from bacterial infection has a fever and feels unwell. He may refuse to eat and he may vomit. Sometimes he may have abdominal pain.
- ◆ When you examine his throat, you see swelling and redness of the tonsils. Sometimes there will be pus on the tonsils. Usually, the tonsillar lymph nodes in the neck (see fig. 29) are enlarged and tender.

Treatment

1. Give paracetamol (or aspirin in children over 10 years of age), antimalarials and plenty of fluids to drink.
2. Give a 5 day course of benzyl (crystalline) penicillin, or oral amoxycillin 8 hourly for 5 days,

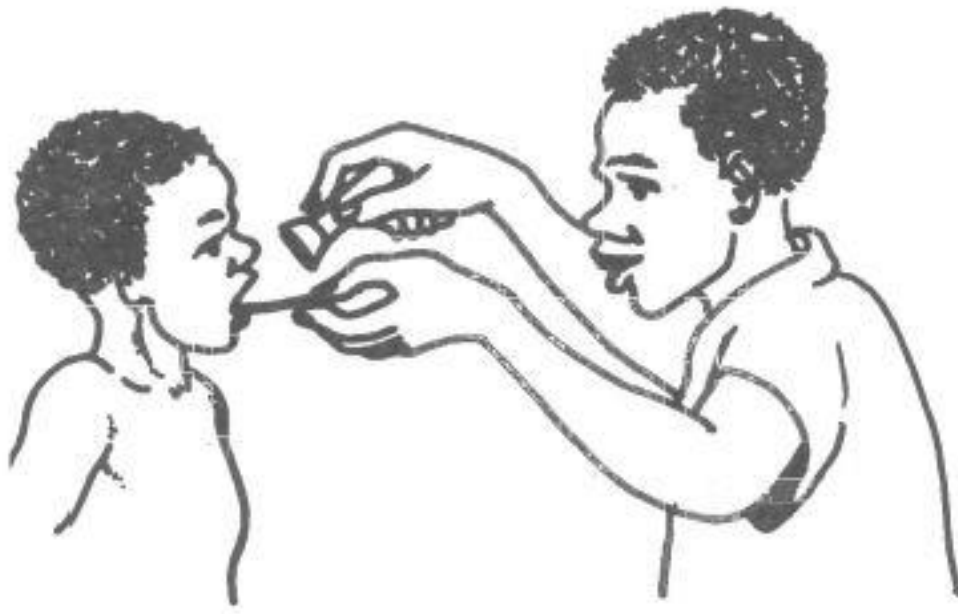


Figure 27 - Look inside the mouth at the tonsils.

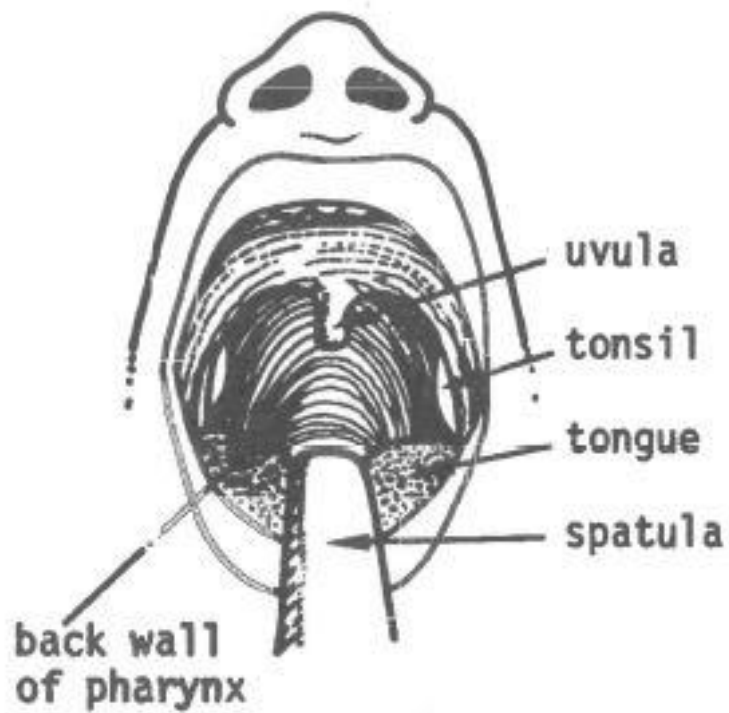


Figure 28 - What you see when you look inside the mouth.

## Cervical adenitis

Swelling and inflammation of the glands in the neck. This often comes with tonsillitis or otitis media. The glands are painful and swollen.

### Treatment

1. Do a Mantoux test (a skin test for TB) if you can.
2. Treat with amoxycillin as for tonsillitis. If no improvement after 2 weeks, suspect tuberculosis, and refer to a doctor for a fine needle aspirate biopsy (FNAB).
3. The ears and throat of every sick child must be examined.

### Caring for a child who has cough at the clinic or outpatients

- ◆ Very often children come to a clinic or outpatients with a cough. Usually the child has only a mild cough. But we must always check that he does not have something serious such as otitis media or pneumonia.
- ◆ If the child has high fever check for malaria if you can with a Rapid Diagnostic Test (RDT). Give antimalarials if the test is positive. If it is negative only give antimalarials if the child is very sick.
- ◆ Give immunizations if they are due. Measles vaccine should always be given no matter how high the temperature is. Other vaccines, however, should not be given if the temperature is above 38°C. They should be given when the child is better.

- ◆ Advise the mother to return if the child becomes short of breath.
- ◆ Most children with coughs don't need an antibiotic.



**Figure 29 - Feeling for the tonsillar lymph nodes.**

## Lower respiratory tract infections (LRTIs)

Diseases of the lower respiratory tract include:

- ◆ Obstructive laryngitis (croup)
- ◆ Bronchitis
- ◆ Asthma
- ◆ Bronchiolitis
- ◆ Pneumonia

Pneumonia is the most common of these diseases.

### Obstructive laryngitis (croup)

Infection of the larynx (voice box) by viruses or bacteria often spreads to involve the trachea and bronchi. This is then called laryngo-tracheo-bronchitis. Rarely obstructive laryngitis is caused by diphtheria (see page 168). A child's larynx is very narrow. So, when infection makes the laryngeal mucosa swell, the swollen mucosa is likely to obstruct (block) the larynx.

Symptoms and signs

- ◆ The illness usually follows a cold. Then, sometimes suddenly, the child develops a barking cough (croup). His breathing is noisy when he breathes in (stridor) because the larynx becomes smaller on inspiration. This may become worse and he may have difficulty breathing in. The ribs may suck in with each breath.
- ◆ In severe cases he may become cyanosed. Breathing may become so difficult that he suddenly stops breathing and dies.

### Treatment

1. Give chloramphenicol, and plenty of oral fluids.
  2. Give prednisolone (2mg/kg BD) orally, or dexamethasone (0.6mg/kg daily) IM or oral.
  3. Give adrenaline by nebulizer if the child has severe stridor or any one or more of the danger signs below.
- ◆ Steam or moist air sometimes helps the child breathe.
  - ◆ Do *not* give any sedatives (drugs that make a person sleepy). Sedatives may stop him breathing. Do *not* try to examine his throat. This may cause sudden laryngeal obstruction and stop him breathing.

Watch the child very carefully. Danger signs are:

- ◆ A rising pulse (pulse rate keeps increasing).
- ◆ Restlessness (not lying quietly)
- ◆ Pallor (looking pale).
- ◆ Increasingly rapid breathing
- ◆ Increasingly severe sucking in of the ribs (severe respiratory distress)
- ◆ Cyanosis (looking blue)
- ◆ Hypoxaemia (low SpO<sub>2</sub>) measured by pulse oximeter

If a child with obstructive laryngitis gets any one of these danger signs, you must give him oxygen, nebulised adrenaline, prednisolone or dexamethasone and urgently refer him to a doctor.

- ◆ He may settle with adrenaline and prednisolone, but if not, he needs a

naso-tracheal tube or tracheostomy. In a tracheostomy the trachea is opened, and a plastic tube is put into the trachea so that air can get in. Give oxygen while waiting for naso-tracheal intubation or tracheostomy to be done by a doctor.

- ◆ To give Nebulised adrenaline, put X ml of adrenaline into 2 mls of normal saline in the nebuliser and use the mask.

### Bronchitis (wet cough)

Bronchitis is an infection of the bronchi caused by viruses or bacteria. It may lead to pneumonia or to chronic wet cough. It may also follow worm infections.

#### Symptoms and signs

- ◆ Bronchitis nearly always follows a cold. The child has a cough and may wheeze.
- ◆ In severe cases there may be rapid breathing. Rhonchi (whistling noises) are heard over the chest with the stethoscope.

#### Treatment

- ◆ Amoxicillin oral fluids and broncho-dilators if there is wheezing in children older than 18 months (see asthma).

### Asthma

- ◆ Asthma usually starts with a cough and a discharge of mucus from a child's nose. His breathing becomes difficult and noisy. His cough gets

worse, he becomes irritable and restless, and he begins to wheeze.

- ◆ The smooth muscle around his smaller bronchi contracts. The bronchial mucosa swells. Both these things make the space inside his bronchi narrower, so that air has difficulty going in and out. They make the child wheeze and make his breathing difficult and uncomfortable (a symptom called dyspnoea). The bronchi get narrower on breathing out (expiration). So breathing out is more difficult for the child with asthma or bronchitis than breathing in. The child with asthma will wheeze more on breathing out than on breathing in. If a virus infection of the bronchi triggers (sets off) the episode of asthma, the child often has fever.
- ◆ A child's bronchi can become allergic (react abnormally) to small pieces of protein from animals and plants. This causes asthma. These small pieces of protein are in dust and go into the air he breathes. They are harmless to most children, and only some children are allergic to them. There is no fever in this kind of asthma, but all the other signs are the same. Some children wheeze and get asthma when they run or play sport.
- ◆ Some children get asthma and bronchitis when they are exposed to smoke from indoor fires, or cigarettes, dusty environments or infectious particles (such as fungi in soil or mould in the house).
- ◆ Some children have one or two attacks of asthma and then never



have asthma again. Other children have many attacks and are "asthmatic". Don't say a child is asthmatic until he has had several attacks, because, if this is his first attack, he may never wheeze again.

- ◆ Children less than about a year old do not have asthma, because they do not have enough smooth muscle around their bronchi. Children who are going to be asthmatic usually get their first attack when they are about one or two years old. They usually become fewer as they grow older. Wheezing in a child over 18 months of age is usually due to asthma. If the child is less than 18 months of age, bronchiolitis (see page 114) is more likely.

#### Treatment

- ◆ A child with asthma needs treatment with drugs which will open up (dilate) his narrowed bronchi. These drugs are called bronchodilators.

There are two groups of drugs which are used in Asthma

- ◆ **Bronchodilators** - this group includes salbutamol (Ventolin), and adrenaline. These drugs act to relax the muscles lining the airways. Aminophylline is not as safe to use as salbutamol and should only be given if you do not have salbutamol or if the child is not improving with salbutamol.
- ◆ **Corticosteroids** – prednisolone or dexamethasone. These drugs act to reduce the swelling and airway narrowing caused by the

inflammation that is part of asthma.

When treating asthma, use one drug from each group, i.e. a bronchodilator drug (salbutamol) and a corticosteroid.



### Treatment of mild asthma.

Oral salbutamol (Ventolin)

- ◆ Each tablet of salbutamol contains 4 mg
- ◆ Give this dose 4 times a day.

Dose:

Weight (kg)	Dose
6 -14kg	$\frac{1}{4}$ tablet
15 - 29kg	$\frac{1}{2}$ tablet
30kg or more	1 tablet

Oral Aminophylline.

- ◆ This should only be used if you have no Salbutamol inhalers or tablets.
- ◆ Aminophylline tablet contains 100 mg.
- ◆ Give this dose 4 times a day.

Dose:

Weight (kg)	Dose
6 - 9kg	6 ml elixir or $\frac{1}{4}$ tablet
10 - 14kg	10 ml elixir or $\frac{1}{2}$ tablet

15 - 19kg	15 ml elixir or $\frac{3}{4}$ tablet
20 kg or more	1 tablet

### Treatment of severe asthma.

If the child is very sick or does not start to improve in 12 hours, send him to health centre or hospital.

1. Intranasal oxygen at 1 litre/minute
2. Nebulised Salbutamol (Ventolin) Respirator Solution, 0.5%

With a nebuliser, Salbutamol (Ventolin) Respirator solution can be given through a face mask every 3 hours. In severe cases it can be given every 2 hours or every hour.

Dose:

Weight (kg)	Dose
Under 9 kg	$\frac{1}{4}$ ml nebulising solution in $1\frac{3}{4}$ ml sterile water or normal saline
9 kg and over	$\frac{1}{2}$ ml nebulising solution in $1\frac{1}{2}$ ml sterile water or normal saline

If nebulised salbutamol (Ventolin) is not available, you will have to use

salbutamol (Ventolin) tablets 4 times a day instead. Use the same dose as for mild asthma.

1. **Prednisolone**, 1mg/kg twice a day orally until the child has improved, then give 1mg/kg daily to complete a 5 day course if the asthma was severe.
2. **Set up an intravenous drip.** Use glucose-saline or Hartman's solution.

Drip rate:

Weight (kg)	Drip rate (using an adult burette) *
6 - 9kg	25 ml/hour (7 drops/minute)
10 - 14kg	50 ml/hour (13 drops/minute)
15kg or more	75 ml/hour (20 drops/minute)

**Note:** Use a paediatric burette if you have one. If using a paediatric burette, the number of ml per hour equals the number of drops per minute (25 ml per hour = 25 drops per minute)

I.V. Aminophylline.

- ◆ Only give this if the child is not improving with Salbutamol
- ◆ Each I.V. aminophylline ampoule contains 25 mg/ml (250 mg/10 ml). **Do not use 0.5 g/2 ml ampoule of aminophylline.** Every 6 hours put

the dose of aminophylline into the burette and give it over one hour.

- ◆ If you do not have a burette, inject the aminophylline intravenously slowly over at least 15 minutes every 6 hours.

The dose is 0.2 ml/kg (5 mg/kg).

Weight (kg)	Dose
6 - 9kg	1½ ml (37.5 mg)
10 - 14kg	2 ml ( 50 mg)
15 - 19kg	3 ml ( 75 mg)
20 - 29kg	4 ml (100 mg)
30 - 49kg	6 ml (150 mg)

Remember I.V. Aminophylline is dangerous:

- ◆ Do *not* give IV aminophylline if the child has already had aminophylline in the last 4 hours.
- ◆ Weigh the child carefully and give the right dose slowly.
- ◆ Stop giving aminophylline if the child gets a headache or starts vomiting.
- ◆ Do *not* give IM aminophylline to children. It is very painful and likely to cause an abscess.
- ◆ Do *not* give rectal aminophylline (aminophylline suppository) to

children. It is dangerous and unreliable.

#### a. Penicillin

If the temperature is more than 38°C give benzylpenicillin (crystalline) every 6 hours. This can be given intravenously while the child is having an intravenous drip.

When the child improves, stop the IV fluids, and change to oral salbutamol, and amoxycillin (if the child was receiving IV benzyl penicillin).

### Bronchiolitis

- ◆ Babies less than 18 months old have a disease of their own called bronchiolitis. Bronchiolitis is a common acute lower respiratory disease in young children in PNG, as in all countries. This causes wheezing and sucking in of the ribs. In bronchiolitis the child has the signs of bronchitis (wheeze) plus lots of crepitations (crackles) and rhonchi (musical sounds) in the lungs when you listen with a stethoscope. Some infants with bronchiolitis also have pneumonia.
- ◆ Bronchiolitis is caused by a virus. It needs different treatment from bronchitis or asthma.
- ◆ Antibiotics do not kill the virus, but they may kill the bacteria causing a secondary infection. Babies have very little muscle round their bronchi and bronchioles, so sympathomimetic drugs usually do not help.
- ◆ If a child with bronchiolitis just has fast breathing and looks well, does not have a high fever, is feeding

well and alert, then no antibiotics are needed. However if the child has chest indrawing, high fever, or looks unwell, the treatment is the same as for pneumonia (see page 116). It is important to give oxygen if the baby is cyanosed or restless, or has hypoxaemia (SpO<sub>2</sub> less than 90%) when measured by a pulse oximeter.

- ◆ Nebulised salbutamol should NOT be given because it can make the child worse. However, nebulised normal saline can help to loosen the secretions and improve the child's breathing. A dose of 2mls can be given every hour for 3 doses.

### Other diseases that can cause wheeze

#### Worm larvae

- ◆ Worm larvae travelling through the lungs can cause an asthma-like illness (see page 80).

#### Inhaled foreign body

- ◆ If a piece of food or foreign body, e.g. coffee bean, peanut, seed, goes into a child's larynx, it causes sudden respiratory obstruction called choking. Usually, he coughs the food or foreign body out or swallows it. Sometimes it goes through his larynx into one of his bronchi. A foreign body in the bronchus is easy to diagnose if his mother saw him choke. But it is difficult if she did not see him choke.

- ◆ Think of a foreign body if you see a child with sudden severe coughing, wheezing, and cyanosis. Sometimes a child is well for a few hours or days and then has another sudden severe coughing attack. This is called the "silent interval" (time without coughing) and is useful for diagnosis.
- ◆ A foreign body is very dangerous. It obstructs a bronchus, and can cause collapse of the lung or pneumonia due to secondary infection. Foreign bodies can only be removed in hospital with a bronchoscope. If you suspect a child has inhaled a foreign body, give penicillin and transfer to a doctor.

#### Tuberculosis

- ◆ TB can cause wheezing if the lymph glands in the chest press on one of the bronchi (see Chapter on Tuberculosis).

#### Pneumonia

- ◆ In PNG pneumonia is the commonest cause of admission and death for both children and adults.
- ◆ Pneumonia is an acute infection of the lungs. Bacteria usually cause it, but some cases are caused by viruses. Pus forms in some of the alveoli, so that air cannot go to them, and oxygen cannot get into the blood.
- ◆ Pneumonia usually begins with an infection of a child's upper respiratory tract, such as a cold or measles. Then this infection spreads down into his lungs and

bacteria attack the inflamed part of his lungs. He has fever and becomes unwell.

- ◆ His pleura becomes inflamed. This makes his breathing painful, so that it is more shallow than normal. He also breathes faster than normal, which is very useful for diagnosis. If a child under the age of 1 year has a respiratory rate of more than 50 breaths a minute, or if the respiratory rate is greater than 40 per minute in a child older than 1 year he probably has pneumonia. As the pneumonia gets worse, the breathing becomes faster, and if it is very bad his breathing may slow, and he becomes cyanosed. He may grunt with every breath as he is trying to prevent his lungs from collapsing.
- ◆ The respirations in pneumonia are fast and shallow

#### Symptoms and signs

- ◆ **Fever.** While most children with pneumonia have fever, some have a normal temperature.
- ◆ **Cough.** Any child with a cough should be examined for other signs of pneumonia.
- ◆ **Fast shallow breathing.** A healthy child breathes slowly when he is quiet or asleep. When he is agitated or distressed, cries or moving about, he breathes faster. He also breathes faster when he has a disease of his lungs, especially pneumonia. The number of breaths he takes during one minute is called his respiratory rate. An increased respiratory rate is a very useful sign. But you must count it

before a child becomes agitated, cries or starts moving about.

A young child normally has a respiratory rate less than 50.

- ◆ A child's normal respiratory rate depends on his age. As he gets older, he breathes more slowly. A healthy adult breathes about twenty times a minute, he has a respiratory rate of about 20. A healthy sleeping newborn baby has a respiratory rate of about 40. Faster rates than this are abnormal in a quiet child.
- ◆ Lower respiratory tract diseases are the commonest cause of fast breathing. But dehydration, or severe anaemia, or any high fever can cause fast breathing. If a child less than a year old has cough and a respiratory rate above 50 when he is quiet, or if an older child has a respiratory rate above 40 he probably has pneumonia or bronchiolitis.

A respiratory rate more than 40 in a quiet child suggests pneumonia.

- ◆ **Sucking in of the ribs (chest indrawing).** A young child's lower ribs are soft and can bend easily. The edge of his diaphragm is fixed to them inside. If his pneumonia is severe, his diaphragm has to contract very strongly each time he breathes in. This pulls in his whole lower chest, as well as the skin between his ribs. His chest looks as if a string has been tied tightly round it each time he breathes in.
- ◆ **Flaring of the nostrils.** The sides of the nose dilate and move out when the child breathes in. This is an attempt to breathe in more air.
- ◆ **Grunting respirations.** As the child breathes out he makes a soft noise like a pig, sometimes it sounds like he is making a short cough at the start of each breath out (grunts). He does this to try to stop small parts of his lungs from collapsing on exhalation.
- ◆ **Head nodding.** Like grunting on exhalation, the child's head bobs forward with every breath out, and is a sign of the effort the child is making to breathe. It is a sign that the child is very ill.
- ◆ **Cyanosis** is a sign of hypoxia (not enough oxygen). They tell us that the child has severe pneumonia. This can be checked using a pulse oximeter: dangerous hypoxaemia and cyanosis exists if the SpO<sub>2</sub> is less than 90%.
- ◆ **Crepitations** (sometimes called crackles). When you listen with a stethoscope to a child with pneumonia, you can often hear crackling noises. These crackling noises sound a bit like crumpled paper being rubbed between your fingers. These crackling noises are called crepitations. They are caused by the fluid in the alveoli and bronchioles as air moves in and out. However, often the young child cries. Then you cannot hear any crepitations. All you can hear are his cries. Sometimes you will also hear "bronchial breathing" if there is severe pneumonia, which sounds like sandpaper being

rubbed together. Sometimes you will not hear any air going in one side of his chest, if the child has a large effusion or empyema (fluid in the pleural cavity). The best way of diagnosing pneumonia is to carefully watch the child breathe and look for all the above signs.

## Summary of diagnosis and treatment of pneumonia

### Mild pneumonia

- ◆ *Cough and fast breathing* (over 50/min. at rest in a child less than 1 year or over 40/min in an older child) with no sucking in of the ribs (chest indrawing).
- ◆ Check for danger signs (severe pallor, grunting, head-nodding, and cyanosis), check for severe malnutrition, and check the SpO<sub>2</sub> by pulse oximetry if you can. If the SpO<sub>2</sub> is greater than 90% and the child does not have any danger signs or severe malnutrition, treat the child as an outpatient.
- ◆ Give oral Amoxycillin T.D.S. for 5 days, and carefully explain to the mother the reasons she should return.

### Moderate pneumonia

- ◆ *Cough and sucking in of the ribs (chest indrawing)*. With or without fast breathing. Check for danger signs (severe pallor, grunting, head-nodding, and cyanosis), check for severe malnutrition, and check the SpO<sub>2</sub> by pulse oximetry if you can. If the child has any of these signs this indicate severe pneumonia. If

the child does not have any danger signs or severe malnutrition, treat as moderate pneumonia. Initially admit the child to health centre or hospital.

- ◆ Give benzyl (crystalline) penicillin IM or IV every 6 hours for 5 days. If the SpO<sub>2</sub> is less than 90% give oxygen. But if the child improves in the next 1-2 days he can be discharged on oral amoxicillin if you are confident that the mother will give it at home.

### Severe pneumonia

As well as cough and difficult breathing with sucking in of the ribs (chest indrawing) the child is:

- ◆ too sick to feed properly, or
- ◆ has cyanosis, or
- ◆ has heart failure (big liver and pulse over 160 per minute).

Children with severe pneumonia often have danger signs: pallor, grunting, head-nodding, and hypoxaemia (low SpO<sub>2</sub> less than 90%). These children need urgent treatment.

## Complications of pneumonia in children

Complication	Sign	Treatment
Hypoxia	Cyanosis Restlessness Low SpO <sub>2</sub> using pulse oximetry	Oxygen
Too weak to feed	Not sucking	Nasogastric feeds
Heart failure	Fast pulse (more than 160/minute) AND Enlarged liver (more than 2 cm)	Digoxin and Frusemide
Pleural effusion or Empyema	Dull chest when percussed No air entry on one side of the chest with stethoscope No improvement with treatment	Transfer to hospital

## Treatment

- ◆ Admit the child to health centre or hospital.
- ◆ Antibiotics: IV benzyl (crystalline) penicillin plus gentamicin or IM chloramphenicol.
- ◆ Give oxygen.
- ◆ Treat the other complications (heart failure, not feeding).

## Treatment of mild pneumonia

1. Treat the child as outpatient.
2. Give oral amoxicillin daily for 5 days.

If there is sucking in of the ribs, admit to health centre or hospital.



Figure 30 - Pneumonia in babies is diagnosed by looking

Amoxicillin tablets or Suspension  
T.D.S. for 5 days

Weight (kg)	Dose
3 - 9 kg	½ tab or 2 ½ ml
10- 14 kg	¾ tab or 5 ml
15 - 19 kg	1 tab or 7 ml
20- 39 kg	1 ½ tab or 10 ml

3. If the child has a fever do an RDT for malaria if you can. If it is positive give antimalarials. If it is negative or you are not able to do a RDT and the child is not very sick, do not give antimalarials. Admit to hospital or health centre and treat for moderate pneumonia if:
  - i. There is sucking in of the ribs, or
  - ii. There is no improvement after 2 days with outpatient treatment.

## Treatment of moderate pneumonia

1. Admit to hospital or health centre.
2. Give benzyl (crystalline) penicillin IM or IV every 6 hours until improvement occurs (usually 2-5 days), then change to oral amoxicillin.

To mix benzyl penicillin: Add 2 ml sterile water to 1 000 000 units (600 mg) vial.

Dose of benzyl penicillin:

Weight (kg)	Dose
3 - 9 kg	½ ml (250 000 units or 150 mg)
10 - 19 kg	1 ml (500 000 units or 300 mg)
20 - 29 kg	1 ½ ml (750 000 units or 450 mg)



30 kg or more	2 ml (1 000 000 units or 600 mg)
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When the child looks better, change to Amoxycillin **tds**. Use the same doses of Amoxycillin as for mild pneumonia. Continue Amoxycillin **tds** for 5 - 10 days.

- ◆ Only give Antimalarials if an RDT is positive or if the child is very sick.
- ◆ Keep the child's airway clear. Suck out the nose gently when necessary to clear the airway.
- ◆ Oxygen if the SpO<sub>2</sub> measured by pulse oximeter is less than 90%.
- ◆ Check the child at least twice a day. If there is no improvement after 24 hours or if the child becomes too sick to feed, or gets cyanosis, or restless, or heart failure, you must treat the child for severe pneumonia.

### Treatment of severe pneumonia

Children less than one month old, treat as Neonatal septicaemia (see page **54**).

Children more than one month old, treat as follows:

1. Admit to hospital or health centre.
2. Suck out the nose gently when necessary to clear the airway.
3. Give oxygen at 2 litres per minute if the child is restless or cyanosed or drowsy or grunting

or in heart failure, or if the SpO<sub>2</sub> measured by pulse oximetry is less than 90%.

4. Give benzyl (crystalline) penicillin and gentamicin OR chloramphenicol IV or IM for at least 10 days.

To mix IM chloramphenicol

- ◆ Add 4 ml sterile water to 1 gram vial of chloramphenicol.

**Dose:** 25 mg/kg every 6 hours. Maximum dose for children is 600 mg every 6 hours.

Weight (kg)	Dose
3 - 4 kg	100 mg (½ ml)
5 - 6 kg	150 mg (¾ ml)
7 - 9 kg	200 mg (1 ml)
10 - 14 kg	300 mg (1 ½ ml)
15 - 19 kg	400 mg (2 ml)
20-29 kg	500 mg (2 ½ ml)

- ◆ When the child has no fever and looks better (usually after 2 to 5 days), change to oral chloramphenicol every 6 hours.

**Chloramphenicol suspension** contains 25 mg/ml (125 mg/5ml).

- ◆ The dose for young children is 1 ml (25 mg) per kg given every 6 hours.
- ◆ For older children use chloramphenicol capsules, which contain 250 mg.

#### Dose of oral chloramphenicol

Weight (kg)	Dose
3 - 4 kg	100 mg (4 ml) suspension
5 - 6 kg	150 mg (6 ml) suspension
7 - 9 kg	200 mg (8 ml) suspension
10 - 14 kg	300 mg (12 ml) suspension or 1 capsule (250 mg)
15 - 19 kg	375 mg (15 ml) suspension or 1 capsule (250 mg)
20 - 49 kg	500 mg (2 capsules)

If the child vomits up the oral chloramphenicol, or will not take it,

change back to giving intramuscular chloramphenicol.

If you do not have any IM chloramphenicol, give benzyl (crystalline) penicillin as for moderate pneumonia and oral chloramphenicol. Contact your PHO to obtain supplies of IM chloramphenicol.

If the child does not start to improve transfer the child urgently to hospital.

- ◆ **Antimalarials** should only be given if an RDT is positive- or if the child is very sick.
- ◆ Digoxin for heart failure.

In children under 2 years of age, if the heart rate is more than 160 per minute and there is a big liver, give digoxin (Lanoxin) elixir.

**Digoxin elixir** contains 50 micrograms/ml.

- ◆ The dose is 25 micrograms (1/2 ml) /kg every 6 hours **for 3 doses**.
- ◆ Do not give a dose more than 5 ml (250 micrograms).

#### Doses of Digoxin

Weight (kg)	Dose
3 - 5 kg	2 ml (100 micrograms)
6 - 9 kg	3 ml (150 micrograms)

10 - 14 kg	5 ml (250 micrograms)
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If the child under 2 years is still in heart failure after these 3 doses of digoxin, give a maintenance dose of digoxin (Lanoxin) elixir daily, starting 24 hours after the last dose.

Maintenance dose of digoxin

Weight (kg)	Dose
3 - 5 kg	1ml (50 micrograms)
6 - 9 kg	1 ½ ml (75 micrograms)
10 - 14 kg	2 ½ ml (125 micrograms)

### Other treatment options

1. **Bronchodilators for wheezing.** If wheezing is present in a child older than 18 months give nebulised salbutamol (Ventolin) every 4 hours, or salbutamol (Ventolin) tabs 4 times a day for 24 hours, or until the child improves (see page 112).
2. **Blood Transfusion.** If the child has a haemoglobin less than 6 g/dl, give a blood transfusion of packed red blood cells if you can (see page 102).
3. **Plenty of fluids.** Fast breathing, fever and not drinking can quickly

make the child dehydrated. If the child has any signs of dehydration encourage the mother to give the child plenty of fluids.

4. **Many children with severe pneumonia do not have dehydration** and giving excess fluids can make their lungs wet. Avoid giving intravenous fluids to children with severe pneumonia.
5. If the child is too weak to drink you will have to give him fluids by nasogastric tube.

Sometimes children with severe pneumonia also have meningitis. Always check the child for neck stiffness. If this is present, treat the child for meningitis with Ceftriaxone instead of penicillin and Gentamicin if you have it available.

### Signs of improvement (getting better)

- ◆ Temperature falls to normal
- ◆ Child is happy, plays and starts to eat and drink
- ◆ Respiratory distress settles and other symptoms and signs improve
- ◆ Hypoxaemia resolves (SpO<sub>2</sub> will be above 90% measured by pulse oximeter)

If a child with pneumonia has the right treatment, he should start to improve (get better) in 2-3 days.

If he does not start to improve after 2-3 days, or if he becomes worse, you must ask yourself these 3 questions:

1. Has he been getting his medicine?

The commonest reason for patients not improving is that they have not received their treatment.

2. Has he got another disease?

He may have another disease as well as pneumonia, e.g. meningitis, or severe anaemia. Or he may have another disease that looks like pneumonia, e.g. tuberculosis, or congenital heart disease or an inhaled foreign body.

3. Has he got a lung complication of his pneumonia? Lung complications of pneumonia include:

- ◆ Pleural effusion (fluid in the pleural cavity)
- ◆ Empyema (pus in the pleural cavity)
- ◆ Pneumothorax (air in the pleural cavity)
- ◆ Lung abscess

If the chest is dull on percussion, or you can hear with a stethoscope the air going in and out of the lungs only on one side, the child probably has a pleural effusion or an empyema. Children with lung complications need chest X-rays and further treatment by a doctor.

- ◆ So, send these children who do not start to improve after 2-3 days of treatment to hospital for further investigations and management.
- ◆ Also send to hospital those children who are not *completely better* after 2 weeks of treatment.

## Prevention of respiratory infections

- ◆ Protect children from cold and wet and damp conditions. Protect children from cigarette smoke and smoke from open fires, especially inside houses where there is poor ventilation.
- ◆ Improve housing, with less overcrowding, especially of the sleeping arrangements. Make sure bedding is clean.
- ◆ Improve nutrition. This will increase the child's general resistance to infections.
- ◆ Immunizations with pentavalent vaccine and pneumococcal vaccine to protect against whooping cough and pneumonia. BCG to protect against tuberculosis, and measles vaccine to protect against measles.
- ◆ Encourage adults who have had a cough with spit for more than a month to be examined for TB.

Many children die from pneumonia. Pneumonia can make the child's nutrition worse. Sometimes pneumonia can permanently harm the child's lungs.

## Chapter 16. Ear diseases

Ear disease is common in young children. Many children have an infection of the middle ear called acute otitis media. If this is not treated properly, the child's ear may discharge a lot of pus. When this continues for some weeks it is called chronic otitis media. Children with otitis media may develop a high fever and febrile convulsions. They can also develop mastoiditis or meningitis or cerebral abscess or permanent deafness. Chronic ear infection is a common cause of deafness, and if a child is deaf her speech development will be delayed, and she will have difficulty learning new things in school. So ear disease is very important in children.

### Normal ear

Figure 31 shows the three parts of the ear – the outer, middle, and inner ear. The **outer ear** is the part of the ear on the outside of the head (the pinna), and the 'ear hole' or meatus. The **meatus** is the tube which connects the outer ear and the middle ear. In an adult is about 2.5 cm (1 inch) long but it is shorter in children. The opening of the meatus is wide, and the next part is narrower. Further in the meatus becomes wide again. At the end of the meatus is the **ear drum**. This is like an ordinary drum because it is made of tight skin with air on both sides. The air in the meatus is outside the drum. Inflammation of the outer ear is called otitis externa.

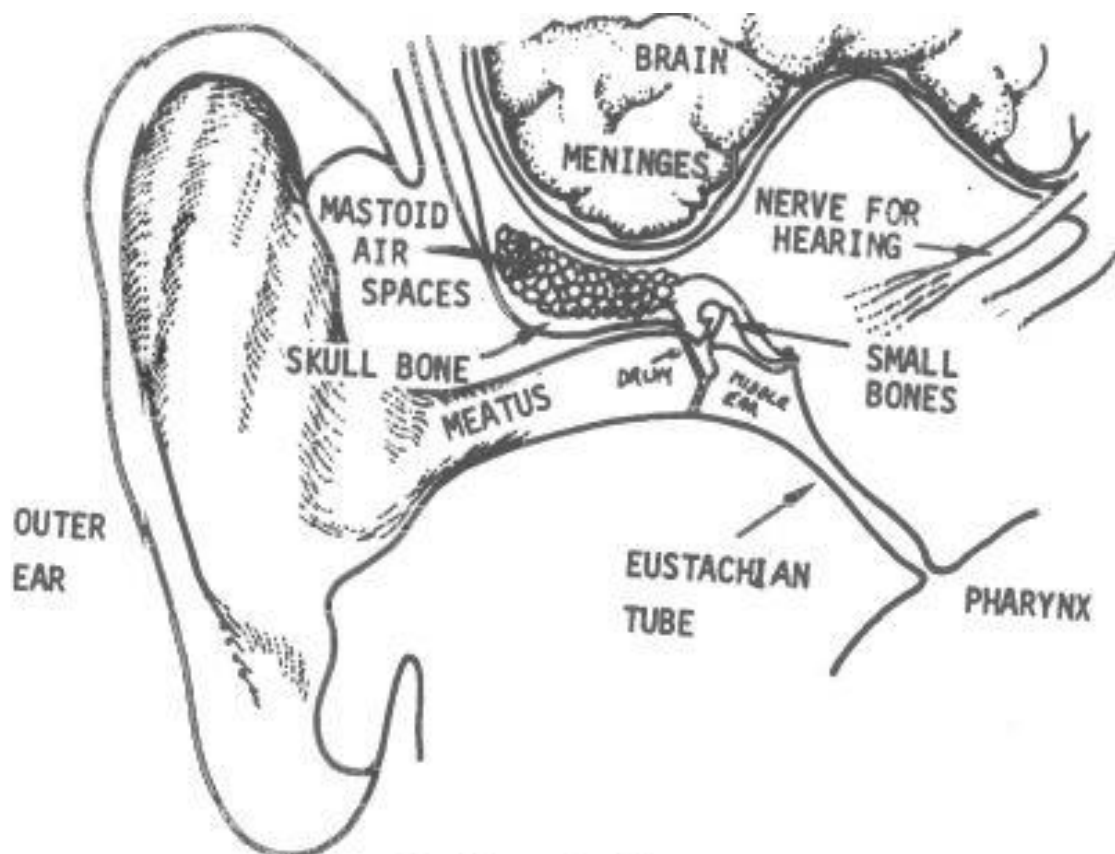


Figure 31 - The parts of the ear.

The **middle ear** is a small space filled with air within the bone of the skull. The walls of the middle ear are covered with thin mucosa. Inflammation of the middle ear is called otitis media. The **inner ear** is deeper inside the skull. It is seldom diseased in children.

There is a small bone in the drum called the **malleus**. Sound causes very small movements in the air the soundwaves - and these movements in the air travel down the meatus to the ear drum. They move the drum and the malleus. Two other small bones (the **incus and stapes**) take the movement to the inner ear. A nerve then takes the sound as nerve impulses to the brain so we can understand what we are hearing.

An inner tube called the **Eustachian tube** takes air from the pharynx to the middle ear. It also drains (removes) fluid from the middle ear. When a child swallows, his Eustachian tubes open and let air go into his middle ears. When you swallow you can hear your own Eustachian tubes opening.

As a child grows, small spaces filled with air grow into the bone from the back of his middle ears. These are the **mastoid air spaces**. They are in the mastoid bones which you can feel as bony swellings behind the ears.

On the inside of the middle ear is the bone which contains the inner ear. The roof of the middle ear is made of thin bone, and on top of this is the brain. The Eustachian tube comes into the front of the middle ear. The mastoid

air spaces join onto the middle ear from behind. The **ear drum** is between the outer and middle ear

The normal ear drum

- ◆ You need an auriscope to examine the ear drum of a child. See page **282** for how to examine a young child's ear drums. When you look into a normal meatus you see hairs, skin, and brown wax. At first you may not see the drum, especially in young children. So practise on adults and look at the ear drums of your friends.
- ◆ The normal drum has a slight bluish grey appearance. You should examine the ears of many children so that you will recognise the appearance of a normal ear drum.

## Otitis media

Infection of the middle ear often comes with an upper respiratory tract infection. Bacteria spread up the Eustachian tube from the pharynx.

Symptoms and signs

- ◆ There is usually fever. Older children may complain of earache, but babies pull or rub their ears or just cry.
- ◆ When you look inside the ear with an auriscope you see that the ear drum is red, or there is pus coming through a hole in the eardrum.
- ◆ Often the condition is not recognised until the drum has perforated (burst open) and pus is discharging from (coming out of) the ear.

If left untreated, the infection may become chronic leading to deafness.

#### Treatment of acute otitis media

- ◆ Amoxicillin tablets or suspension **t.d.s.** for 5 days.

Weight (kg)	Dose
3 - 9 kg	½ tab or 2 ½ ml
10 - 14 kg	¾ tab or 5 ml
15 - 19 kg	1 tab or 7 ml
20 - 39 kg	1 ½ tab or 10 ml

- ◆ If febrile do a Rapid Diagnostic Test or blood slide for malaria and treat if test positive (see page **89**).
- ◆ Paracetamol if the child has ear pain (see page **89**).
- ◆ If pus discharging, clean ear with tissue paper (see page 283)
- ◆ If the ear pain and fever are not improving after 3 days of amoxicillin, ask a paediatrician to review the child
- ◆ If pus is still discharging after one week of treatment, give cotrimoxazole (septrim) B.D. oral for 5 days (see page **267**).

**Examine the ears of every sick child.**

## Chronic Otitis media

Sometimes a child has a discharging ear for more than two weeks. This is chronic otitis media. The ear will only heal when it is kept dry.

#### Treatment of chronic otitis media

1. Clean the pus out of the ear with tissue (toilet) paper to dry the ear (see page **283**). It is important that you show and teach the parent how to do this.
2. After the pus has been cleaned out of the ear, put 1 or 2 drops of boric acid in alcohol ear drops into the ear if it is available (see page **283**). This will kill the bacteria and help dry the ear. Again, it is important that you show and teach the mother how to do this.
3. Explanation and education of the parents.

#### **Sending the patient home**

- ◆ The hole (perforation) in the ear drum will not heal unless the pus is removed many times a day, and the ear is kept dry.
- ◆ So, it is most important that you show the parent how to get the pus out of the ear with toilet paper and how to use the boric acid in alcohol ear drops. The parents must be able to do this at least 4 times a day to keep the ear dry.
- ◆ Explain to the parents that it will take several weeks for the perforation to heal. So, the ear has to be kept dry for several weeks.
- ◆ Many parents do not think that a child with pus in his ears (ear



discharge) is sick. So, you must take time to explain to the parents the importance of getting the pus out of the ears and keeping the ears dry.

- ◆ Explain that if this is not done the child may not be able to hear in the future.

#### Follow up

- ◆ Review the child every 2 weeks until the ear is dry and there is no longer any discharge.
- ◆ When the ear is dry, try to look at the drum with an auroscope.
- ◆ If the perforation is still present, but the ear is dry, continue with the boric acid in alcohol ear drops once a day only and review every month. If the hole persists for more than 3 months refer the child to a medical officer.
- ◆ Refer urgently any child who has a tender swelling behind the ear. This may be mastoiditis which is osteomyelitis of the mastoid bone (see below).
- ◆ Never plug a discharging ear with cotton wool
- ◆ Use tissue paper to clean the pus out of the ear. Do NOT use cotton buds

### Mastoiditis

Otitis media occasionally causes infection of the mastoid bone which is the bony lump behind the ear. This infection is called mastoiditis.

#### Symptoms and signs

- ◆ There is swelling, tenderness and redness of the mastoid bone behind the ear. The swelling is fixed to the mastoid bone of the skull. Its edges are difficult to feel. Sometimes it pushes the pinna (outside part of ear) forwards and it sticks out.
- ◆ Other infections may look a bit like mastoiditis. But if you examine the swelling carefully, you can tell the difference.
- ◆ Mumps causes a swelling below the ear. Infected lymph glands (nodes) have a definite edge and you can move them a little. Both otitis media and otitis externa can cause swollen lymph glands in the neck behind the ear.

#### Treatment of mastoiditis

- ◆ Send to a surgeon or paediatrician quickly. An operation is usually needed.
- ◆ Give cloxacillin and ceftriaxone or chloramphenicol (see page 266) every 6 hours until the child can be transferred.

### Otitis externa

Infection of the skin of the ear canal and outer ear is called otitis externa.

#### Symptoms and signs

- ◆ The child has ear pain and discharge. But the drum, if you can see it, is normal.
- ◆ Moving his ear hurts her, because it moves her inflamed ear canal. Pain on moving the ear helps in telling the difference between otitis media



and otitis externa. Otitis media involves the ear drum. This is too far inside the head to be affected by moving the ear. So moving the ear of a child with otitis media does not usually hurt.

- ◆ Occasionally there is a boil in the ear hole. This is very painful and may block the ear canal (meatus).

#### Treatment

1. Clean out any pus from the ear using toilet paper.
2. Show the mother how to keep the ear clean with toilet paper
3. Apply crystal (gentian) violet (if it is available) to any sores in the ear.
4. Give amoxicillin **t.d.s.** for 5 days if there is much swelling of the meatus, or if there is a boil in the meatus or if there are any swollen lymph glands in the neck.

#### Foreign body in the ear

A foreign body is something in a place where it should not be. Children sometimes put small stones or beads or seeds in their ears. These things are not meant to be put inside the ear, and so we call them foreign bodies if they get inside the ear.

A foreign body in the ear can cause pain. Sometimes the foreign body may cause secondary infection and ear discharge.

#### Treatment

- ◆ Ask the parents if they know what it was that the child pushed into his ear. Look inside the child's ear with an auriscope. Identify what the

foreign body is. If the foreign body is a stone or other non-plant (non-vegetable) matter you can remove it by gently syringing the ear (see page **283**).

- ◆ Do *not* try to syringe out of the ear a seed or coffee bean or any other plant matter. These plant or vegetable foreign bodies swell up with water. Syringing the ear makes it more difficult to remove these plant foreign bodies.
- ◆ Never try to remove a foreign body from the ear with forceps. The forceps will probably push the foreign body further into the ear, and may injure the ear drum.
- ◆ Refer the child to a doctor if the foreign body is a plant material, or if you cannot remove the foreign body by syringing.

## Chapter 17: Tuberculosis

Tuberculosis (TB) is a common disease in Papua New Guinea. It occurs throughout the country, in towns, cities, coastal areas and highlands. The increasing movement of people between the Highlands and coastal areas has spread TB through the Highlands. Prevention of the spread of TB by finding and treating infectious cases, and by protecting young children with BCG vaccine, is therefore very important.

### How TB presents (shows itself)

- ◆ TB is an infectious disease caused by tubercule (TB) bacilli. TB is usually a chronic disease, but sometimes it is a cause of acute pneumonia, and in babies TB can cause them to be very sick very quickly.
- ◆ TB can cause disease in any part of the body. TB most often harms the lungs. Sometimes it harms the lymph nodes, or meninges (coverings of the brain), or the bones, or the abdomen organs.
- ◆ TB has four common presenting symptoms. It can also present in several fewer common ways (see page 127).
- ◆ Many other diseases can also cause these symptoms. TB causes few signs until a child is very ill. So, TB is difficult to diagnose, unless you always remember it.

### How TB harms a child

- ◆ When an adult with infectious TB coughs, droplets of his sputum go into the air. These contain living TB bacilli. If a child breathes in TB bacilli they multiply slowly and cause a lesion in her lungs.
- ◆ Some bacilli spread through the lymph vessels to the lymph nodes next to the main bronchi. Here the bacilli grow and make the nodes enlarge (TB lymphadenitis).
- ◆ A small lesion in a lung with enlarged lymph nodes is called a primary TB lesion. The child has primary TB infection.
- ◆ A child's immunity (how good she is at fighting TB bacilli) decides if she becomes ill or stays healthy.

### The child with strong immunity

- ◆ Most children have a strong immunity, and soon kill the TB bacilli which infect them. They have a mild TB infection without symptoms. They are not ill. Their primary lesion soon heals.
- ◆ A few children have a short illness with fever and loss of weight, and then they recover by themselves. We do not usually diagnose these illnesses.

### The child with weak immunity

- ◆ TB bacilli spread in his body. The lesions in his lungs and lymph nodes become bigger and he becomes ill. When TB spreads like this it causes symptoms and the child becomes sick. Sometimes an enlarged lymph node presses on a bronchus and obstructs it. This

prevents air going to part of a lung or may cause the child to wheeze (like asthma).

- ◆ Occasionally, an infected lymph node ruptures (opens) into a bronchus, and TB bacilli spread from it all through a child's lungs. This is very serious.
- ◆ Sometimes TB bacilli spread in the blood to parts of a child's body and cause millions of small lesions. This makes him very ill and is called miliary TB. Or the bacilli may spread to one part of his body only, and cause TB lymphadenitis, TB meningitis or brain TB, or TB of the abdomen, or TB of the bones or joints.

Many children are infected with TB, but few become ill

Why are some children so good at fighting TB bacilli that they never become ill? Why do other children get severe TB? We do not always know. Age is one reason. Young children have less immunity to TB than older children.

Another reason is malnutrition. TB is more common in malnourished children, and TB makes children malnourished. Whenever we see a malnourished child, we must ask ourselves - has she also got TB? TB makes a child's nutrition worse and is one cause of the vicious circle of malnutrition and infection. TB bacilli spread more easily in a child when her body has been weakened by HIV, or whooping cough, or measles, or some other infection such as malaria or chronic diarrhoea. If a child does not

recover from any of these acute diseases, she may have developed TB.

Malnourished children are more likely to have TB

### How adults infect children

A child with TB does not usually infect other children. This is because TB bacilli cannot usually get out of his body.

An adult with TB is different. He can be very dangerous, and easily infect children. He is infectious by coughing out some of his lung lesion. This makes a hole in his lung called a cavity. TB bacilli grow in the walls of this cavity and are coughed out with the sputum. A cavity sometimes bleeds, so blood in the sputum is an important sign of TB in an adult. An adult with TB is usually only mildly ill until he is dying. He can walk about coughing out bacilli.

When you find an adult with TB, look for children he might have infected. These children are his contacts, and they may have TB or they can be protected from getting TB by medicine. When you see a child with TB, look for the adult with a chronic cough who probably infected him.

Look also for other children the adult might have infected. Each adult with TB may infect 10-15 other people, if they are not diagnosed and treated.

Investigate the household contacts in every case of TB

Infectious adults cough up sputum containing millions of TB bacilli. We

can see these bacilli if we examine the sputum with a microscope.

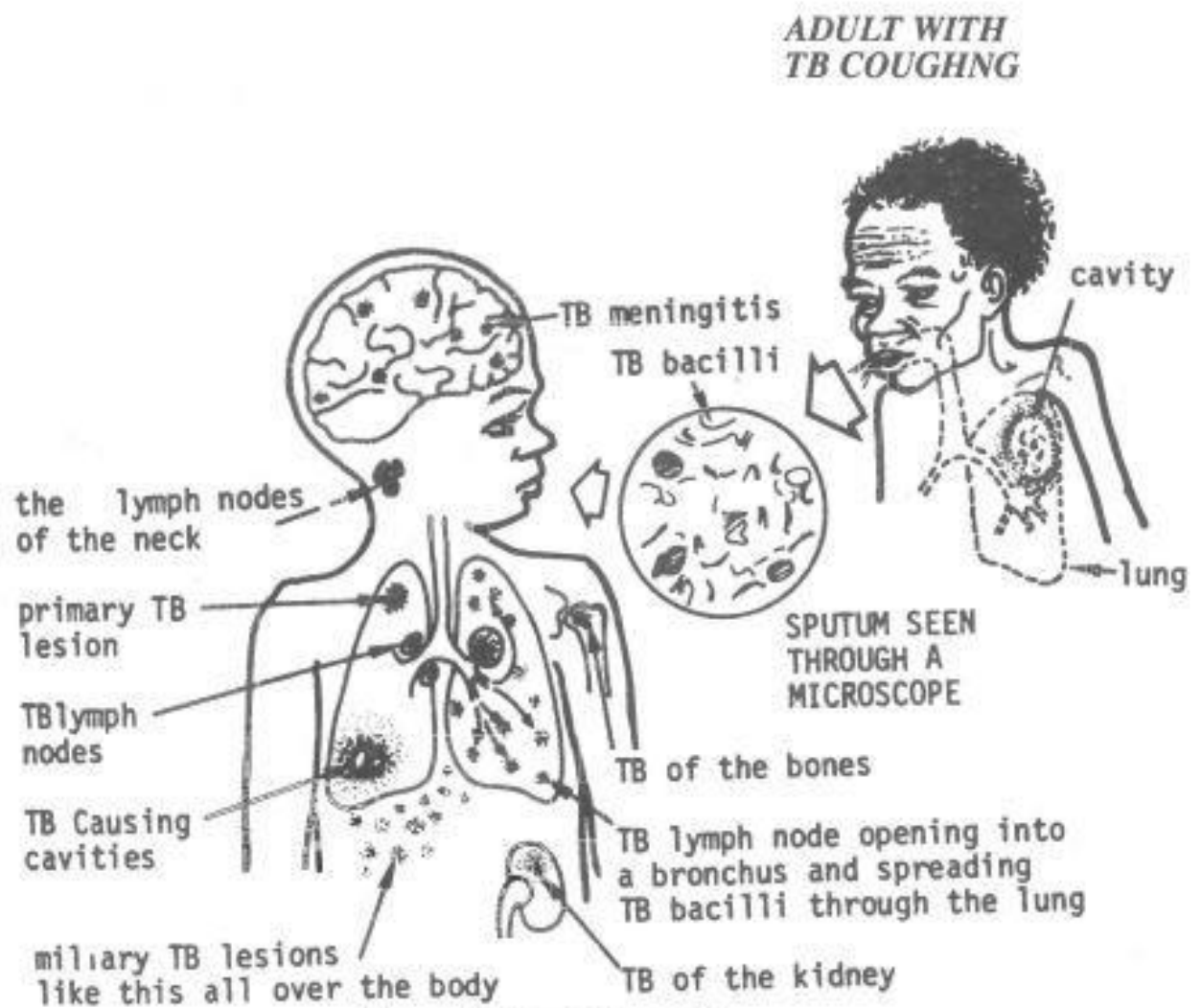


Figure 32 - How TB spreads

This is useful, because, if we can see TB bacilli, we can be sure the patient has TB.

Laboratories don't usually report 'TB bacilli seen'. Instead they report AFB (acid fast bacilli) seen. Usually, we cannot examine children's sputum, because they swallow it. Children cough up much fewer TB bacilli than an infected adult, so they are not likely to transmit TB to other children.

## Ways in which TB presents (shows itself)

### Four common ways

1. Losing weight. A child with TB does not grow normally. Usually she loses weight, so that her growth line falls. Sometimes she is so severely malnourished that she presents with severe malnutrition (marasmus or kwashiorkor).
2. Painless enlarged lymph nodes, usually in the neck (cervical lymphadenopathy), or just above the clavicle (collar bone).
3. Pneumonia which is not cured by proper treatment with a course of antibiotics in hospital.
4. Chronic cough lasting four or more weeks.

### Six less common ways

1. Intermittent fever which is usually worse at night.
2. Anaemia which does not respond to the usual treatment.
3. Drowsiness or coma (TB meningitis).
4. Pain or swelling in the back (TB spine).
5. Fluid in the abdomen - ascites (Abdominal TB).
6. Swelling of one joint (TB arthritis).



Figure 34 - Investigate the family in every case of TB.

## Symptoms and signs

### Pulmonary Tuberculosis

Any child with pneumonia who does not get better within two weeks of treatment with penicillin or chloramphenicol may have tuberculosis. Think of tuberculosis in any child who has a chronic cough, fever, weight loss, wheeze or other chest signs.

### Cervical lymph gland Tuberculosis

- ◆ The lymph glands in the neck or just above the clavicle become enlarged. They are rubbery, matted together, usually not very tender, and sometimes there is a sinus (hole) draining cheesy material from the nodes to the skin.
- ◆ The glands do not get smaller after 1-2 weeks treatment with amoxycillin.
- ◆ Diagnosis is made by the typical appearance, or by biopsy or fine needle aspirate of one of the enlarged glands.

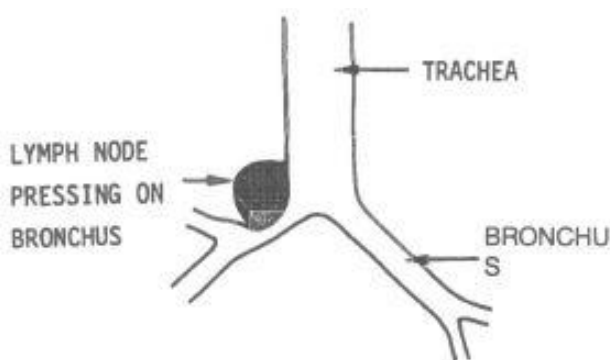


Figure 33 - How enlarged TB lymph nodes obstruct the bronchus.

### Abdominal Tuberculosis

- ◆ Lymph glands in the abdomen may be affected.
- ◆ Ascites (fluid in the abdomen) often occurs. The belly is swollen.
- ◆ Severe wasting may occur.
- ◆ Tuberculous Meningitis
- ◆ There is slow development over several days of headache, vomiting, neck stiffness and fever. Later the child becomes comatose. Suspect TB meningitis.
- ◆ If the symptoms of meningitis have been present for one or more weeks, or meningitis in a child who is severely malnourished.

### Bone or Joint Tuberculosis

The bones usually affected are the vertebrae (bones of the spine). TB of the spine is called Pott's disease. The vertebrae collapse and an abscess sometimes forms which may press on the spinal cord and cause paralysis.



Figure 35 - Pott's disease, showing deformity of the spine.

The hip is the joint most often affected by TB. The child has a limp and pain in the hip joint. Sometimes the knee joint or other joints are involved. X-rays can identify Pott's disease of the spine and TB of the joints.

It is important to remember that children never complain of back pain unless there is something wrong and children never limp unless there is something wrong.

### Miliary Tuberculosis

The disease has spread through the body (disseminated). It is diagnosed by seeing a spotted appearance on the chest x-ray of a sick or malnourished child. The liver and spleen are often enlarged, and there may be ascites.

### Investigations

Where possible, try to do the following investigations on children who may have tuberculosis.

#### Examination of sputum or gastric aspirate for acid fast bacilli (A.F.B.).

Adults with pulmonary TB usually have AFB in their sputum. But children swallow their sputum, so examination of sputum is difficult in children.

Gastric juice, aspirated early in the morning, will contain sputum swallowed during the night.

This may show AFB ([see page 288](#)). So, in younger children we usually look for AFB in the gastric aspirate collected early in the morning, before the stomach contents are mixed with food (fasting gastric aspirate). We can usually collect sputum from older

children. But you must remember that children with TB do not usually have cavities in their lungs. They usually have much less AFB in their sputum than adults. We often do not find AFB in the sputum or gastric aspirate of children with TB.

**X-rays.** Take a chest x-ray, if possible, on all children suspected of having TB. X-ray of the bone or joint helps in the diagnosis of TB bone or joint.

**Investigation of contacts.** Try to investigate all the people living in the child's house (household contacts). Someone with TB has spread the disease to this child. If you do not find this person, he is likely to continue to spread TB, and make more people sick. Look for people in the house who have had a cough with spit for more than a month.

- ◆ Collect 3 specimens of sputum for AFB from any contact who has had a cough with spit for more than a month.
- ◆ If possible, do a chest x-ray on all the household contacts. Do a Mantoux test on all the children under 7 years living in the same house as the patient.

**Gland biopsy.** Biopsy of an enlarged gland in a child suspected of having TB helps in the diagnosis when other tests are negative.

**Fine Needle Aspiration Biopsy (FNAB).** In this test a needle is put into the lymph node and material sucked into a syringe for examination under the microscope.



**GeneXpert.** This is a new test which enables the diagnosis to be made quickly and also to tell if the Tuberculosis bacteria are resistant to the normal drugs. The test is performed on sputum, gastric aspirates, cerebrospinal fluid or fluid from the pleural cavity.

**Haemoglobin.** Children with TB often have anaemia. Remember to check the Hb. If the Hb is under 10 g% treat for anaemia (see page 101).

### TB score in children

The diagnosis of TB in children is often difficult because children do not usually have AFB found in their sputum. To help make the diagnosis of TB in children we can give a number or score of 0, 1, 2, or 3 for each of the following symptoms or signs the child has. We then add up the total number or score for the child. A total score of 7 or more suggests the child has TB, and TB treatment should be started provided no other diagnosis is more likely.



## Symptoms and signs used in TB score

Symptom/sign	Score
1) Length of illness	
• less than 2 weeks	0
• 2 - 4 weeks	1
• More than 4 weeks	3
2) Nutritional status	
• Above <2 line on the weight for age chart	0
• Between the <2 and <3 lines	1
• Below <-3 line	3
3) Household contact	
• No household contact	0
• Verbal household contact	1
• Known sputum positive household contact	3
4) Positive Mantoux test	3
5) Enlarged painless lymph nodes in neck	3
6) Night sweats or unexplained fever	2

7) Angle deformity of spine	4
8) <i>Malnutrition</i> , not improved after 1 month of treatment	2
9) Firm, non-fluid, non-traumatic, <i>swelling of joint</i>	3
10) <i>Coma</i> (with or without convulsions) for more than 48 hours	3
11) Unexplained ascites	3

## Treatment of children with TB

The antibiotics used to treat TB in children are:

- ◆ Rifampicin
- ◆ Isoniazid (INAH),
- ◆ Pyrazinamide
- ◆ Ethambutol

All these drugs can cause skin rashes and jaundice.

Rifampicin turns urine and other body secretions orange. This is normal and shows that the drug is being taken. The parents, and child if old enough, must be warned that the urine will look orange. If they are not warned they may worry about the orange urine.

Treatment for TB has become easier because of fixed dose combinations (three drugs - rifampicin, isoniazid and pyrazinamide - in one tablet, for the first 2 months of treatment and rifampicin and isoniazid for the continuation part of treatment). These tablets also dissolve in water, so it is easier for the child to take the medicine. Ethambutol is given separately and only for the first 2 months of treatment. It is very important that you check the doses that the children are receiving, and it is important to make sure that the mother and father understand the importance of the child taking the medicine every day. If it is not regularly given the TB bacilli may become resistant to the drugs.

### Drug Resistant TB (MDRTB)

Unfortunately, there are some TB bacteria that have become resistant to the normal TB drugs. This is called MDR TB (Multi Drug Resistant TB).

Treatment for patients infected with these MDR TB bacteria is much more difficult than the treatment of Drug Sensitive TB. If you think the child might have MDR TB (e.g. the child has defaulted from treatment previously and is not responding to the current treatment, or if there is a known contact has MDRTB) you should refer the child to a hospital.

### Treatment Guidelines for Childhood Tuberculosis in PNG

All children are treated with 2 months intensive phase using the fixed dose combination tablets -FDC- (rifampicin (R) Isoniazid (H) Pyrazinamide (Z)) and ethambutol (E). The continuation phase will be with the FDC rifampicin (R) and isoniazid (H) for 4 or 7 months, depending on the type of TB.

Treatment duration: Pulmonary TB is treated for 6 months (2 months RHZE + 4 months RH). All other forms of TB including TB meningitis, TB osteomyelitis, miliary TB, TB pericarditis/effusion, abdominal TB, and lymph node TB is treated for 9 months (2 months RHZE + 7 months RH). Children with HIV should be treated for 9 months (2RHZE/7RH) no matter what type of TB they have.

Poor adherence and defaulting:  
Children who have failed to complete a full course of treatment previously (i.e. defaulted from treatment) and retreatment cases will be treated the

same way. Children suspected of having MDR should be evaluated by a paediatrician and have a GeneXpert test. Children who have MDR should be treated by a paediatrician or a

healthcare worker familiar with MDR-TB

## Dosing TB medications using the new dispersible FDC.

For children in the weight bands of 4 to 25 kg using the new FDC for children

NEW FDC DRUG TABLE	Numbers of tablets		
	Intensive Phase		Continuation Phase
	RHZ (dispersible tabs)	E	RH (dispersible tab)
	75/50/150	100	75/50
4-7.9 kg	1	1	1
8-11.9 kg	2	2	2
12-15.9 kg	3	3	3
16-24.9 kg	4	4	4
25 kg+	Go to adult dosages and preparations		

**N.B.** As the child improves his weight goes up. You must remember to increase his drug dose as his weight goes up during the course of his TB treatment.

**Registration.** A Case Index Card must be filled in at the time of diagnosis. This makes sure that the patient is registered as a case of TB and full details of his address are known. He can then be followed up if he defaults (stops) from treatment. It also enables the household contacts to be investigated for TB. A TB treatment card must also be filled out when starting TB treatment.

## Health education

- ◆ Explain to both the child and his family about TB. Tell them you can cure it. Explain that this will take 6 months.
- ◆ Explain that he must take his drugs daily for the first two months and then twice a week for the next 4 or 7 months. If he stops taking them, the disease may come back again. The family and child must understand that treatment has to be regular and continue for 6 months.
- ◆ Patients with TB need education as well as drugs

### Weigh the child regularly

- ◆ During treatment the weight will increase.
- ◆ Drug doses must be increased as the weight of the child increases.
- ◆ Check weight and correct drug dose at each review

At the end of the initial 2 months daily treatment, make sure the family and child know that treatment must continue for another 4 or 7 months, as maintenance treatment. Make sure that child's treatment card is correctly filled out. TB patients should gain weight when treated. If a patient fails to gain weight after a month's TB treatment, the diagnosis may be wrong. He may not have TB, or the TB may be resistant to the usual drugs. These patients should be referred to a hospital.

## How to prevent TB

We can prevent TB in children in 4 ways.

1. **We can diagnose and treat TB in adults.** We must examine the sputum of all adults who have had a cough for more than a month. We must treat all infectious adults we diagnose, so that living bacilli do not get out of them. An adult soon stops being infectious when he is treated. But he must finish his treatment and take his drugs regularly. If he does not finish it, the bacilli may start growing, so that he becomes infectious again. We must teach infectious adults to cover their mouths when they cough. They must not spit. This is important, because bacilli can get from spit on the ground into the air, and into children's lungs.
2. **We can make a child better at resisting (fighting) TB.** Making his nutrition better makes his immunity stronger. Also, we can give him an artificial active immunity with BCG vaccine (**see page 220**). This contains living harmless organisms called BCG bacilli and gives a child a safe mild infection.

BCG does not make a child completely immune to TB. But, it is useful, because he is less likely to become ill with TB than a child who has not had BCG.

3. Improved housing, and less overcrowding, will also help prevent TB.

4. Isoniazid Preventive Therapy (IPT)

Give IPT to children who have a family or household member known to be a sputum positive TB patient, and who are:

- a. less than 5 years old, and not symptomatic for TB
- b. HIV-infected, irrespective of age, and not symptomatic for TB


If the child has *no* symptoms or signs,

- ◆ We must prevent TB spreading in his body by giving him isoniazid prophylaxis for 6 months.
- ◆ Because he has no symptoms or signs, he does not have TB disease - but he has been infected with TB and is at risk of getting TB disease.
- ◆ As he does not have TB disease, we do not register him as a case of TB.
- ◆ We treat him with INAH only, daily for 6 months.

Dose of isoniazid for prophylaxis

Weight (kg)	Dose
3 - 5 kg	50 mg ( ½ tab) daily
6 - 10 kg	100 mg (1 tab) daily
11 - 15 kg	150 mg (1 ½ tab) daily
16 - 20 kg	200 mg (2 tab) daily
21 kg and over	300 mg (3 tab) daily

If such a child has any symptoms or signs of TB (e.g. chronic cough, persistent pneumonia, weight loss and enlarged lymph nodes) he has TB disease. He must have full TB treatment.

 **Key message:**  
Prevent TB by  
finding and treating  
sputum positive  
adults





## Chapter 18. The brain and nervous systems

The brain is a very important organ of the body. It controls whether we are awake or asleep, conscious, or unconscious. It controls the movements of all our muscles. It controls all our senses: vision (sight), hearing, speech and language, and touch. It controls our thoughts, feelings, and emotions. And it controls our breathing, heartbeat and all other internal body functions.

The nervous system is the brain plus the spinal cord, plus the nerves which go to all our organs, carrying messages back and forward.

When the brain and nervous system is working well, the child is fully conscious. He can wake up, eat, play, move, hear, speak, and recognise other people. She does things that are appropriate to her age. If the brain is not working well then, a child may not be able to do many of these things.

The brain of a young child develops and grows from the time he is in the womb to when he is a young adult. During the time in the uterus, during birth, the newborn period (first 28 days of life), throughout childhood and adolescence the brain is changing, growing and learning new skills. Thus during all this time the brain is especially vulnerable to injury and disease.

The brain can be injured by

- ◆ **Infection.** Bacteria or viruses may infect the brain or its coverings (the meninges) and the spinal fluid. This is called viral encephalitis if it affects the brain, or viral (aseptic) meningitis if it affects the meninges.)
- ◆ **Hypoxia or lack of oxygen** (such as birth asphyxia, or drowning, or severe pneumonia if the child does not receive enough oxygen). If the brain does not get enough oxygen at birth, many of the brain cells may die. This causes severe brain injury.
- ◆ **Trauma** (such as birth trauma, road accident, injury from an adult such as child abuse)
- ◆ **Hypoglycaemia** (if the brain does not receive enough glucose because of starvation, or if the child is sick and cannot feed)
- ◆ **Malnutrition** (The brain needs a healthy diet to grow and develop. Breast milk has the best balance of fats and protein for the brain to grow, and vitamins. After breast feeding, many children's brains do not grow as they are starved of a good, balanced diet)
- ◆ **Anaemia** (such as if the child is lacking iron, or has repeated episodes of malaria)
- ◆ **Malaria** (in cerebral malaria, malaria parasites block the small capillaries of the brain and slow the flow of blood to the brain).

It is common for some children to have several of these types of injuries that affect the brain, such as a boy who has malnutrition and develops a severe

infection which causes hypoxia (lack of oxygen) and because he is sick he cannot eat for days and develops hypoglycaemia. If each of these problems is not recognised and treated urgently he may develop permanent injury to his brain.

The brain is protected by the skull bones. At the bottom of the brain is the spinal cord, which carries all the messages from the brain to and from the peripheral nerves, which go to all our organs (muscles, skin, heart lungs etc). The spinal cord is about as thick as your little finger and goes inside the vertebral column (the bones of the spine). The brain and the spinal cord are protected by several coverings called meninges. There is a narrow space between the meninges, filled with a clear fluid called cerebrospinal fluid or CSF. The CSF goes all round the brain and spinal cord.

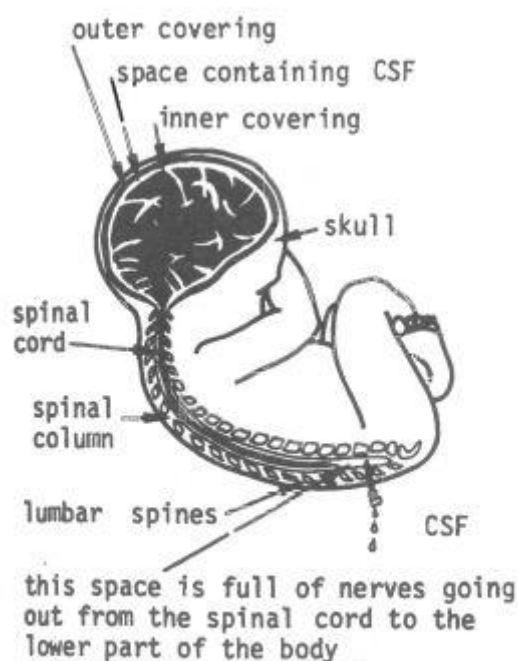


Figure 36 - Where the CSF comes from.

Normally CSF looks like clean water.

Normally, the CSF is sterile (it contains no germs at all). If germs enter the CSF they cause an infection this is called meningitis. When a child has meningitis, his brain is inflamed, and we must diagnose and treat it quickly or the brain will be injured.

### Signs of brain disease

When the brain is not working correctly, the child does not behave normally. She will probably have one or more of the following symptoms and signs.

1. **Drowsiness** ("slip tumas"). When a healthy child is tired she goes to sleep, but can be woken up at any time. When a child's brain is sick, she becomes drowsy. She cannot be woken up easily. She sleeps more than usual.
2. **Staring expression**. She does not look properly at his mother. She may have a staring expression (seems to be looking without seeing).
3. **Irritable** ("krai tumas"). A healthy child cries when she is unhappy. But she usually stops crying when his mother feeds her or picks her up and comforts her. When a child cries because her brain is sick, she often does not stop crying when her mother feeds her or comforts her. She does not like looking at the light (photophobia).
4. **Vomiting**. Brain disease may make a child vomit. But usually he has no diarrhoea. If a child is vomiting without diarrhoea, think that he

might have a brain disease or injury.

5. **Headache.** An older child may complain of headache if his brain is sick. Young children cannot complain of headache. But he may cry a lot because of headache.
6. **Fits or convulsions** ("guria"). When an older child has a fit, he suddenly becomes unconscious and falls to the ground. All his muscles contract at the same time so that his body becomes stiff (unable to bend). He stops breathing and he becomes cyanosed (blue). His eyes turn upwards, but he does not seem to see anything. Sometimes he vomits, passes urine or faeces, or bites his tongue. After about half a minute, he starts to breathe again. His arms and legs make strong movements. These movements usually stop after two or three minutes, and then he sleeps deeply.

Fits are not so easily recognised in a baby. The mother is only likely to notice her baby is having a fit if she is holding him. His eyes may turn upwards. He becomes blue and stiff for a minute or two and then he goes to sleep.

7. **Meningeal signs.** When a child has meningitis, the muscles of his neck and back get tight. A healthy child can touch his chest with his chin. A child with meningitis often cannot do this. He has a stiff neck. The three meningeal signs are: neck stiffness, Kernig's sign and 'head between the knees' sign.

You can see meningeal signs most easily in adults and older children. You only sometimes see them in children less than 2 years old. You do not usually see them in babies. Often babies with meningitis are floppy rather than stiff.



Figure 37 - Examining a child for neck stiffness.

#### Neck stiffness

- a. The best way to test neck stiffness in a young child is to sit her on her mother's knee where she is comfortable. Get her to fix for a few seconds on your smiling face, and then move slowly from side to side to see if she will follow you fully to the left and then the right, moving her neck freely. Then see if she will follow your face up and down, again moving her neck freely. If she only moves her eyes but not her neck, or if she cannot follow you because of neck stiffness or pain, then this is a meningeal sign suggestive of meningitis in a child with fever.
- b. Another way to test for neck stiffness is to lie the child on her back (see fig 37). Put your hand under her head and lift it

forwards. See if his chin can touch her chest. A normal child can easily touch her chest with her chin. A child with neck stiffness cannot do this. Bending her head forwards hurts her.

It may be difficult to check for neck stiffness if the child is crying. To help you - place one hand under the child's head and the other hand under his chest. Gently lift his chest so that she is half sitting up. It is now easier to test if she has a stiff neck.

- ◆ **Kernig's sign** (see fig. 38). Lie the child on his back. Bend one hip so that the knee is pointing to the roof. Now straighten the knee so that the foot is pointing to the roof. A normal child can do this. A child with Kernig's sign will have pain and cannot straighten the knee. He has a positive Kernig's sign.



Figure 38 - Kernig's sign.

- c. **Head between the knees sign** (see fig.39). Try to put the child's head between his knees. A normal child can do this easily. A child with meningeal signs cannot do this because his back is too stiff.

Remember that these meningeal signs suggest meningitis in *older* children and adults. Most children with meningitis are less than 2 years old. These young children with meningitis often do *not* have any meningeal signs. Meningeal signs are very *uncommon* in babies with meningitis.



Figure 39 - Head between the knees sign.

You must think of meningitis in children who are sleepy (drowsy) or very irritable or have a fit (convulsion)

8. **Swollen (bulging) fontanelle**. Babies have a special sign that suggests meningitis. This is a swollen, or bulging, fontanelle, the soft spot on the top of the baby's head.
  - ◆ The fontanelle of a healthy child is soft and almost flat. Meningitis makes it swell. A child's fontanelle closes as he grows older. You can only diagnose meningitis by this sign when the fontanelle is still open. Usually, the fontanelle stays open until the child is about one year old.
  - ◆ Swelling of the fontanelle is a late sign. Try to diagnose meningitis before the fontanelle swells.

- ◆ Crying makes the normal fontanelle swell a little. Sometimes the normal fontanelle swells a little when the child lies down. Try to feel the fontanelle before the baby starts to cry. If it is slightly bulging, then gently sit the baby up, and feel the fontanelle again.

## Meningitis

Organisms (bacteria, virus and fungi) can grow in the child's meninges and CSF, and harm the brain. This causes meningitis. Organisms get into the CSF from the back of the nose, which is very close to the brain, or from the middle ear. They can come through the blood from some other part of the body, such as the gut. They can also get into the CSF on a dirty lumbar puncture needle.

Bacteria that produce pus cause bacterial (or purulent) meningitis. TB is another type of bacteria that commonly causes meningitis. Viruses also cause meningitis. Purulent meningitis and TB meningitis nearly always kill a child if you don't diagnose it early and treat him immediately and carefully. TB often causes symptoms for several weeks before it causes meningitis – it is a chronic (slow developing) form of meningitis. Viral (or aseptic) meningitis is usually less serious, but it can still cause severe brain injury and convulsions.

## Bacterial (purulent) meningitis

Bacterial meningitis is a very serious disease. It occurs most commonly in young children. The symptoms and signs of meningitis depend on the child's age. The younger the child, the less obvious are the signs. It is important to diagnose and treat bacterial meningitis quickly. If it is not diagnosed and treated quickly the child will probably die or have permanent brain complications. The complications of meningitis include deafness, blindness, epilepsy, learning problems, paralysis, hydrocephalus, and persistent stiffness of limbs (spastic cerebral palsy).

### Symptoms and signs of bacterial meningitis

**In older children**, the illness starts suddenly. There is fever, headache, loss of appetite and sometimes vomiting. The child may be sleepy and does not like looking at the light. The neck is stiff and Kernig's sign may be present. The head between the knees sign is present. He may have convulsions. Occasionally there is a dark red rash (purpura).

**In children under two years**, neck stiffness, head between the knees sign and Kernig's sign are often absent. The signs are fever, sleepiness (drowsiness), vomiting, convulsions, staring expression (seems to be looking without seeing) and bulging fontanelle. Most cases have only some of these signs. Think of meningitis if a young child has one or more of these signs.



**In young babies**, it is even more difficult to diagnose meningitis. Fever, cyanosis, vomiting, a high-pitched cry, sleepiness, unable to feed, jerky (sudden, quick) movements or convulsions may occur. Usually only one or two of these signs will be present, e.g. a sleepy baby who refuses to feed.

**Diagnosis** is made by doing a lumbar puncture and looking at the cerebrospinal fluid (CSF). Cloudy CSF means bacterial meningitis

When doing a lumbar puncture make sure:

- ◆ The child is held properly (see fig. 40). Show the person helping you how to hold the child properly before you start. Do not hold the child's head too flexed that his airway is obstructed. If the child is conscious and likely to move, sedate him and wait until he is quiet.
- ◆ Do the lumbar puncture when he has become quiet. (See page 286) for details on how to do a lumbar puncture.



**Key message:**  
Cloudy CSF means  
bacterial meningitis

**Rules to help you diagnose and treat meningitis early:**

1. Always think about meningitis when you see any sick or convulsing child with a fever.
2. Always do a lumbar puncture if you suspect meningitis unless the child is extremely ill. In this case treat the child with IM ceftriaxone for meningitis and Artesunate for cerebral malaria), and refer to a paediatrician.
  - i. If the CSF is clear, give Artesunate for cerebral malaria (see page 93). Repeat the lumbar puncture in 24 hours if there is no improvement.
  - ii. If the CSF is obviously cloudy, treat for bacterial meningitis. Give Ceftriaxone and Artesunate.
  - iii. If the CSF is bloodstained, or you cannot get any CSF, give IM Ceftriaxone for meningitis and Artesunate for cerebral malaria.



**Figure 40 - Meningitis is diagnosed by finding cloudy CSF on lumbar puncture.**

If possible, send the specimen of CSF to a pathology laboratory for examination of cells, protein, sugar, bacterial stain and culture.

**Treatment of bacterial meningitis.** (See page 54 for babies less than one month)

1. Ceftriaxone for 10 days.

To begin with, give IM Ceftriaxone.

2. Antimalarials.

- ◆ Treat as for cerebral malaria with IM Artesunate (see page 93). Give IM Artesunate twice daily (b.d.) until the child improves.
- ◆ Then give oral Artemether-lumefantrine 3 times a day (t.d.s) for 3 days. Give primaquine on the first day of oral treatment.

3. Anticonvulsants.

If a child with meningitis has a fit (convulsion),

- a) Stop the fits
  - i) Give him IM paraldehyde or IV diazepam (Valium) or rectal diazepam.
  - ii) If the child is still convulsing after 10 minutes, give the same dose of paraldehyde or diazepam again.
  - iii) If the child is still convulsing after another 10 minutes, give the drug which you have not used (paraldehyde or diazepam). Repeat this drug if necessary.
- b) Prevent more fits
  - i. Give a loading (starting) dose of phenobarbitone.

- ii. Give the loading dose of phenobarbitone IM if possible.
- iii. Then give an oral maintenance dose of phenobarbitone daily while the child is in hospital.
- iv. If the child has a lot of fits, phenobarbitone should be continued after discharge.
- v. IM phenobarbitone contains 200 mg/ml. Phenobarbitone tablet contains 30mg.

**Prevent fits in all children under 2 years who have meningitis.** Do not wait for children under 2 years to have a fit before giving them phenobarbitone. Give a loading dose of IM phenobarbitone and then daily maintenance dose of oral phenobarbitone to all young children under 2 years old, who have meningitis. Continue the phenobarbitone as long as the child is in hospital.

4. Nasogastric tube feeds.

Only give nasogastric feeds if the child is too sick to drink. Use expressed breast milk (EBM) or full strength full cream milk in babies and young children: Use full strength full cream milk in older children. Splint the child's elbows to prevent him pulling out the tube.

Amount of fluids to give 4 times a day:

Weight (kg)	Dose
3 - 5 kg	100 ml
6- 9kg	150ml
10 - 14 kg	200ml
15- 19kg	250ml
20 -29 kg	300ml
30 - 49 kg	350 ml

Weight (kg)	Paraldehyde I.M.	Diazepam (Valium)	
		I.V.	Rectal*
3 – 5kg	1ml	¼ ml (1.25mg)	¼ ml (1.25mg)
6 – 9kg	1 ½ ml	½ ml (2.5mg)	½ ml (2.5mg)
10 – 14kg	2 ½ ml	½ ml (2.5mg)	1ml (5mg)
15 – 19kg	3 ml	¾ ml (3.75mg)	1 ½ ml (7.5mg)
20 – 29kg	4 ml	1ml (5mg)	2ml (10mg)
30 or more	5 ml	2ml (10mg)	2ml (10mg)

\*Use either a Mantoux syringe (without the needle) inserted into the rectum. Lubricate the syringe with some grease or use



a 5 ml syringe. Mix the required dose of diazepam with 5 ml of water in the syringe. Put the solution into the rectum through a feeding tube.

Dose of phenobarbitone

Weight(kg)	Loading (starting) dose	Daily maintenance dose
3 – 5kg	¼ ml (50mg) IM or 2 tab (60mg) oral	½ tab (15mg) oral
6 – 9kg	½ ml (100 mg) IM or 3 tab ( 90 mg) oral	1 tab (30mg) oral
10 – 14kg	¾ ml (150mg) IM or 5 tab (150mg) oral	2 tab (60mg) oral
15 – 19kg	1 ml (200mg) IM or 6 tab (180mg) oral	3 tab (90mg) oral
20 – 29kg	1 ml (200mg) IM or 7 tab (210mg) oral	4 tab (120mg) oral

30 or more	1 ml (200mg) IM or 7 tab (210mg) oral	5 tab (150mg) oral
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Patients with meningitis often have difficulty getting rid of water from their bodies. So you must be careful not to give them too much fluid. This is why IV fluids are not used, except for dehydrated patients.

#### 5. Check the haemoglobin

If the child has a haemoglobin less than 7 g per dL give a blood transfusion of packed cells if you can, and treat his anaemia (see page 101).

#### 6. Nursing care

The nursing care of a child with meningitis is very important.

- a) You must take good care of the airway and breathing.
  - i) Place the patient on his side.
  - ii) Regularly suck out secretions from his pharynx.
  - iii) Give nasal oxygen if he has convulsions or cyanosis or chest indrawing.
- b) Avoid the child getting fluid overloaded (oedema). If a child has oedema, if his eyelids are puffy, then he is probably receiving too much fluid and this should be reduced. Avoid IV fluids in children with meningitis, especially if they have eyelid puffiness (oedema).
- c) Give paracetamol if the child has a headache or high fever (38°C or more).

#### Complications and discharge planning

- ◆ After 2-3 days of IM ceftriaxone, improvement should be obvious. If

the child still has a fever and is not interested in his surroundings, or continues to have fits, or still has a bulging fontanelle, he should be referred immediately to a paediatrician or other doctor who can care for sick children. He may have tuberculous meningitis or a complication of purulent meningitis. Even if he improves, he still needs 10 days of ceftriaxone or the meningitis will come back in a worse way. Do not send a child with meningitis home too early.

- ◆ The head circumference should be measured each day. If it increases in size the child should be referred to a doctor.
- ◆ If a child with meningitis has had convulsions, he may need to go home on daily phenobarbitone. If he only had 1 or 2 fits at the start of his illness, the phenobarbitone can be stopped when he leaves hospital.
- ◆ If he had more than 2 fits while in hospital, or if the fits occurred more than 2 days after the start of his illness, he should be discharged on daily maintenance dose of phenobarbitone. The phenobarbitone should be continued daily until he has taken it for a total of one month. It can then be stopped if he has had no further fits.
- ◆ If the child has had further fits, the phenobarbitone must be continued (see convulsions, page 145).

Before a child with purulent meningitis goes home, the following things need to have occurred:

1. Completed 10 days of ceftriaxone
2. Signs of meningitis resolved (no bulging fontanelle, no neck stiffness)
3. Feeding well again
4. No fever
5. Check her for brain problems (such as poor movements, or not able to see)
6. Check for further convulsions, and decide if need ongoing phenobarbitone
7. Discuss with the mother (and father if possible) about Danger signs and what to look for when she takes her child home.
8. Make an appointment to see the baby, or an appointment to be seen by a paediatrician in a month, where the baby's brain function can be checked.
9. Check that his vaccines are up to date, and if not, update them

## Tuberculous Meningitis

- ◆ The disease comes on more slowly than bacterial meningitis. At first the child has a headache; the child stops playing and becomes sleepy (drowsy). Then the child starts to vomit and loses her appetite. Later, neck stiffness, head between the knees sign and Kemig's sign are present and she becomes more and more drowsy.
- ◆ Finally, she becomes unconscious, has convulsions and becomes spastic (stiff) unless treatment has

been given. A child with TB meningitis, who is not treated, usually dies after 3 weeks of getting the TB meningitis. The Mantoux test is often negative in tuberculous meningitis. The CSF is clear or slightly cloudy.

- ◆ Send the CSF to the pathology laboratory for examination if possible.

### Suspect TB meningitis if:

1. Signs of meningitis have been present for one week or longer.
2. The child has recently lost weight or is malnourished
3. The child already has TB somewhere else in his body, e.g. cervical gland TB, or pulmonary TB or miliary TB.
4. Someone else in the family or house has TB.
5. A child has been started on treatment for bacterial meningitis but does not begin to improve after 2-3 days of starting ceftriaxone.

The longer a child has TB meningitis untreated the less chance he has of full recovery. If treatment is given early, while she is still conscious and not spastic, she has a good chance of full recovery. When a child with TB meningitis becomes spastic or comatose, recovery is more unlikely. So treatment must be given early.

If you suspect TB meningitis, send the child urgently to a paediatrician or other doctor who can look after sick children. If you cannot immediately send the child to hospital, treat him with IM ceftriaxone for bacterial

meningitis and rifampicin, isoniazid and pyrazinamide for TB (see page 131). Then send her to hospital as soon as you can.

### Viral or Aseptic Meningitis

- ◆ Many different viruses can cause meningitis. Some of the viruses causing meningitis also cause rashes or diarrhoea. Mumps virus is another cause of viral meningitis, so check for swelling of the parotid gland. The symptoms and signs of viral meningitis are similar to those for bacterial meningitis, and it is not always possible to tell them apart. Usually, patients with viral meningitis are less severely ill than those with bacterial meningitis. The CSF is clear.
- ◆ If a child has signs of viral meningitis (fever, neck stiffness, clear CSF) and flaccid (floppy) paralysis of any one limb, suspect polio. Notify the Provincial Disease Control Officer immediately and refer to the paediatrician or other doctor. Collect stool sample for checking for polio virus.
- ◆ Treatment of viral meningitis is oral fluids, antimalarials and paracetamol or aspirin. Try not to give injections in case the disease is poliomyelitis. If the child has poliomyelitis, injections may cause paralysis. If not improved after two days, start treatment for bacterial meningitis and send to hospital. If you are in any doubt about the diagnosis start treatment for bacterial meningitis with ceftriaxone.

### Viral encephalitis

- ◆ Viruses can also affect the brain. A virus infection of the brain is called encephalitis. A number of different viruses can infect the brain and cause encephalitis. Encephalitis is often transmitted by mosquitoes.

#### Symptoms and Signs

- ◆ The illness may be either mild or severe. Mild cases have headache, vomiting and some sleepiness (drowsy). Severe cases have convulsions and coma. The start of the disease is much more sudden (only a few hours) in encephalitis than it is in tuberculous meningitis.
- ◆ The diagnosis is made by doing a lumbar puncture and looking at the CSF. The CSF is clear, and not cloudy as in purulent meningitis.
- ◆ If possible, the CSF should be sent to a laboratory for examination.

#### Treatment

Fluids, antimalarials and paracetamol (or aspirin in older children). There is no special treatment, except treating fits if they occur. Every young child who has a convulsion should have a lumbar puncture done to make sure he does not have bacterial meningitis. Send the child to a paediatrician or provincial hospital if he is not better after two days in case he has TB meningitis.

### Poliomyelitis

#### Cause

- ◆ A virus infection of the spinal cord and sometimes the lower part of the brain.

### Symptoms and Signs

- ◆ The child usually has an illness like influenza. There is fever, malaise (feeling unwell), vomiting and headache. Sometimes there is neck stiffness. This is followed a few days later by weakness and paralysis (unable to move) of the muscles in one or more limbs (arms and legs). The paralysis usually affects one arm or leg more than the others. Sometimes it affects the respiratory muscles.
- ◆ There is no loss of sensation in polio as the paralysis affects only the muscles. Paralysis of a limb may follow an IM injection given into that limb during the influenza stage of the disease. Sometimes there is no influenza-like illness, and paralysis is the first sign of the disease.

### Investigations

- ◆ A lumbar puncture should be done to make sure the child does not have purulent meningitis. In polio the CSF is clear.

### Treatment

There is no special treatment. The following is a general guide:

1. Strict rest in bed. Activity (running around) in the acute stage of the illness often makes the paralysis worse.

2. During the acute stage, affected limbs should be immobilised (kept still) in splints to prevent flexion deformities (limbs permanently bent).

The splints also help to make the child rest.

3. No injections. These may cause paralysis.
4. When the acute stage has finished, begin gentle movements of the affected limbs.

After discharge from hospital, the child should be seen at regular intervals to make sure that flexion deformities are not occurring. If they do occur, the child will require plaster back slabs and physiotherapy to straighten the limbs.

5. Special shoes and callipers (leg splints) may help severely affected children to walk again.
6. Parents of these children can sometimes be given practical help in looking after their children.

e.g. In Port Moresby the Red Cross runs a special Handicapped Children's Centre for children and their parents.

### Prevention

If polio occurs in your area, notify the Provincial Disease Control Officer and paediatrician immediately. Mass immunization with Sabin oral vaccine will stop the epidemic. Sabin oral vaccine prevents children getting poliomyelitis. Give Sabin oral vaccine to all young children (see page 222).

Prevent polio by Sabin immunization

## Meningism

- ◆ Meningism means fever and stiff neck not due to meningitis. Any infection in children may cause this condition of fever and stiff neck that is not meningitis e.g. pneumonia, malaria, tonsillitis, otitis media. So examine the child all over.
- ◆ Meningism is diagnosed by finding one of these diseases (e.g. pneumonia, otitis media, and malaria) in a child with fever, stiff neck and completely clear CSF on lumbar puncture.

## Convulsions (fits)

Convulsions are common in young children. They may be caused by many conditions. Any young child who has a convulsion and fever should have a lumbar puncture done to make sure he does not have bacterial meningitis. Take a blood slide for malaria parasites and give antimalarials.

### Common causes

1. **A high fever.** The fever may be due to any infection, e.g. malaria, otitis media, pneumonia, etc. This is called a **febrile convulsion** (see page 145).
2. **Cerebral malaria** (see page 93).
3. **Meningitis** (bacterial meningitis, tuberculous meningitis, viral meningitis).
4. Encephalitis.
5. **Brain damage.** Injury to the brain, either by trauma, bleeding or anoxia (lack of oxygen) may cause convulsions. This may occur soon after birth or after a head injury.
6. **Hypoglycaemia** (low blood sugar). This is likely in low birth weight babies, in malnourished children, severe malaria or in children who have swallowed some poisons.
7. **Epilepsy.** No obvious cause can be found for the convulsions, which occur from time to time (see page 145).

### Symptoms and Signs

- ◆ A convulsion starts suddenly. The child may feel a strange or frightening sensation, he then loses consciousness and falls to the ground. His eyes move around and seem to be looking at nothing. All his muscles become rigid (hard and contracted), stopping normal breathing. He may become cyanosed (blue). Urine and faeces may be passed. This stage lasts about 30 seconds.
- ◆ Next follows a stage of quick, strong movements of the limbs and head. The child begins to breathe again. After two or three minutes the movements usually stop, and a stage of deep sleep begins.
- ◆ Note that during a convulsion the child is unconscious. This is different to tetanus, in which muscle spasms occur in a conscious child.
- ◆ Most convulsions stop by themselves, but sometimes they keep on going. If they have not stopped, you must give an anticonvulsant to stop them, and

make sure the child can breathe well and is not cyanosed.

## Treatment

When you see a child who is having a convulsion (fit), remember the word "FITS".

F = First Aid

I = Injection

T = Treat the cause

S = Stop further fits

## First aid

1. Clear the airway
  - i. Lay him on his side
  - ii. Suck out his mouth and nose
  - iii. Give oxygen if the child is cyanosed, or has obstructed breathing or chest indrawing
2. Prevent any injury. Move him away from any dangerous objects that he might cut himself on and turn him on his side so that if he vomits, he will not aspirate.

## Injection

1. **Stop the convulsion.** Use IM paraldehyde or IV diazepam (Valium) or rectal diazepam.
  - i. Dose of Paraldehyde is 0.2 ml/kg. IM. Do not give a child a dose more than 5mls.
  - ii. Dose of IV Diazepam (Valium) is 0.05 ml/kg (0.25 mg/kg) IV. Do not give a child a dose more than 10

mg (2 ml). Diazepam (Valium) ampoule contains 10 mg/2 ml that is 5mg/ml.

- iii. Dose of Rectal Diazepam (Valium) is 0.1m/kg rectally. Do not give a child a dose more than 10 mg (2 ml).

If a child is fitting, it may not be possible to weigh him. If he has not been recently weighed (no recent weight recorded in his health record book), you may have to give him IM paraldehyde or rectal diazepam to stop the fit without knowing his weight.

- ◆ Look at the child and look in his health record book if available, to see how old he is.
- ◆ The table showing dose of IM paraldehyde and IV or rectal diazepam will help you decide what dose to give.
- ◆ Give the same doses of paraldehyde or diazepam (Valium) again if the child is still convulsing after 10 minutes.

If the child is still convulsing after another 10 minutes, give the drug which you have not already used (paraldehyde or diazepam).

- ◆ Repeat this if necessary.
- ◆ **Do not use** paraldehyde from an ampoule that has been opened for more than 24 hours. Use a glass syringe if possible when giving paraldehyde.
- ◆ **Do not give** paraldehyde IV.
- ◆ **Do not give** diazepam (Valium) IM.

2. **Give a loading (starting) dose of phenobarbitone** to the child if he fitted for 20 minutes despite being given 2 doses of paraldehyde or diazepam (Valium). Give the loading dose of phenobarbitone IM if possible.



Phenobarbitone ampoule contains 200 mg/ml. Phenobarbitone tablet contains 30mg.

Table of Doses of Paraldehyde and Diazepam (Valium)

Approximate age	Weight (kg)	Paraldehyde IM	Diazepam IV	Valium rectal* See page 139
Under 6 months	3 - 5	1ml	1.25mg ( $\frac{1}{4}$ ml)	1.25mg ( $\frac{1}{4}$ ml)
6 months – 1 year	6 - 9	1 $\frac{1}{2}$ ml	2.5mg ( $\frac{1}{2}$ ml)	2.5mg ( $\frac{1}{2}$ ml)
1 – 2 years	10 – 14	2 $\frac{1}{2}$ ml	2.5mg ( $\frac{1}{2}$ ml)	5mg (1 ml)
3 – 5 years	15 – 19	3 ml	3.75mg ( $\frac{3}{4}$ ml)	7.5mg (1 $\frac{1}{2}$ ml)
6 – 10 years	20 – 29	4 ml	5mg (1 ml)	10mg (2 ml)
11 years and older	30 or more	5 ml	10mg (2 ml)	10mg (2 ml)

Dose of loading (starting) dose of phenobarbitone.

Weight (kg)	Dose
3 - 5 kg	$\frac{1}{4}$ ml (50 mg) IM or 2 tab. (60 mg)
6 - 9 kg	$\frac{1}{2}$ ml (100 mg) IM or 3 tab. (90 mg)
10- 14 kg	$\frac{3}{4}$ ml (150 mg) IM or 5 tab. (150 mg)
15 - 19 kg	1 ml (200 mg) IM or 6 tab. (180 mg)
20 kg or more	1 ml (200 mg) IM or 7 tab. (210 mg)

## Treat the cause

Do a lumbar puncture and a blood slide for malaria.

- ◆ **If the CSF is clear** - give IM quinine for cerebral malaria (see page 93).
- ◆ Repeat the lumbar puncture in 24 hours if there is no improvement.
- ◆ **If the CSF is obviously cloudy with pus** treat for bacterial meningitis. Give IM ceftriaxone (see page 137) and IM Artesunate.
- ◆ **If the CSF is bloodstained**, or you cannot get any CSF - Give IM ceftriaxone for meningitis and IM Artesunate for malaria.
- ◆ **Examine the child carefully**, looking for an acute infection. Check his eardrums, mastoids, throat, mouth for Koplik spots, chest and abdomen.

Treat any infection that you find.

## Stop further fits

- ◆ If the child is febrile, cool him. He may need paracetamol, or aspirin (in older children) (See page 89).
- ◆ If he continues to have fits, or if his fits lasted longer than 20 minutes he should already have received a loading dose of phenobarbitone.
- ◆ If the child has needed a loading dose of phenobarbitone he will have to continue with oral maintenance phenobarbitone every day.

Maintenance dose of phenobarbitone given by mouth each day:

Weight (kg)	Dose
3- 5 kg	½ tab. (15 mg)
6- 9 kg	1 tab. (30 mg)
10- 14 kg	2 tab. (60 mg)
15- 19 kg	3 tab. (90 mg)
20-29 kg	4 tab. (120 mg)
30 kg or more	5 tab. (150mg)

- ◆ Usually the maintenance dose of phenobarbitone is given at night. But if giving it each morning is easier for the parents to remember, it should be given in the morning.
- ◆ The maintenance dose of phenobarbitone should be continued every day until the child has had no convulsions for at least 18 months. When the child has had no fits for 18 months, the dose of phenobarbitone can be slowly reduced over a period of at least 2 months.
- ◆ Sometimes phenobarbitone does not prevent further fits occurring. If this happens you should refer the child to a doctor. Phenytoin (Dilantin) will sometimes prevent the fits when phenobarbitone does

not work. Use the 30 mg capsule or tablet of phenytoin. Do not use the 100 mg capsule or tablet of phenytoin.

- ◆ Phenytoin is usually used instead of phenobarbitone in children aged more than 5 years.

Dose of phenytoin (Dilantin)

Weight (kg)	Dose
3 - 5 kg	1 tab. or capsule (30 mg)
6 - 14 kg	2 tab. or capsules (60 mg)
15 - 19 kg	3 tab. or capsules (90 mg)
20 - 29 kg	4 tab. or capsules (120 mg)
30 kg or more	5 tab. or capsules (150 mg)

## Febrile convulsions

- ◆ A high fever in a young child can cause a convulsion (fit). Acute infections may cause a high fever. This fever can cause convulsions. So, these fits are called febrile convulsions. The acute infection can be a virus infection, otitis media, malaria, tonsillitis, pneumonia, measles, urinary infection or any other acute infection. A child who has had a febrile convulsion may have another febrile convulsion when he has a fever again.
- ◆ Febrile convulsions are most common in children between six months and six years old.
- ◆ As a child grows older, he is less likely to have convulsions with a fever.
- ◆ Every young child who has a fit and a fever needs a lumbar puncture and a blood slide for malaria.
- ◆ Febrile convulsions are the most common type of fit
- ◆ Examine a child with febrile convulsion carefully to find the cause of his acute infection (see fever, page 87). Then treat this infection.

## Epilepsy

A disease in which convulsions occur from time to time. Usually the cause of the disease is not known. But it may follow brain injury at birth, meningitis, or a head injury.

### Symptoms and Signs

- ◆ In mild cases convulsions occur only once or twice a year. In severe cases convulsions occur every few days. In very severe cases convulsions occur many times each day.

### Treatment

- ◆ Phenobarbitone sometimes helps. Other anticonvulsants e.g. phenytoin (Dilantin) or other special drugs are sometimes needed instead of phenobarbitone. These drugs should be ordered by a doctor. Drugs for epilepsy have to be taken every day. This is difficult for many patients, however if drugs are not taken regularly the epilepsy may get worse.
- ◆ Send children with epilepsy to a paediatrician or other doctor who can treat children. Then their treatment can be worked out. Children who have epilepsy sometimes hurt themselves during a convulsion. They may roll into a fire and get burnt. They may hurt themselves when they fall down at the start of a convulsion. They should not do things that are likely to hurt them if they have a convulsion (e.g. swim alone, ride a bicycle, climb trees, drive a car, sleep near a fire, and work with machinery).
- ◆ You should explain these things to the parents of children who have epilepsy. Most children with epilepsy can have their convulsions controlled with phenobarbitone, phenytoin or other drugs such as sodium valproate or

carbamazepine. Then they can lead normal lives, go to school, get jobs and have families of their own. People with epilepsy should not be subjected to stigma or discrimination, but deserve equal opportunities for going to school and participating in the community.

## Hydrocephalus

In this disease there is too much cerebrospinal fluid (CSF) in the head. This causes an increase of pressure in the skull, with a big head and damage to the brain.

### Cause

- ◆ Blockage to CSF flow may be congenital (born with it), or may follow meningitis or bleeding in the brain.

### Treatment

- ◆ Contact your paediatrician or other doctor about these children. Some cases may respond to medical treatment.
- ◆ Those that do not respond to medical treatment can sometimes be helped by an operation if the child is developing normally.
- ◆ Sometimes the disease stops, and the child develops normally despite his big head.

## Cerebral palsy

In this disease children have poor muscle control due to brain damage in early life.

The brain may be damaged by many conditions, such as:

1. Birth asphyxia (not enough oxygen reaching the brain)
2. Bleeding into the brain (cerebral haemorrhage)
3. Low birth weight
4. Severe jaundice
5. Meningitis
6. Low blood sugar (hypoglycaemia)
7. Viral encephalitis

Cerebral palsy can be mild, moderate or severe. Some children with cerebral palsy have normal intelligence, so you should talk to them as if they can understand you and treat them kindly. Because of their nerve and muscle spasticity some cannot speak. Some have intellectual disability (learning problems) and that is why they cannot speak. The muscles may be tight (spastic), or there may be jerky movements of the limbs (dystonia).

### Treatment

- ◆ Regular exercises with a physiotherapist prevent permanent flexion deformities (limbs bent and joints stiff). Physiotherapists can also help teach badly affected children to walk. If a physiotherapist is not available, nurses or other health workers can do this work.
- ◆ Once the brain is damaged it cannot be made normal again, but improvements can occur in many cases.
- ◆ Parents of these children can usually be given practical help in looking after their children.

- ◆ In Port Moresby the Red Cross runs a Special Handicapped Children's Centre for these children and their parents.

## Endemic cretinism

- ◆ Goitre, better called endemic goitre, occurs throughout the Highland areas of Papua New Guinea. This is caused by a deficiency (not enough) of iodine in the diet. This makes the thyroid gland work harder to produce enough thyroid hormone. This hormone is necessary for life and for brain development.
- ◆ In some people the thyroid gland does not produce enough hormone. These people get a larger thyroid gland which we call a goitre.
- ◆ A much more serious disease than goitre is the disease called endemic cretinism, which is related to goitre. An iodine deficient mother is unable to supply enough thyroid hormone to the developing baby (fetus) inside her uterus. This thyroid hormone deficiency of the fetus may sometimes cause poor development of the baby's brain. When the baby is born he has the disease called endemic cretinism.
- ◆ One percent of the population used to have this disease in some places, such as the Jimi valley in Jiwaka. There are still known places where cretinism is endemic (common throughout the population) including Karamui district in Simbu where traditional salt contains no iodine.

Endemic cretinism includes the following signs and symptoms:

1. The patient is usually intellectually disabled (developmentally delayed, learning problems).
2. He is often deaf-mute (can't speak or hear).
3. He sometimes has squint (eyes don't look straight).
4. His muscles are often not strong. He usually walks with his knees bent. Usually his legs are stiff.

In the most severely affected people, there is severe mental retardation. The child is unable to use his hands and legs properly and may not be able to walk at all. These children may die of malnutrition and other diseases while they are still young.

## Treatment of goitre

An IM injection of iodised oil (Neohydriol or Lipiodol). The injection is given into the buttock.

### Dose

- ◆ Adults - 2 ml.
- ◆ Children under 15 years - 1 ml.

In younger people the goitre may disappear altogether. In older people it may only get smaller. Some of the goitre is scar tissue and will not go away unless it is removed by an operation.

## Treatment of endemic cretinism

Nothing can be done to help children with endemic cretinism, although they too should receive an IM injection of iodised oil. It is hoped that by giving

iodised oil to all women of childbearing age (10 - 45 years) in iodine deficient areas every 5 years, endemic cretinism will be prevented in Papua New Guinea. All females aged between 10-45 years (reproductive or childbearing age) in a village or area should be given iodised oil by IM injection in the buttock if:

1. Any cases of endemic cretinism are seen, or
2. The number of people in whom a goitre (enlarged thyroid gland) can be seen is 1 in 20 or more, i.e. visible goitre rate is 5% or higher.

#### Dose

- ◆ Adults - 2 ml.
- ◆ Children under 15 years - 1 ml.

This dose lasts for 5 years.

Another way to prevent endemic goitre and endemic cretinism is to pass a law that all salt that is sold must have iodine added to it. This will give people enough iodine in their diet if they buy salt. Papua New Guinea now has this law.

### Sporadic cretinism

Occasionally a child is born with little or no thyroid gland. Without treatment with thyroxine (thyroid hormone) the child does not grow properly. He is mentally very slow in development. The skin, especially on the face, looks thick and puffy. The tongue sticks out from the mouth. Often there is a large umbilical hernia. Usually there is constipation.

Treatment must start early if the child is to develop normally. If you suspect a baby has sporadic cretinism send him to a doctor for diagnosis and treatment.

### Down syndrome

This is a congenital condition in which there are delays in both mental and physical development.

#### Symptoms and signs

A child with Down syndrome has a short flat head, up slanting eyes, a small flat nose, and a large tongue. The hands and feet are wide. The palm of the hand has a single skin crease that goes right across the palm. These children are usually happy and friendly. They are not difficult to manage. Sometimes they have other congenital abnormalities, e.g. congenital heart disease. They are a bit more susceptible to infections than other children, but if they do not have any other congenital problems (heart or bowel problems) then they grow and lead happy lives.

#### Treatment

There is no special treatment, unless they have other medical problems (heart disease, bowel problems such as obstruction). For most children with Down syndrome their parents should look after them in their community, and they are happy and play. Most can go to school. The role of the paediatric nurse or paediatrician is to make the diagnosis, check them for other problems, and counsel the parents about Down syndrome and what to



expect. They do not to be sent to hospital unless they have some other illness that needs hospital treatment. Parents should be told their child will develop but be a bit slower than other children, but they can have a happy and good life if they are looked after in a loving family and the community accepts them.

## Tetanus

### Cause

- ◆ Tetanus is caused by bacteria which make a child's muscles contract severely. His jaw muscles contract so strongly that he cannot open his jaw and eat.
- ◆ Tetanus bacteria live in the gut of animals which eat grass. The bacteria are passed with the animals' faeces onto the ground. Tetanus bacteria can live for many years in earth and dust. If a child cuts himself, tetanus bacteria may go into the wound and grow.
- ◆ Tetanus bacteria can infect any size cut, even a very small one. But they infect a large, deep or dirty cut more easily. Tetanus bacteria can also infect the umbilical cord and cause neonatal tetanus (see page 56). Tetanus bacteria grow slowly.

### Symptoms and signs

- ◆ In older children the disease may not start for 2 to 3 weeks after bacteria have infected a cut. Tetanus bacteria stay and grow in the wound. They cause disease by making a toxin (poison) which goes from the wound into the nerves of

the body. The toxin passes along the nerves to the muscles.

- ◆ The toxin makes the muscles contract too much. At first the muscles are only stiff and painful. Later, the child has strong painful contractions (spasms). Tetanus usually starts in the jaw muscles and a child cannot eat or suck because he cannot open his mouth. This spasm of the jaw muscles is called trismus. As the stiffness becomes worse, the mouth stays shut. The stiffness soon spreads to other muscles. The back and head bend backwards. The muscles of the face contract. The corners of the mouth are pulled out and the eyebrows move upwards. This produces a nasty looking grin. Later, all the stiff muscles contract in spasms. This makes the child so tired that he becomes exhausted. Also, the respiratory muscles may go into spasms and prevent the child breathing, and he may die.
- ◆ Fits also cause muscle contractions. But fits make a child unconscious. A child with tetanus stays conscious (can look around and react normally between spasms) and cries with pain.

### Treatment

**Neonatal tetanus.** See page 56 for the treatment of babies with tetanus.

#### Tetanus in children

Children with tetanus need strong sedation and very careful nursing. It is difficult to nurse a tetanus patient in a health centre. So refer the child to a

paediatrician and arrange an ambulance to take the child quickly to hospital. Start treatment before sending the child to hospital. Make sure the child is well sedated for the journey to hospital.

1. Give IM paraldehyde 0.2 ml/kg. Maximum dose 5 ml.
2. Put up a dextrose saline IV drip, to run slowly, for intravenous drugs. Run the drip at 25 ml/hour (7 drops per minutes).
3. Give IV tetanus immunoglobulin 4000 units (2 large ampoules). If you do not have the IV ampoules of tetanus immunoglobulin, give 3 ampoules of the 3ml IM ampoules of tetanus immunoglobulin. This is a dose of 750 units, as each 3 ml IM ampoule contains 250 units.

Make sure you use the large 3ml IM ampoules, and not the small ½ ml (60 units) ampoules.

4. Give IV diazepam (Valium). Give 0.1 ml/kg (½ mg/kg) of diazepam IV slowly.
5. Repeat this dose of IV diazepam every half hour if severe spasms come back.
6. Give IM chlorpromazine (Largactil) 0.1 ml/kg (2.5 mg/kg).
7. Give IV benzyl (crystalline) penicillin.
8. Transfer to hospital

The child must be looked after carefully by a trained health worker during the journey to hospital.

- ◆ The child's airway (pharynx) may need to be sucked out.

- ◆ The tetanus spasms may need more IV diazepam.
- ◆ The IV drip must be carefully watched.
- ◆ Keep the drip going slowly at 25 ml/hour (7 drops a minute). Then you can give diazepam IV if the child has spasms.
- ◆ If the drip goes into the tissues, you will have to give more IM paraldehyde for spasms.

**If you cannot send the child to hospital**, you will have to look after him as best you can at the health centre.

Carry out the immediate treatment, as above

Then:

1. Remove the IV drip. It is safer not to use an IV drip if the child is staying at the health centre.
2. Pass a nasogastric tube.
3. Give chlorpromazine (Largactil) by nasogastric tube every 6 hours. Use 25mg tablets of chlorpromazine, crushed up.

Carry out the immediate treatment, as above, then:

1. Remove the IV drip. It is safer not to use an IV drip if the child is staying at the health centre.
2. Pass a nasogastric tube.
3. Give chlorpromazine (Largactil) by nasogastric tube every 6 hours. Use 25mg tablets of chlorpromazine, crushed up.
4. Give diazepam (Valium) by nasogastric tube every 6 hours. Use 5mg tablets of diazepam, crushed up.

Chlorpromazine (Largactil) dose:

Weight (kg)	Dose
Under 10 kg	1 tab (25 mg) 6 hourly
10 - 14kg	1 ½ (37.5 mg) 6 hourly
15 - 24 kg	2 tab (50 mg) 6 hourly
25 - 39 kg	2 tab (75 mg) 6 hourly

Diazepam (Valium)

Dose:

Weight (kg)	Dose
Under 10 kg	½ tab (2.5 mg) 6 hourly
10 - 14 kg	1 tab ( 5 mg) 6 hourly
15 - 24 kg	2 tab ( 10 mg) 6 hourly
25 - 39 kg	3 tab ( 15 mg) 6 hourly

If you have no diazepam tablets, you must use phenobarbitone tablets instead. Use 30 mg tablets of phenobarbitone crushed up. Give a large dose of phenobarbitone to begin with (stat.). Then give one dose each day.

**Dose of phenobarbitone.** (To be used if you have no diazepam tablets).

Weight (kg)	Dose
3- 5 kg	30 mg (1 tab) stat. Then 15 mg ( $\frac{1}{2}$ tab) each day.
6 - 9 kg	60 mg (2 tab) stat. Then 30 mg (1 tab) each day.
10- 14 kg	90 mg (3 tab) stat. Then 60 mg (2 tab) each day.
15- 19 kg	150 mg (5 tab) stat. Then 90 mg (3 tab) each day.
20-29 kg	180 mg (6 tab) stat. Then 120 mg (4 tab) each day.
30-49 kg	240 mg (8 tab) stat. Then 180 mg (6 tab) each day.

5. Give Paraldehyde 0.2 ml/kg IM or by nasogastric tube for severe spasms. This can be given every 6 hours if necessary. If you give paraldehyde by nasogastric tube you must dilute it with at least 50 ml of milk or other fluid.
6. Give milk or fluids by nasogastric tube. Give the same amount by nasogastric tube as in meningitis (see page 138).
7. Give Crystapen IV every 6 hours.
8. Immunize the child with tetanus toxoid, when he is better, before you discharge him home. An attack of tetanus does not give the patient any immunity against tetanus.

## Prevention

Tetanus is a horrible disease. It is much better to prevent it than to have to treat it. Tetanus is prevented by immunization with triple antigen or tetanus toxoid. If a child has a cut, wound or burn check the immunization record in his health record book.

1. If he is fully immunized against tetanus (3 or more doses of triple antigen or tetanus toxoid been given in the past), and the last dose of triple antigen or tetanus toxoid was given less than 5 years ago, he is fully protected against tetanus. He does not need any more tetanus toxoid now.
2. If he is fully immunized against tetanus, but the last dose of triple antigen or tetanus toxoid was given 5 or more years ago, he is not fully protected against tetanus. He needs a booster injection of tetanus toxoid now.
3. If he is not fully immunized against tetanus (Only two, one or no doses of triple antigen or tetanus toxoid given in the past) he is not protected against tetanus.
4. Give him tetanus toxoid injection now.
5. Look at his cut, wound or burn. If it is dirty, deep or infected: Give procaine penicillin or amoxycillin daily for 5 days. Also, give tetanus immunoglobulin IM 250 units if the child only had one or no doses of triple antigen or tetanus toxoid in the past.

6. Tell the child and his parents about returning to complete the course of tetanus immunization.

N.B. Do not suture a dirty, deep or infected wound. The wound must be cleaned thoroughly with chlorhexidine (Savlon) under sedation or anaesthesia. A deep wound must be examined for any foreign body.

All dead tissue must be excised. The wound should then be packed with a Eusol dressing. Send children with large or deep wounds to a doctor after cleaning them and giving tetanus prophylaxis and starting penicillin.

## Chapter 19: Renal (kidney) and genital diseases

The renal (kidney) or urinary tract includes the kidneys, ureters, bladder and urethra. The genitals are the external organs of sex.

### Urinary Tract Infection (UTI)

Infection of the bladder, and sometimes involving the kidney and ureter. UTI or urinary tract infection is the most common kidney disease in children. 10% of all children with fever that makes them unwell enough to be admitted to a hospital have UTI. If the UTI involves the kidneys it is called pyelonephritis.

#### Cause

Bacteria from the skin or the faeces go up the urethra, bladder and ureters from the outside to infect the kidneys. Or bacteria can reach the kidneys from the blood stream. The infection is more common in girls than boys because girls have short urethras.

#### Symptoms and signs

- ◆ Older children may complain of passing urine very often (frequency of micturition). Or they may complain of pain when they pass urine (dysuria). This pain when they pass urine may feel like a burning or scalding pain. Sometimes there is pain over the kidney area (loin), or in the abdomen. They often have fever. Sometimes the urine

contains blood (haematuria).

Younger children with urinary tract infection may not complain of pain when they pass urine. They may just have fever, or vomit and not feel well.

- ◆ You must think of UTI in a child who has fever or other illness for which you cannot find a cause. Children with malnutrition and fever sometimes have a urine infection.

#### Investigations

- ◆ Urine that is collected must be a clean and mid - stream specimen. It must be examined while fresh. Older children can give a mid-stream urine.
- ◆ For babies you can collect urine by the clean catch method. Ask mother to hold the baby upright. Gently clean the genital area with water on cotton wool or gauze swab.
- ◆ Then gently tap the area just above the pubic bone. Have the urine container ready all the time- sometimes just washing the genital area will stimulate a bladder emptying reflex.
- ◆ Make sure you don't collect the first bit of urine- because it is often contaminated.
  1. Hold the urine up to the light and look at it. If it is quite clear it is probably not infected, but only by looking through a microscope can you be sure.
  2. If you have urine test strips, dip one in the urine and read it. If the urine has blood, nitrates and leucocytes in it, it is infected.

3. Look at a drop of this urine under the microscope if you have one available. The presence of any bacteria, or of several pus cells, in a high power field of the microscope means urinary tract infection.
4. Culture and sensitivity tests on urine are important if pathology services are available. Keep the urine specimen in the refrigerator if it cannot be examined immediately.

### Treatment

If the child is very sick, febrile, not feeding well or if the older child has severe pain in the abdomen or over the kidney area, admit them and treat with amoxycillin and gentamicin. For those who do not have signs of severe illness treat with Cotrimoxazole (Septrin)

- ◆ **Cotrimoxazole (Septrin or Bactrim)** twice a day for one week.  
Cotrimoxazole tablet contains 80mg trimethoprim plus 400 mg sulphamethoxazole. Cotrimoxazole suspension contains 40 mg trimethoprim plus 200 mg sulphamethoxazole/ 5ml.

Dose of Cotrimoxazole (Septrin or Bactrim):

Weight (kg)	Dose
3 - 5 kg	2 ½ ml twice a day.
6 - 9 kg	5 ml or ½ tab twice a day
10- 14 kg	7 ½ ml or ½ tab twice a day
15 - 19 kg	10 ml or 1 tab twice a day.
20 - 29 kg	1 ½ tab twice a day
30 kg and over	2 tab twice a day.

- ◆ The child should drink plenty of fluids if she has a urinary infection.
- ◆ Treat urine infection for one week
- ◆ After treatment, the urine should be looked at again to make sure the infection has been cured. If the urine is still infected (does not look quite clear), more treatment is needed. Chronic urinary tract infections go on damaging the kidneys. So if urinary tract infections do not clear up (as shown by examination of urine) after one week of treatment, send the child to a paediatrician or other

doctor who looks after sick children.

- ◆ Some cases do not clear up properly with treatment because there is an obstruction or other problem somewhere in the urinary tract. These cases need a kidney ultrasound scan and special x-rays of the kidneys (intravenous pyelogram and micturating cystourethrogram).

### Acute glomerulonephritis

- ◆ This usually follows about two weeks after a Streptococcal throat infection (tonsillitis) or skin infection. There is fever, oedema (swelling) of the face and legs, haematuria (blood in the urine) and hypertension (raised blood pressure). The urine looks dark and sometimes is the colour of coca cola.
- ◆ The urine contains blood and some, but not a lot, of protein. You may be able to see the blood when you look at a urine specimen, or if you do a urine dipstick there will be ++++ blood.
- ◆ These symptoms and signs are often mild, and many children with acute nephritis are not sick enough to come for treatment.
- ◆ Most children recover completely. A few are left with permanent kidney disease. Some have severe body swelling from fluid retention because their kidneys are not making enough urine and excreting the water and wastes that they should.

### Treatment

Give a 10 day course of amoxycillin for the Streptococcal infection.

### Complications

Refer to a base hospital if:

1. the child passes very little urine (oliguria) or
2. becomes breathless or swollen (due to heart failure) or
3. has very high blood pressure or
4. has a fit or is lethargic or confused (which is often due to high blood pressure).

Take the blood pressure of every child with renal disease

### Nephrotic syndrome

A more obvious and serious disease.

### Cause

The exact cause is not known. Some cases are related to chronic malaria.

### Symptoms and Signs

1. Generalized oedema comes on slowly. The face, legs and abdomen become very swollen with fluid.
2. The urine contains large amounts of protein. It is frothy to look at, and when you check with a urine dipstick it contains ++++ protein. There may be some blood, but this is usually minimal (+ or ++).
3. Always test the urine for protein (see page 291) in every child with oedema.
4. Also check the blood pressure.
5. The illness is often chronic, but many cases of nephrotic syndrome respond well to steroids



(prednisolone), and some cases resolve without any treatment.

6. Test the urine for protein in every child who has oedema

### Treatment

- ◆ A high protein diet with no added salt. Tinned foods and milk contain a lot of salt. So, if possible, use fresh foods.
- ◆ Refer the child to a paediatrician or doctor with skills in looking after sick children. Special treatment with prednisolone or other drugs can be tried at hospitals. Sometimes the child needs to stay in hospital for up to a month, but after starting treatment many children can continue prednisolone through the health centre, with good liaison between the paediatric nurse or HEO and the paediatrician.
- ◆ You should explain to the parents that the treatment with prednisolone does not always work in children with nephrotic syndrome in Papua New Guinea, but it is definitely worth trying.
- ◆ Children who are treated with prednisolone for more than a few days should also be given Isoniazid

Prophylaxis (see p )

### Oedema

Oedema is body swelling, it may involve the face, hands and feet, arms and legs. When you press the skin gently with your finger or thumb, it leaves an indentation in the skin.

### Causes of oedema

### Nephrotic Syndrome

- ◆ Oedema is generalized and usually severe, the face and eyelids are very puffy. A lot of protein (albumin) is found in the urine.

### Anaemia – severe

- ◆ Oedema is usually in the legs and feet only, unless the anaemia is severe. The child has severe pallor with low Hb.
- ◆ Little or no protein is found in urine
- ◆ The child often has hookworm ova in stools
- ◆ The child may also have other signs of malnutrition, or chronic malaria infection (such as a big spleen)

### Kwashiorkor

- ◆ Oedema of face and legs.
- ◆ Unhappy child with loss of appetite
- ◆ Growth failure
- ◆ Often skin (flaky-paint) and hair changes (orange sparse hair)
- ◆ Little or no protein is found in urine

### Acute glomerulonephritis

- ◆ Slight (small amount of) oedema, mainly of the face (especially the eyelids) and legs
- ◆ Raised blood pressure (hypertension)
- ◆ Blood in the urine (haematuria)
- ◆ Some, but not a lot, of protein in the urine

### Heart failure

- ◆ Oedema of legs
- ◆ Big tender liver
- ◆ Fast pulse and fast breathing

- ◆ Often a heart murmur is heard
- ◆ Little or no protein is found in urine

#### TB abdomen

- ◆ Oedema of the abdomen (ascites)
- ◆ Malnourished
- ◆ Often signs of TB elsewhere, e.g. chest or lymph glands
- ◆ May have a family history of TB
- ◆ Little or no protein is found in urine

#### Liver failure

- ◆ Oedema of legs and abdomen (ascites)
- ◆ Jaundice
- ◆ Liver may be large, hard and lumpy
- ◆ Little or no protein is found in urine

#### Strongyloides

- ◆ Oedema of the abdomen (ascites) and legs
- ◆ Often a history of diarrhoea
- ◆ Many Strongyloides larvae can be seen in microscopy of fresh stool.

Test the urine for protein and take blood pressure in every child with oedema.

#### Vulvo-vaginitis

- ◆ Some small girls get a sore vulva. Sometimes there is a discharge (pus) from the vagina.
- ◆ These symptoms may be caused by thread worms, thrush (monilia, candidiasis), foreign body in the vagina, or by a bacterial infection of the vulva or vagina. The discharge and inflammation usually responds well to treatment.

#### Treatment

1. Apply 1% crystal violet in water (aqueous gentian violet) to the vulva 3 times a day if you have it. If not gently wash the vulva with normal saline- or sit the child in a bowl of saline or saltwater two or three times daily
2. Give a single dose of Albendazole. (see page 263).
3. Give oral amoxycillin tds for 5 days.

If there is a discharge (pus) from the vagina:

- ◆ Send a specimen of the pus, if possible, to a laboratory for gram stain and culture.
- ◆ If you suspect there is a foreign body in the vagina, then consider referring the child to a paediatrician. The child may need sedation for a rectal examination. On gentle rectal examination with a small finger, you will be able to feel it through the front wall of the rectum.
- ◆ Sadly, sometimes a purulent vaginal discharge will be because of a sexually transmitted infection or damage from child sexual abuse, even in young girls. If you suspect this, you should discuss your concerns carefully with the girl's mother.
- ◆ Urgently refer to your paediatrician or other doctor looking after children in your province. Special tests are needed to diagnose certain infections caused by child sexual abuse, and special treatment is needed to prevent long term complications. If proven or highly

suspected, the sexual abuse of children always must be notified to child protection / social welfare officers.

- ◆ Do not examine the child's genitals by yourself
- ◆ Make sure you have a female relative of the child and a nurse with you before you examine a girl's genitals.
- ◆ Send the child to a paediatrician or other doctor who looks after children if the soreness or discharge is not improved after 3 days. Also, send the child to a doctor if you can feel a foreign body in the vagina when you do a rectal examination, or if you suspect a rectal foreign body and the child is too scared to have such an examination.

doctor who looks after children. He may need a circumcision (removal of the foreskin).

- ◆ Sometimes a child's foreskin becomes pulled back over the end (glans) of his penis. His foreskin will not go back again and acts like a tight band around his penis (paraphimosis). Send him quickly to a doctor. He needs a cut in the foreskin to relieve the constriction (tight band).

## Phimosis

- ◆ A mother often worries about the foreskin (prepuce) that covers her son's penis.
- ◆ Tell her that often the foreskin cannot be pulled back until the child is 3 or 4 years or even older. Parents must not try to force the foreskin back. When it is ready to go back it can be pulled back easily.
- ◆ Sometimes a mother thinks that the hole in her child's foreskin is too small. Explain that if the child passes urine with a good stream, the hole is big enough. If the hole really is too small (phimosis), urine comes out too slowly. The child's foreskin swells with urine, and he cries when he tries to pass urine. So send him to a paediatrician or

## Chapter 20: Heart disease

Heart diseases in Children are common and can be classed into two groups, congenital (present at birth) and acquired conditions.

### Congenital heart disease

- ◆ Six to eight in every thousand babies born in PNG, as in all countries of the world, have a type of congenital heart disease. This means more than 900 babies are born in PNG each year with congenital heart disease.
- ◆ In most cases of congenital heart disease there is no cause that can be found. One cause is the effect of the rubella virus on the development and growth of the foetus when the mother is one to three months pregnant.
- ◆ Another cause is genetic syndromes like Down syndrome in which some affected children have congenital heart disease. Pre-term babies are more likely to have one type of congenital heart disease patent ductus arteriosus (PDA). However, such intrauterine infections and genetic syndromes and prematurity only cause a small number of the cases of congenital heart diseases.

### Symptoms and signs

Congenital heart disease should be suspected when a child:

1. fails to grow normally, or,

2. is cyanosed: at birth, or cyanosed at rest or with exercise, or,
3. becomes short of breath easily, such as during breast feeding, or,
4. has a loud heart murmur, or
5. has repeated attacks of pneumonia

Children who are failing to thrive, or with these other signs and are thought to have congenital heart disease should be referred to a paediatrician or other doctor who deals with children.

- ◆ If the child is well and active, but you think he has a heart disease because of a murmur, the child can be referred to a paediatrician for cardiac screening non-urgently. Find out when the cardiology paediatricians are doing their screening and contact the paediatrician to make sure the child gets on the list for screening. Screening involves an echocardiograph, a chest x-ray and other tests, and review by a cardiology paediatrician.
- ◆ Children who have congenital heart disease may get frequent pneumonia, and they may have respiratory distress because of heart failure. The signs of heart failure are a large tender liver, fast pulse, fast breathing and oedema of the legs. If these occur the child needs frusemide (Lasix) and often digoxin or captopril, and sometimes oxygen and help with feeding (such as using a nasogastric tube if the infant is breathless on feeding). Send the child to a paediatrician to be diagnosed properly and to start treatment. The paediatrician will write a personal treatment plan for

the child, which will include the medications they should take, and how they should be followed up.

- ◆ The Open Heart Surgical Team performs about 30-40 heart operations each year in PNG. Some operations (closure of a patent ductus arteriosus: PDA) are done in Port Moresby by national cardiac surgeons.

## Rheumatic fever

An illness in children and adolescents in which there is inflammation of the joints and the heart. Rheumatic fever usually occurs two to six weeks after a Streptococcal throat infection (caused by Group A Streptococcus).

### Symptoms and signs

- ◆ The child usually first complains of pain in a large joint, such as knee, ankle, elbow and wrist. The joint is hot, swollen, red and tender (*arthritis*). This may last a day or longer. As it gets better another joint becomes painful and swollen. This may be followed by a number of joints becoming painful and swollen, one after the other (*migratory polyarthritis*).
- ◆ There is also fever and malaise (feeling unwell).
- ◆ A heart murmur is usually heard (*rheumatic carditis*). The inflammation of the heart may cause permanent damage to the heart, or it may kill the patient. The heart valves are likely to get permanently damaged. They may get scarred and narrowed (*stenosis*). Or they may be scarred and unable to shut properly. This allows blood to flow in the wrong direction (*incompetence*). The mitral valve is most frequently affected. The aortic valve is the other valve often affected.
- ◆ Other features of Rheumatic fever which are not always present are lumps under the skin (subcutaneous nodules) and a rash (erythema marginatum).
- ◆ Another quite different form of rheumatic fever is chorea. This may develop very quickly or quite slowly. The child has jerky irregular movements of his limbs and face which he cannot control. The jerky movements usually last several weeks. They disappear during sleep and become worse when the patient is active.

**Differential diagnosis** (i.e. diagnosis from other diseases).

Rheumatic fever can usually be diagnosed by finding fever, arthritis affecting 2 or more joints and a heart murmur. Other diseases which may be confused with rheumatic fever are:

1. **Septic arthritis.** One joint, more swollen than in rheumatic fever, hot and very tender. No heart murmurs.
2. **Tuberculous arthritis.** Usually one joint, not as hot or painful as rheumatic fever or septic arthritis. No heart murmurs. Family history or other signs of tuberculosis.
3. Muscle and joint pains due to malaria

4. Joints not actually swollen. No heart murmurs. Blood slide or rapid diagnostic test positive for malaria.
5. **Osteomyelitis.** The main place of tenderness and swelling is over the bone not the joint. No heart murmurs.
6. Muscle and joint pains due to Dengue
7. **Polioomyelitis.** Unable to move the limb because of paralysis (not because of pain as in arthritis). No heart murmurs.

Sometimes it is difficult to distinguish Rheumatic fever from other forms of arthritis. If in doubt, refer to a paediatrician.

#### Treatment of rheumatic fever

1. Rest in bed. This is important because rest lowers the work of the heart and allows the valves to heal.
2. Aspirin. Give aspirin in high dose every 6 hours until pain is relieved (1-3 days).

High dose of aspirin for first 1- 3 days treatment of rheumatic fever:

Weight (kg)	Dose
10 - 14 kg	300 mg (1 tab) 4 times a day
15- 19 kg	450 mg (1 ½ tab) 4 times a day
20 - 24 kg	600 mg (2 tab) 4 times a day
25 - 29 kg	750 mg (2 ½ tab) 4 times a day
30 kg and over	900 mg (3 tab) 4 times a day

In rheumatic fever, aspirin quickly relieves the pain of arthritis and brings the temperature down.

When the pain is relieved (in 1-3 days' time) reduce the aspirin dose to the usual dose. Do not continue the high dose of aspirin for more than 3 days.

Usual dose of aspirin:

Weight (kg)	Dose
10 - 19 kg	150 mg (½ tab) 4 times a day
20 - 29 kg	300 mg (1 tab) 4 times a day
30 - 39 kg	450 mg (1 ½ tab) 4 times a day

Continue the usual dose of aspirin for 2-4 weeks.

3. Amoxicillin or benzylpenicillin (crystalline penicillin). This is given for 10 days to treat the streptococcal throat infection.
4. Return to activity. The child should be kept in bed until the signs and symptoms of active disease (especially fever) have disappeared. When there is no fever, less joint pain, normal pulse rate, and the child looks and feels better, and her appetite is back to normal it is good to mobilise and gently exercise to return to normal activity.
5. Sometimes children with acute rheumatic fever will have persistent heart failure, which requires regular treatment with frusemide (Lasix) and digoxin.
6. All children with acute rheumatic fever should be registered with the Rheumatic Heart Disease program. The PNG Rheumatic Fever Case Reporting Form is available at: <http://pngpaediatricsociety.org/rep>

[orts/disease-surveillance-case-reporting-forms](#)

#### Treatment of chorea

- ◆ These children do not have painful swollen joints (arthritis). They do not need aspirin. The jerky movements are treated with chlorpromazine (Largactil). See page 266 for dose. They also need amoxicillin or benzylpenicillin (crystalline penicillin).

#### Prophylaxis (prevention) of rheumatic fever

- ◆ A child who has had one attack of rheumatic fever is more likely to have another attack of rheumatic fever if she gets a streptococcal throat infection. So, it is important to prevent the child getting any more streptococcal throat infections.
- ◆ You can prevent streptococcal infections by giving penicillin regularly. One 250 mg penicillin tablet each day, or one injection of long acting penicillin injection benzathine penicillin 1,200,000 units every 4 weeks, will prevent streptococcal infections.
- ◆ Penicillin prophylaxis should be given after the first attack of rheumatic fever until the person is at least 20 years of age. This prophylactic penicillin is to prevent further attacks of streptococcal sore throat, and to prevent further damage to the heart valves. There is a risk of further damage to the heart if the child gets another attack of rheumatic fever. It is very



important that affected adolescents continue to take penicillin prophylaxis, if adolescents get another attack of Rheumatic fever this can lead to severe heart failure. In girls this can be especially dangerous when they are pregnant.

- ◆ You should get the penicillin tablets or long acting penicillin injection for rheumatic fever prophylaxis from your Area Medical Stores through your Provincial Health Office.
- ◆ Penicillin is the best antibiotic against Streptococci.

### Prophylaxis for dentistry

- ◆ Children who have heart disease (congenital heart disease or past history of rheumatic fever) must be given penicillin if they have any dental extractions (removal of teeth).
- ◆ This is to prevent bacteria from their mouth getting into their blood stream and infecting a damaged heart valve (endocarditis).

Give a single dose of amoxycillin one hour before the dental extraction.

Weight (kg)	Dose
Under 20 kg	3 tab (750 mg) amoxycillin one hour before the dental extraction.
20 - 30 kg	6 tab (1.500g) amoxycillin one hour before the dental extraction.
Over 30 kg	12 tab (3g) amoxycillin one hour before the dental extraction.

### Endocarditis

- ◆ Endocarditis is an infection inside the heart which can occur in children with congenital heart disease and in those with rheumatic heart disease.
- ◆ It is usually caused by bacteria and is a serious complication.
- ◆ The signs are not always obvious- sometimes there is bleeding under the nails or damage to the skin. But any child with heart disease who is febrile and unwell or anaemic with no obvious cause could have endocarditis and should be referred as quickly as possible to a paediatrician or doctor who deals with children.



- ◆ If there is likely to a delay of more than a day in your referral, you should commence treatment with crystalline penicillin and gentamycin.

### Heart failure in anaemia

- ◆ Severe anaemia can cause heart failure. It is common to have a heart murmur with severe anaemia, and the other signs (very fast heart rate, fast and difficult breathing, enlarged liver).
- ◆ Treat the anaemia (see page 101) and the heart failure, give oxygen, frusemide and refer safely to a hospital with a paediatrician. If a child is in heart failure from anaemia, they need to be treated in a health facility where a blood transfusion can be given safely, and the heart failure treated carefully.

## Chapter 21: Diseases of bones

Fractures are dealt with in your surgical textbook. Tuberculosis of bones has already been described.

We will discuss only two diseases now, infections of bones and joints, and a common cancer affecting bones. Both of these are important diseases of bones affecting children in Papua New Guinea.

### Osteomyelitis

- ◆ Osteomyelitis is infection of the bone. There may or may not be a history of injury to the bone.
- ◆ In the acute stage the baby or child has fever, malaise (feels unwell), cannot use the limb, and there is tenderness (pain when you press) over the end of a long bone, e.g. femur, tibia, humerus or forearm. Other bones can be affected, including the maxilla (upper jaw bone) or mandible (lower jaw bone) in children whose teeth are badly infected. Osteomyelitis must be diagnosed early to prevent chronic disease and bone deformity.
- ◆ The infection may spread from the bone to subcutaneous tissue. The child may then seem to have cellulitis (skin infection) or abscess. But in any child with cellulitis look carefully and feel to see if there is swelling, induration (hardness of the skin), tenderness and pain on movement, which are signs of underlying osteomyelitis.

- ◆ All swellings over the end of a long bone, especially in babies, should be treated as osteomyelitis until you are sure they are not osteomyelitis.

Treat osteomyelitis for four weeks

- ◆ A child with a painful limb and fever may have osteomyelitis. A child with a painful joint and fever may have septic arthritis. These are both serious infections. Always admit the child and give cloxacillin (or flucloxacillin) or chloramphenicol.
- ◆ If fever, tenderness and swelling remain after 48 hours of treatment, refer to hospital.
- ◆ Early surgical incision and drainage may be needed.

### Treatment

1. Antibiotics
  - ◆ Cloxacillin / flucloxacillin for 4 weeks
  - ◆ The dose is 50mg/kg/dose, given every 6 hours intravenously.
  - ◆ If you do not have Cloxacillin or Flucloxacillin, Chloramphenicol for 4 weeks can be effective
  - ◆ Give chloramphenicol suspension or capsules every 6 hours:
  - ◆ The dose of chloramphenicol is 25mg/kg/ dose, given every 6 hours.

Do not give a dose more than 500 mg to a child, for example:

Weight (kg)	Dose
3 - 4 kg	100 mg (4 ml) suspension
5 - 6 kg	150 mg (6 ml) suspension
7 - 9 kg	200 mg (8 ml) suspension
10 - 14 kg	300 mg (12ml) suspension or 1 capsule
15 - 19 kg	375 mg (15ml) suspension or 1 capsule
20 - 49 kg	500 mg or 2 capsules

If the child is very sick or is vomiting, give IM chloramphenicol as for meningitis (see [page 137](#)).

## 2. Nutrition

Most children with osteomyelitis have malnutrition. Give nutritious food and a balanced diet (high protein and sufficient energy).

## 3. Blood transfusion

Many children with osteomyelitis have anaemia. If the child is anaemic (haemoglobin less than 6 g/dL), give a blood transfusion of packed cells if this is possible (see [page 103](#)).

## 4. Monitoring

- ◆ Culture any pus to see whether the antibiotic should be changed.
- ◆ Blood culture, if possible, is done at the start of the illness, to identify the bacteria.
- ◆ If you are using chloramphenicol Hb and white cell count should be done if possible, each week to check for chloramphenicol toxicity.
- ◆ X-ray of bone is done, if possible, every 2 weeks to assess progress.

## Chronic osteomyelitis

- ◆ If osteomyelitis is not treated early or properly, or not treated for long enough, chronic osteomyelitis will occur.
- ◆ Chronic osteomyelitis is where there is a necrosis (breakdown) of the bone, and a chronic sinus (hole between the bone and the skin) appears, draining pus from the inside of the bone.
- ◆ Bone damage in a young baby is very serious because it may stop the limb (arm or leg) growing and cause limb deformity and fractures. If the hip is affected it may prevent the child walking.
- ◆ Send all children with suspected chronic osteomyelitis to a hospital where they can be seen by a paediatrician and surgeon.

## Pyomyositis

- ◆ The abscess is in the muscle. There may also be an underlying osteomyelitis.
- ◆ It is often difficult to be sure if a child has pyomyositis or osteomyelitis so you must treat for osteomyelitis with cloxacillin/flucloxacillin or chloramphenicol for 4 weeks.
- ◆ If you are sure only the muscle and NOT the bone is involved, a surgical doctor can incise and drain (I&D) the muscle abscess and give antibiotics for only one week.

## Septic arthritis

- ◆ Like osteomyelitis this is a serious disease. An abscess forms in the joint and will do great harm unless it is treated quickly. The joint swells up and any movement of the joint causes pain.
- ◆ You can be certain of the diagnosis if you aspirate pus from a swollen joint. Treatment is very similar to that of osteomyelitis. Aspirate as much pus as possible. Give cloxacillin / flucloxacillin or chloramphenicol.
- ◆ Splint the joint. Refer to hospital.

Refer children to a doctor for surgery if they meet the following criteria

1. All cases of osteomyelitis, pyomyositis or cellulitis if:
  - i. The child still has a fever or a lot of tenderness and swelling after 2 days treatment with cloxacillin/flucloxacillin or chloramphenicol; or
  - ii. There is an abscess that needs to be incised and drained.
2. All cases of septic arthritis.
3. All cases of chronic osteomyelitis.



Figure 41 - Burkitt's lymphoma, showing swelling of maxilla which has pushed the eyeball out.

## Burkitt Lymphoma

- ◆ This is the commonest tumour in children in Papua New Guinea. It usually starts in the maxilla (upper jaw) and mandible (lower jaw) as a fast growing tumour. In the early stages it can easily be mistaken for a dental problem, but it doesn't usually present with a lot of pain.
- ◆ If you look inside the mouth you might see that the molar teeth have been moved by a swelling. Other parts of the body which it may affect are the orbit (eye socket), abdominal organs, and spinal cord causing paralysis of legs (paraplegia).
- ◆ Children with Burkitt lymphoma should be referred to a paediatrician in a base hospital.

Special drug treatment with anti-cancer drugs (chemotherapy) will sometimes cure the tumour if treatment is given early and the cancer has not yet spread. If the cancer has spread or chemotherapy is not given early, the prognosis is poor.

- ◆ The tumour may come back after treatment and spread to other parts of the body. Soon after this the child dies. Refer any child with suspected Burkitt lymphoma or other cancer urgently to hospital for assessment.

## Chapter 22. Common infectious diseases

Many diseases of children in Papua New Guinea are infections (due to an infectious agent – a virus, bacteria or parasite), and many are infectious (can be spread easily from one person to another). This chapter covers only a few of the important infectious diseases, many of which can now be prevented by vaccines (then they are sometimes called “vaccine-preventable diseases”). Other separate chapters in this book deal with other common infectious diseases (such as pneumonia, diarrhoea, meningitis, tuberculosis, HIV).

### Whooping Cough (Pertussis)

#### Cause

- ◆ Caused by the bacteria *Bordetella pertussis*, which spreads by "droplets" from person to person by coughing, sneezing and talking.
- ◆ Incubation period (time between contact with the disease and the start of illness): 7- 10 days.
- ◆ Period of communicability (time during which the child is infectious and can pass on his disease): From 2 days before the start of illness until 3 weeks after the start of illness.
- ◆ The disease starts as a cough, nasal discharge, and fever (URTI). But the cough slowly gets worse. After about one week the cough starts to come in spasms (lots of coughing together).
- ◆ The bacteria that cause whooping cough grow in the bronchi. They cause the mucosa of the bronchi to make very sticky mucus. So, a child with whooping cough, coughs in a special way.
- ◆ She coughs continuously (paroxysms of coughing) without breathing deeply in. When she breaths in again after paroxysms of cough, she breathes so strongly that she makes a noise called a 'whoop.' She goes "Cough - cough - cough - cough – whoooooop," to take a big breath. She may become cyanosed and look as if she is going to choke. After coughing and whooping she may vomit. Often thick sticky mucus hangs from her mouth.
- ◆ When she is not coughing, she usually looks healthy, she doesn't usually have fast breathing or chest indrawing, but she can become very tired from all the coughing.
- ◆ She can also develop secondary pneumonia, where she will have persistent fast breathing and chest indrawing.
- ◆ Diagnose whooping cough from the sound of the whoop and the paroxysms of coughing.

#### Symptoms and signs

- ◆ Whooping cough affects children of all ages but is most common in children under four years of age. It is very serious in young infants.

The diagnosis of whooping cough is difficult during the first week of the illness, before the whoop has started,

and the child often just has the cough and a runny nose.

- ◆ Ask the mother if her child has been near any other child with whooping cough. Whooping cough causes changes in the blood (increase of lymphocytes), so a blood film may be able to help in the diagnosis.
- ◆ After a child has coughed for about 1 - 2 weeks, he starts to whoop, and diagnosis is easy. Children usually cough for another 2-3 months and then recover. It is sometimes called the "100 day cough" because the cough goes on for so long a time (almost 3 months).
- ◆ A child with mild whooping cough coughs for only a few weeks and may never whoop. Babies less than a year often do not whoop. Instead, they have spasms of coughing, stop breathing for 30 seconds or a minute, become cyanosed, and then vomit mucus.
- ◆ These attacks are dangerous, and infants can die from them. Strings of mucus may hang down the sides of their mouth. The mother often has to clean the mucus out of the baby's mouth before she can breast feed him.

#### Complications:

1. Pneumonia. Sometimes a piece of sticky mucus blocks one of the child's smaller bronchi and causes pneumonia. If this is not treated properly it may permanently damage her lungs.

2. Malnutrition. The long illness and vomiting may cause the child to lose weight. If she was already a bit malnourished when she got whooping cough, she is likely to become very malnourished after 2-3 months of the illness.
3. Convulsions. Sometimes a child has a fit at the end of the bad coughing spasm. If this happens give her paraldehyde.
4. Heart failure. This sometimes happens in severe whooping cough.
5. Others. The severe coughing may cause nose bleeds (epistaxis), ulcers under the tongue, subconjunctival haemorrhage, oedema of the eye lids or rectal prolapse.
6. Whooping cough makes *primary tuberculosis* worse. If a child with primary TB gets whooping cough, her resistance to TB is decreased. The tuberculosis gets worse. Her cough and weight loss, which started as whooping cough, may continue because she now has TB.

#### Treatment

Admit to hospital or health centre if the child:

1. is under 6 months of age
2. has had any cyanotic attack
3. has pneumonia
4. has convulsions
5. has heart failure
6. is malnourished

When treating the child as an outpatient:

1. Warn the mother that the coughing may last 1-3 months.

2. Encourage the mother to feed the child immediately after vomiting. An attack of whooping cough lasts several weeks. The child's nutrition must be looked after carefully. He should be re-fed after vomiting. The vomiting gets rid of the sticky mucus in his stomach, and he will now tolerate food and drink.
3. Tell the mother to return if the child:
  - a) Has shortness of breath.
  - b) Has apnoea (stop breathing), cyanosis (blue colour) or convulsion.
  - c) Loses weight.
4. Prevent the spread of whooping cough. Give pentavalent vaccine to any young child contacts who are not fully immunized.

When treating the child in health centre or hospital:

1. Suction of the pharynx. Many babies die by choking to death. So, if the baby goes blue with a coughing spasm, suck the sticky mucus out of his pharynx. This may have to be done many times a day.
2. Oxygen if there is apnoea and/or cyanosis.
3. Pneumonia
  - ◆ Treat with azithromycin or erythromycin or chloramphenicol (see page 118).
4. Convulsions
  - ◆ Treat with paraldehyde (see page 143)
5. Heart failure
  - ◆ Treat with digoxin (see page 118).
6. Nutrition

- ◆ Encourage the mother to feed the child immediately after vomiting. Treat malnutrition if present (see page 35).
7. No cough medicines
    - ◆ The cough helps the child get rid of the sticky mucus. If he did not cough out the mucus, it would block up his small bronchi. So, we should not try to stop him coughing. But if the child coughs all night and cannot sleep, he will soon become exhausted. If the child has trouble sleeping at night, give him chloral hydrate elixir (see page 265 for dose).
  8. Erythromycin or chloramphenicol
    - ◆ Whooping cough is only helped by erythromycin or chloramphenicol if the antibiotic is given in the first week of illness. But the child does not whoop in the first week of illness.
    - ◆ So, the diagnosis is usually not made until after the first week of illness. By this time, it is too late for antibiotics to make the disease better. But we still give erythromycin or chloramphenicol, 4 times a day for 5 days, to stop the child infecting other people. Give chloramphenicol IM if the child is less than 3 months old, or has severe pneumonia, or is vomiting.
    - ◆ If the child has pneumonia give the erythromycin or chloramphenicol for 7-10 days.

## Prevention



1. Immunization with pentavalent vaccine prevents whooping cough.

- ◆ Babies are not born with any immunity (protection) against whooping cough. Whooping cough is most dangerous in young babies. Many young babies who get whooping cough die from the disease. Most deaths in whooping cough occur in babies under 6 months of age. So it is important to make sure that all babies start Pentavalent immunization when they are 1 month old. The second dose of pentavalent vaccine is given 1 month after the first dose. The third dose is given 1 month after the second dose. The baby is only protected from whooping cough when he has had two doses of pentavalent vaccine (at about 3 months of age).
- ◆ Babies catch whooping cough from their older brothers and sisters who bring the disease into their house. This can be prevented if the brothers and sisters (siblings) are fully immunized.
- ◆ Prevent whooping cough by triple antigen

2. Early treatment with erythromycin or chloramphenicol.

- ◆ When a child gets whooping cough, his brothers and sisters will probably catch the disease if they have not been fully immunized. Children under 2 years of age and malnourished children get very ill, and may die, if they get whooping cough.

You must think of whooping cough if an unimmunized child, who has been in contact with a case of whooping cough gets a cold or cough. If this child is under 2 years old, or is malnourished, you must treat him with erythromycin or chloramphenicol at the first sign of a cough or cold.

- ◆ Chloramphenicol will make the whooping cough much milder if it is given early, in the first week of the disease, before the cough becomes severe or the child whoops. As chloramphenicol is given 4 times a day, it is often necessary to admit these children.

3. **Isolation.**

- ◆ Keep patients with whooping cough away from young children. A child who has had whooping cough should not return to pre-school or school until 3 weeks after the start of the whoop.

Whooping cough in immunized children

- ◆ Whooping cough component of the pentavalent vaccine is effective in preventing severe pertussis, but many infants develop whooping cough before they have had enough vaccines to be protected. The whooping cough vaccine is not as good as the diphtheria toxoid or tetanus toxoid in pentavalent. Some children fully immunized with pentavalent still get whooping cough. But their disease is much

milder than it is in those who have not been immunized.

#### Recurrence of whooping cough

- ◆ Once a child has had whooping cough, he will not get whooping cough again. The disease gives him strong immunity. But if he gets a cough a few weeks or months after an attack of whooping cough, he may start whooping again. This is *not* another attack of whooping cough. It happens because the child's brain remembers he whooped before when he coughed. So when he gets another cough he may start to whoop again.

**Contacts of whooping cough** should be kept away from pre-school (but not ordinary school) for 3 weeks after the last contact with a case of whooping cough. This is because whooping cough is a dangerous disease in young children. If the contact has already had whooping cough or been fully immunized with 3 doses of pentavalent vaccine, there is no need to keep him away from pre-school.

## Measles

### Cause

- ◆ Infection due to a virus. It is very infectious and often occurs in epidemics. It is spread by "droplets" sprayed from one child to another during coughing, sneezing or talking.
- ◆ Incubation period: 10 - 14 days.

- ◆ **Period of communicability:** 4 days before the rash till 5 days after the start of rash.

### Symptoms and signs

- ◆ Measles starts with a fever, a discharge from the nose, a cough, a sore mouth, and sore red eyes. The child becomes irritable and keeps his eyes closed. On the third day, his fever gets worse.
- ◆ On about the fourth day the rash comes. He begins to get better a few days later. Measles is not easy to diagnose before the rash comes, but red watery eyes are a useful sign. We can get more help by looking inside a child's cheeks.
- ◆ The measles rash starts here one or two days before it comes on the skin. The measles rash inside the cheeks is called Koplik spots. These look like small white pieces of salt on the red mucosa of the cheeks. Always look for Koplik spots if a child has a fever, or a cough and sore eyes. Koplik spots tell you that the measles rash is going to come tomorrow, or the next day.
- ◆ The measles rash comes on the fourth day of the fever
- ◆ The measles rash is made of small red lesions.
- ◆ Some are flat (macules) and others are raised (papules). The rash first comes behind a child's ears. Then it comes on his neck, then on his face and body, and last on his arms and legs. It lasts about four days, and then starts to go away. In dark skinned children it is often easier to feel the rash than to see it. In severe measles the rash is a darker

red or sometimes black colour. The dark measles rash peels off (desquamation). A dark measles rash is a sign of severe measles.

### Complications

1. **Severe measles.** Well-nourished children usually recover quickly from measles. But in malnourished children the virus affects the mucosa (cells lining body surfaces) badly. The measles virus causes a rash on the skin which we can see. It also causes a rash inside the body which we cannot see. Severe measles usually occurs in malnourished children.
  - a) The rash on the skin darkens, and then peels off (desquamates).
  - b) The inside of the mouth becomes very sore (stomatitis).
  - c) The conjunctiva becomes badly affected (conjunctivitis).
  - d) The lungs are affected (pneumonia).
  - e) The larynx may be affected (laryngitis).
  - f) The gut is affected (diarrhoea or dysentery).

Dark measles rash means severe measles.

2. **Common complications.** Otitis media, pneumonia, diarrhoea and stomatitis (sore mouth) are common complications of measles. Permanent lung damage may occur if the pneumonia is not treated correctly.
3. **Malnutrition.** Measles makes a child's nutrition worse. His sore

mouth stops him eating. His diarrhoea makes him absorb less food. His fever increases the food burnt by his body for energy. Most children lose weight after measles. If a child was malnourished when he got measles, he is likely to become much more malnourished, and get marasmus or kwashiorkor.

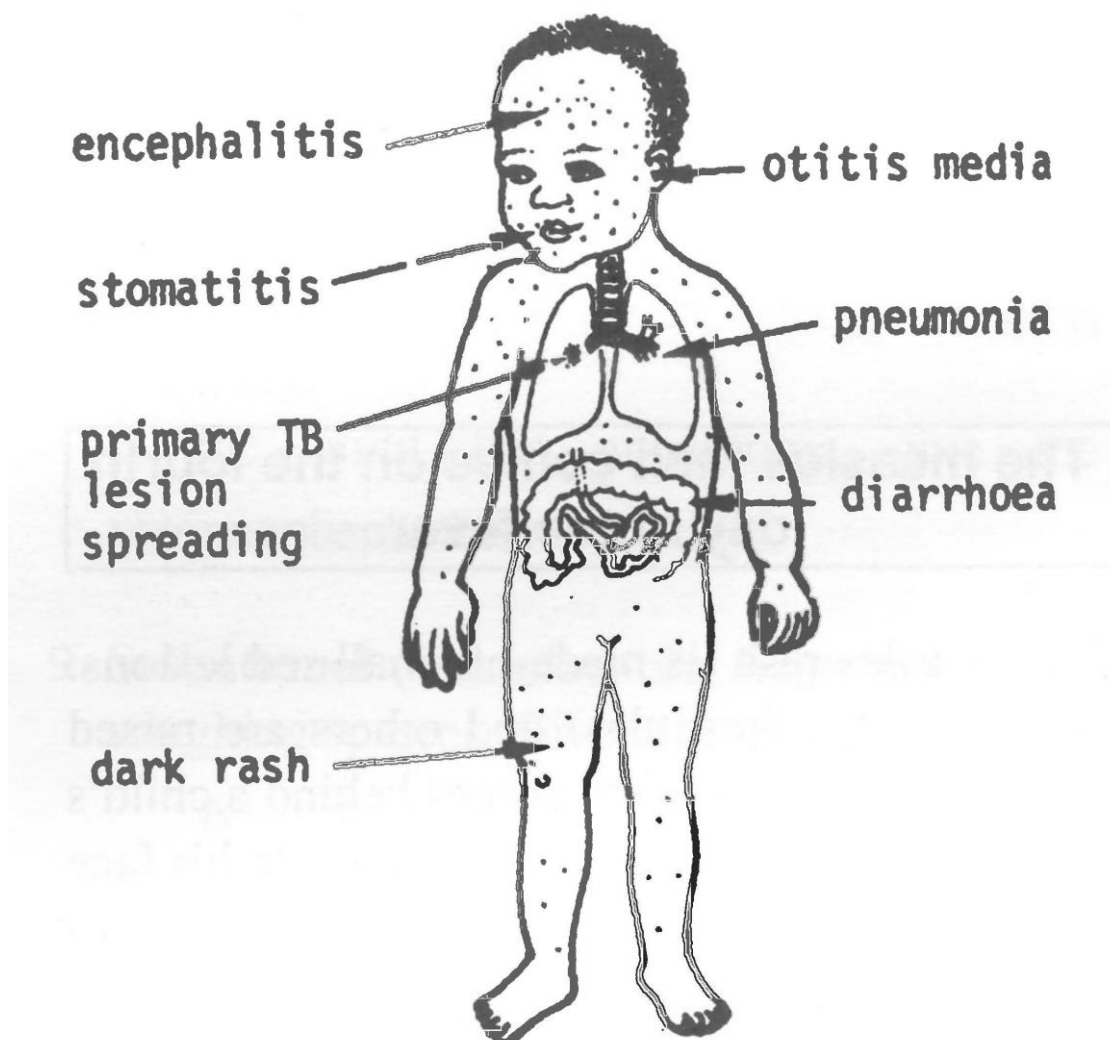
Note the vicious circle between measles and malnutrition. Malnutrition makes the attack of measles worse. And measles makes the child's nutrition worse.

4. **Tuberculosis.** Measles, like whooping cough makes primary tuberculosis worse. Measles decreases the child's resistance to TB.
5. **Cancrum oris.** A bad stomatitis in a malnourished child with measles may go on to become an ulcer. The ulcer may spread from the inside of the cheek to the outside. The child has a hole in his face which is called cancrum oris.
6. **Convulsions.** These are usually caused by the high fever (febrile convulsion, see Page 145).
7. **Encephalitis.** This is a very uncommon, but serious, complication of measles. The child has a severe headache, becomes very drowsy, sleepy or unconscious and has convulsions.

Most children with measles encephalitis die.

8. **Subacute Sclerosing Pan-Encephalopathy (SSPE).** This is an uncommon but fatal complication

that occurs some months or years after the measles infection. Affected children develop neurological signs and deteriorate over weeks to months.



**Figure 42 - Some complications of severe measles.**

## Treatment

Well-nourished children who do not have severe measles or complications are treated as outpatients. Children with severe measles or complications should be admitted to hospital or health centre.

Admit to hospital or health centre if:

1. The rash is dark or peeling (desquamating)
2. The child has severe diarrhoea or is dehydrated
3. The child is unable to drink well because of soreness of the mouth.
4. The child has pneumonia
5. The child has difficulty breathing
6. The child has severe conjunctivitis
7. The child has had a convulsion
8. The child is poorly nourished
9. The child has severe oral thrush

Well-nourished children with mild measles

1. Treat as an outpatient.
2. Give the same treatment as for fever - fluids, paracetamol, and antimalarials (see page 89).

Remember to give extra fluids if the child has diarrhoea.

3. Antibiotics do not kill the measles virus. So penicillin is only given for complications like otitis media or pneumonia.
4. Vitamin A to all children with measles as soon as the diagnosis is made.

Under 1 year: ½ concentrated capsule (100,000 u/s)

1 year and over: 1 concentrated capsule (200,000 u/s)

5. Encourage the parents to feed the child.

Remember that measles has a bad effect on nutrition.

6. Treat mild complications in the outpatients, e.g. mild conjunctivitis, mild pneumonia, mild diarrhoea, mild stomatitis, with the appropriate treatment.
7. Warn the parents to return at once if the child gets any of the signs of severe measles (see list of reasons for admitting the child with measles to hospital or health centre).
8. Siblings. Give measles and rubella (MR) vaccine to the child's siblings who are between 6 months and 5 years of age if they have not already been immunised.

## Treatment of severe measles

1. Admit the child to hospital or health centre.
2. Give the same treatment as for fever - fluids, paracetamol, and antimalarials (see page 89).
  - ◆ Remember to give extra fluids if the child has diarrhoea.
3. Encourage the parents to feed the child.
4. Give a single dose of oral vitamin A.
  - ◆ Under 1 year: ½ concentrated capsule (100,000 u/s)

- ◆ Over 1 year: 1 concentrated capsule (200,000 u)
- 5. Treat the complications:
  - a) Stomatitis (see page 83).
  - b) Conjunctivitis (see page 172).
  - c) Pneumonia (see page 116). All children with severe measles should receive antibiotics, amoxicillin if they have moderate pneumonia, or benzylpenicillin and gentamicin or chloramphenicol if they have severe pneumonia.
  - d) Laryngitis (see page 111).
  - e) Diarrhoea (see page 70). Rehydration with ORS, and giving zinc are the basis of treatment.
  - f) Otitis media (see page 121).
  - g) Convulsions (see page 143).
  - h) Malnutrition (see page 35).
- 6. Siblings: give measles and rubella (MR) vaccine to all the child's siblings who are between 6 months and 5 years if they have not already been immunised.

### Prevention

1. **Immunisation with measles vaccine prevents measles.** In Papua New Guinea 4 doses are required. Measles vaccine is now given as the measles / rubella vaccine. Give the first dose at 6 months of age and the second dose at 9-12 months of age, the third at 18 -24 months and the 4<sup>th</sup> at School entry
2. **Isolation.** Keep patients with measles away from young children. A child who has had measles should not return to pre-school or school until one week after the start of the rash.

3. **Other children in the ward.** Make sure the other children in the ward have been immunised with measles and rubella vaccine (MR) if they have not been immunised. Give measles and rubella (MR) vaccine if they are between 6 months and 5 years.
4. **Contacts of measles** should be kept away from pre-school (but not ordinary school) for 3 weeks after the last contact with a case of measles. This is because measles is a dangerous disease in young children. If the contact has already had measles or been immunized against measles, there is no need to keep her away from pre-school.

## Rubella (German Measles)

### Cause

- ◆ A virus infection which spreads by droplet infection.
- ◆ Incubation period: 2-3 weeks.
- ◆ **Period of communicability:** 1 day before the rash till 4 days after the start of the rash.

### Symptoms and signs

Rubella is a much less severe illness than measles. Usually there is a slight fever and other symptoms and signs of a cold. There is a fine red rash. The neck (cervical) lymph glands behind the ears are enlarged.

### Complications

- ◆ If women catch rubella during the first four months of pregnancy, the foetus may be affected. Blindness due to cataracts (cloudy lenses in

the eyes), deafness, heart disease and microcephaly (small head) are common abnormalities caused by rubella in the foetus.

- ◆ This is called congenital rubella syndrome, and is prevented by girls having the rubella vaccine in childhood, before they reach reproductive age.
- ◆ Keep pregnant women away from people with rubella

### Treatment

Symptomatic treatment - fluids and paracetamol or aspirin. Pregnant women should keep away from children with rubella.

### Prevention

Rubella vaccine has been introduced in Papua New Guinea. It is given with the measles vaccine (MR: measles rubella vaccine) at 6 months, 9 to 12 months, 18 to 24 months and at school entry. It is very important that all children have this vaccine, to reduce the chance of congenital rubella syndrome in the community.

## Chicken pox (Varicella)

### Cause

- ◆ A virus infection spread by contact with infectious people and by droplets which spread by coughing, sneezing, contact with saliva and contact with the fluid from the chickenpox rash.
- ◆ Incubation period: 2-3 weeks.
- ◆ Period of communicability: 1 day before the rash till 6 days after the start of rash.

### Symptoms and signs

- ◆ The illness usually starts with a rash, although the child may have been sick for one or more days with a fever. The rash consists of spots which are first red (macules), then raised (papules), and then watery blisters (vesicles).
- ◆ The blisters then become cloudy (pustules). The spots usually start on the face, then spread to the trunk and limbs (arms and legs). In chicken pox the rash is mostly on the chest, abdomen, back, upper part of arms and upper part of legs. All stages of the rash (macules, papules, vesicles, pustules) may be present at the same time in chicken pox.

### Treatment

Symptomatic treatment. Calamine lotion can be put on the rash to stop the itching. Infected spots can be treated with antibiotic compound ointment or gentian violet. Finger nails should be cut short to prevent the child scratching. Penicillin is given IMI if the skin becomes severely infected, or pneumonia occurs.

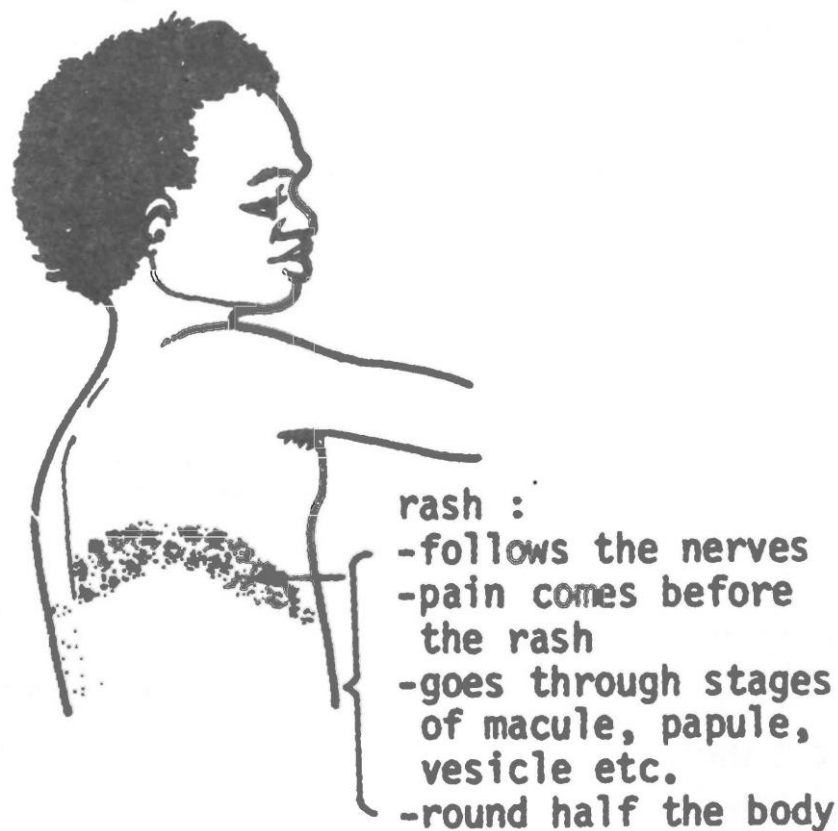
## Herpes Zoster

- ◆ Herpes zoster is caused by the same virus as chickenpox but is less common. The skin lesions look like the lesions of chickenpox but have a different distribution (where the rash occurs on the body). The lesions of chickenpox are all over the body, but the lesions of herpes



zoster follow a nerve. They are usually close together in a broad line that goes round one half of the chest or abdomen (see fig 43)

- ◆ Sometimes the line goes down part of one arm or leg. Occasionally, there are lesions on the face and the eye. Eye lesions are dangerous, so send the child to a doctor.
- ◆ Herpes zoster is easy to diagnose because of the distribution of the rash, and because it is painful.
- ◆ The pain comes first, before the rash. The lesions go in about a week. Treat them as if they were chickenpox. Give paracetamol for the pain.



**Figure 43 - The rash of herpes zoster follows one of the nerves.**



## Mumps

### Cause

A virus infection spread by "droplets", which spread by coughing, sneezing, contact with saliva and on hands.

Incubation period: 12 - 26 days.

**Period of communicability:** 1 week before the swelling until 9 days after the start of swelling.

Symptoms and signs.

The illness begins with fever, malaise (feeling unwell) and pain when eating. One or two days later a tender, painful swelling develops over one or both of the parotid salivary glands (between the lower jaw and the ear). Sometimes the submandibular glands (under the lower jaw) become swollen and painful. The tenderness (pain) lasts for two or three days. The swelling usually goes down within one week.

### Complications

The mumps virus occasionally affects other organs besides the parotid glands.

- 1) **Brain.** Viral meningitis and encephalitis may occur, causing headache, vomiting, sleepiness and sometimes coma (unconsciousness).

Meningeal signs - stiff neck, Kernig's sign occur. Children with mumps meningitis and encephalitis almost always get better. This is different to

measles encephalitis, which is often fatal (kills the child).

- 2) **Testes.** Orchitis (inflammation of the testes) may occur in adolescents or in adults. It is very uncommon in young children.
- 3) **Pancreas.** Pancreatitis may occur causing acute abdominal pain and vomiting.

### Treatment

- ◆ Symptomatic - Bed rest and paracetamol.

## Diphtheria

- ◆ Caused by bacteria, and spread by droplets which spread by coughing, sneezing, contact with saliva and on hands.
- ◆ Incubation period: 2-5 days.
- ◆ **Period of communicability:** 2 weeks or less. Till throat swabs are negative.
- ◆ Diphtheria can be a very serious disease which may cause obstruction to the airway.

### Symptoms and signs

- ◆ A sick child with fever. Greyish white patches are usually seen on the throat. The neck is often swollen.
- ◆ Always examine the throat and ears in every sick child
- ◆ Sometimes the nose is affected causing a blood-stained purulent (pus) discharge.

- ◆ The larynx may be affected causing respiratory difficulties with stridor (noise when child breathes in).
- ◆ Suspected cases should be sent urgently to base hospital where swabs are taken, and penicillin given, and tracheostomy done if necessary. Serious complications like heart disease or nerve paralysis may occur. In nerve paralysis there may be regurgitation (spilling) of fluids through the nose. Or the child may be unable to swallow or unable to breathe.

### Prevention

- ◆ Immunization with the pentavalent vaccine prevents diphtheria.

## TYPHOID

- ◆ Caused by a bacteria *Salmonella typhi*. It is spread by a person's food, drink or hands being contaminated with faeces containing typhoid bacteria.
- ◆ Incubation period: 1-3 weeks.
- ◆ **Period of communicability:** Usually 3 weeks. May be several months or years, in which case the person, often an adult, is a carrier (spreads the disease but is not sick himself).

### Symptoms and signs

- ◆ A child with typhoid usually comes to see you because she has a fever for more than a week or PUO, (pyrexia (fever) of unknown origin (cause)). She may have no other symptoms, or only mild symptoms, like a

cough or loss of appetite or slightly tender abdomen.

- ◆ Sometimes a child with typhoid looks very ill (toxic) as well as having a high fever. She may look like she has severe pneumonia. Or she may look like she has an acute abdomen with a tender swollen abdomen. Or she may look like she has meningitis with drowsiness (being sleepy), stiff neck, severe headache, or convulsions.
- ◆ Children with typhoid often have anaemia and an enlarged spleen. So, they may be diagnosed as having malaria.

### Diagnosis

Typhoid is not easy to diagnose. Think of it especially if the child comes from an area where typhoid is common or:

1. Has had a fever for more than one week, especially if she has already been treated for malaria and with penicillin without any improvement.
2. Has had fever and slight abdominal symptoms (diarrhoea or constipation or abdominal pain or abdominal swelling) for one week.
3. Has fever and severe headache or convulsion or drowsiness (very sleepy) or confusion or talking nonsense but lumbar puncture shows CSF is completely clear.
4. Has fever and looks ill, with anaemia and enlarged spleen, but blood slide shows no malaria parasites.

5. Has fever and mild or moderate pneumonia but does not improve with penicillin.
6. Has fever with a normal pulse rate. Usually, the pulse increases as the temperature goes up. A school child with a fever of 39°C would be expected to have a pulse rate more than 120/minute. If the pulse rate is only 80/minute, it is much less than expected with a fever of 39°C. This suggests typhoid.
7. Has fever and looks sick, with a normal or low white blood count. In most bacterial infections the white blood count is raised. But in typhoid the white blood count is often normal or low.
8. Diagnosis is confirmed by blood culture taken early in the disease. Later, diagnosis is by culture of the stools and Widal test for antibodies in the blood.

**Complications** include pneumonia, bowel perforation and bowel haemorrhage.

### **Treatment**

If you think a child has typhoid:

1. **Admit** the child to hospital or health centre.

Transfer the child urgently to hospital if he has any of the following:

- a. Severe abdominal pain
- b. A distended abdomen
- c. Black stools (melena)
- d. Confusion or is unconscious
2. **Confirm the diagnosis**, if possible, by doing a Widal blood test. Blood culture and stool culture should

also be done if the facilities are available.

3. **Ceftriaxone** is the best antibiotic. It must be given for two to three weeks. To begin with give the ceftriaxone daily IM or IV. IM or IV chloramphenicol can be given if you do not have ceftriaxone. Ciprofloxacin is a good alternative
4. **Antimalarials** (see page 93). Sometimes the child will already have had a full course of antimalarials. If the child looks very sick or if he has already had Artemether-lumefantrine (Mala1), treat him for severe malaria with Artesunate followed by Artemether-Lumefantrine.
5. Fluids
  - a. **If dehydrated**, rehydrate with ORS or IV Half Strength Darrows solution.
  - b. **If vomiting but not dehydrated**, give IV maintenance fluids (see page 279).
  - c. **If not dehydrated and not vomiting**, give milk and other oral fluids.
6. **Food**. Children with typhoid are often ill and have not been eating well for several weeks. They need extra food to build themselves back to normal. Encourage them to eat while they are ill. Explain to their parents to give them extra food as soon as they start to feel better and regain their appetite.
7. **Prevention of spread of the disease**. The patient's faeces are infectious and will spread the disease unless special precautions are taken.

If possible, patients with typhoid should be isolated from other patients and their faeces and urine disposed of in a sanitary way. Medical and nursing staff should wear gowns while attending these patients. Most importantly, staff and relatives must wash their hands thoroughly with soap and water after touching the patients or their bed linen.

### Progress

Even with the right treatment it may take at least a week before the fever goes. A useful rule is to continue the ceftriaxone or chloramphenicol for 10 more days after the fever has gone. The total time that ceftriaxone or chloramphenicol is given should never be less than 14 days. So the total treatment time will be between 2 and 3 weeks.

### Prevention

Typhoid is a disease of poor hygiene. Parents should be taught to:

1. Wash their own hands and their children's hands thoroughly with soap and water after defaecation (passing stools) and before preparing or eating food.
2. Check that they use clean safe drinking water.
3. Be careful when buying fast foods (ready to eat cooked foods), ice cream or ice blocks. Before buying these foods, they should make sure that the foods have been prepared, stored and handled under hygienic conditions
4. Use a toilet, either a flush toilet or a pit latrine, and not defecate in the open

**Typhoid vaccine** is available but is not very effective. The main emphasis on prevention of typhoid must, therefore, be on improvement of personal and household hygiene, improved sanitation, and better food hygiene.

## Hepatitis A (Infectious hepatitis)

### Cause

- ◆ A virus disease affecting the liver. It is spread by drinking or eating food that is contaminated by the hepatitis A virus. The source of contamination is the faeces of a patient or carrier. In conditions of poor sanitation, water and food are easily contaminated (made dirty) by faeces.
- ◆ Hands are also easily contaminated. Flies can carry bits of faeces on their feet and leave them on food.
- ◆ Hepatitis A is very common in Papua New Guinea. Most children get the disease during childhood, but only a few develop jaundice.
- ◆ Incubation period: 10-40 days.
- ◆ **Period of communicability:** 1 week before jaundice till 1 week after the start of jaundice.

### Symptoms and signs

- ◆ The disease is usually milder in children than in adults. The onset

(start of the illness) may be sudden or slow, with loss of appetite, fever, headache, tiredness and sometimes vomiting and abdominal pain. The urine is dark and looks like tea because of the bile it contains. (See page 292) for testing the urine for bile.

- ◆ The child becomes jaundiced, which is best seen by looking at the sclera (white of the eyes), which become yellow.
- ◆ When the abdomen is palpated, the liver is usually found to be enlarged and tender.
- ◆ Many cases of hepatitis A do not have jaundice.
- ◆ Children infected with hepatitis A may have mild symptoms, like a slight fever and loss of appetite for a few days (abortive cases). Or they may have no symptoms at all (subclinical cases).
- ◆ Always test the urine for bile if a patient is jaundiced

### Treatment

Most cases get better. There is no special treatment. Occasionally the disease is severe, and the child develops liver failure.

Warning signs of severe hepatitis

1. Severe vomiting
2. Child becomes confused and unconscious
3. Child bleeds easily

These signs warn you that the child has liver failure. Send these cases quickly to a doctor.

## Hepatitis B (Serum hepatitis)

### Cause

- ◆ A virus disease spread by injection of blood from a carrier of hepatitis B virus.
- ◆ This may occur from mother to baby in infancy or during blood transfusion. Or during injection of drugs if the same syringe or needle is used on more than one patient. Or if the syringe and needles are not properly sterilised. Or the virus can enter the body through skin sores - or spread as a sexually transmitted virus.
- ◆ Hepatitis B is very common in Papua New Guinea.
- ◆ Incubation period: 2-6 months.
- ◆ Period of communicability: can be for many years

### Symptoms and signs

Same symptoms and signs as infectious hepatitis, but more severe. Most patients recover from the infection, but some become chronic carriers of hepatitis B virus.

### Chronic carriers of hepatitis B virus

The hepatitis B virus sometimes stays in the liver of some patients after their attack of jaundice. Most of these patients recover but remain infectious. Between 10-30% of people in Papua New Guinea carry the hepatitis B virus in their blood and are therefore carriers. The hepatitis B virus also causes hepatoma (liver cancer) in some chronic carriers.

## Prevention

- ◆ Hepatitis B can now be prevented by immunization with hepatitis B vaccine. Four doses of the vaccine are given- the first as hepatitis B vaccine as soon as possible after birth and the remaining three as components of the pentavalent vaccine (see page 223)
- ◆ Unsterilized needles or syringes can cause hepatitis

## Chapter 23: Diseases of the Eye

### Conjunctivitis

Conjunctivitis is a common eye disease. It is caused by a number of bacteria and viruses. Conjunctivitis may lead to blindness if not treated properly, especially in young babies.

#### Symptoms and signs

- ◆ The eyes are red, painful and often discharge pus. The eyelids may be oedematous (swollen).
- ◆ If pus is present a swab for bacteriology is taken if laboratory facilities are available.

#### Treatment

1. Mild conjunctivitis
  - a. Treat the child as an outpatient
  - b. Show the mother how to wash the eyes with previously boiled cold water, or with breast milk.
  - c. Show the mother how to put eye ointment into the eyes.
  - d. Supply the mother with a tube of antibiotic compound, tetracycline or sulphacetamide or chloramphenicol eye ointment.
  - e. Tell the mother to wash the eyes and put in the eye ointment 4 times a day for 5 days.
  - f. Warn the mother to return at once if the eyes become worse, or if the conjunctivitis is not a lot better after 2 days.
2. Severe conjunctivitis (a lot of pus and/or swelling of eyelids).

- a. Admit the child to health centre or hospital.
- b. Wash the eyes gently with previously boiled cold water, or with sterile saline, 4 times a day.
- c. Put antibiotic compound, or tetracycline, or sulphacetamide or chloramphenicol eye ointment into the eyes 4 times a day for 5 days.
- d. Give IM benzyl (crystalline) penicillin 6 hourly if there is fever and swelling around the eyes.

Send the child to base hospital if conjunctivitis is not a lot better after two days of treatment.

**N.B.** Remember gonococcal conjunctivitis if a baby less than 2 weeks has severe conjunctivitis (see page 55).

Give the baby benzyl (crystalline) penicillin 3 times a day and gentamicin once daily for 5 days. Treat the parents for gonorrhoea.

### Corneal ulcer

This often follows conjunctivitis but may come by itself. If untreated, penetration of the cornea may occur followed by blindness.

#### Symptoms and signs

- ◆ A painful, red, watery eye.
- ◆ Sometimes the ulcer is easily seen. Careful examination of the cornea with a good light will show the ulcer as a roughened cloudy area of the cornea. If you suspect a corneal



ulcer, place the orange end of a fluorescein sterile ophthalmic strip against the eye for a few seconds if it is available. Then remove the paper and ask the child to blink. If a corneal ulcer is present it will now appear as a green area on the cornea. Fluorescein ophthalmic drops may be used instead of the ophthalmic strip.

### Treatment

- ◆ Put antibiotic compound, or tetracycline, or sulphacetamide or chloramphenicol eye ointment into the eye 4 times a day. Place an eye pad over the eye.
- ◆ Atropine eye drops should be applied once a day. Continue treatment for 5 days. If you do not have Atropine eye drops so if the corneal ulcer is not a lot better after two days of treatment send the child to hospital.

## Vitamin A deficiency

Vitamin A deficiency can cause blindness.

### Symptoms and signs

- ◆ The most serious form of the disease is when the cornea is affected and becomes cloudy, soft and may break open. This is called keratomalacia and it leaves the child blind.
- ◆ The early signs of vitamin A deficiency in young children is dryness of the conjunctiva and cornea (xerosis or xerophthalmia). The conjunctiva becomes brownish in colour, wrinkled up and dry.

- ◆ In older children the first symptom of vitamin A deficiency is that the child cannot see in the dark (night blindness). You must examine carefully the eyes of every malnourished child, every child with diarrhoea and every child with measles.
- ◆ If the eyes look dry, give vitamin A immediately. Two doses of Vitamin A should be given as part of standard treatment of children with measles.

### Treatment

- ◆ Vitamin A 200,000 U daily by mouth for 3 days for children 1 year or older. The capsule of vitamin A contains 200,000 U.
- ◆ For infants (<12 months) the dose is 100,000 daily for 3 days. Cut the vitamin A capsule and squeeze out 3 drops onto the infants tongue. The 3 drops will provide 100,000 U of vitamin A. Do this each day for 3 days.
- ◆ Antibiotic compound or sulphacetamide or chloramphenicol eye ointment 3 times a day for 5 days. Send the child to a base hospital if the eyes are not a lot better after two days of treatment.

## Trachoma

This infection of the conjunctiva affects many children in Papua New Guinea. It may cause blindness. In most cases, however, it is a mild infection, and heals itself without any treatment.



### Symptoms and signs

- ◆ In the early stages of the infection, the eyes are sore and watery. The inside of the eyelids, especially the upper eyelids, show many little pinkish white raised spots (follicles) on a red background.
- ◆ Later, thin fibrous tissue containing blood vessels (pannus) grows over the cornea.
- ◆ Scarring of the upper eyelids may follow healing. This may make the eyelashes rub on the cornea causing ulceration and blindness.

### Treatment

- ◆ Treat for one month with tetracycline eye ointment put into the eyes twice a day.
- ◆ Refer to an eye doctor those who have corneal scars or eyelashes rubbing on the cornea. They may need an eye operation.
- ◆ Visual defects due to trachoma are becoming less and less common as education on community and personal hygiene improves.

### Penetrating eye injuries

Eyes injured by sticks or other sharp instruments need special treatment to prevent the child going blind.

### Treatment

1. Tetanus toxoid 0.5 ml. stat (immediately)
2. Chloramphenicol 6 hourly
3. Put antibiotic compound, or tetracycline, or sulphacetamide or

chloramphenicol eye ointment into the eye daily

4. Place an eye pad over the eye.
5. Pethidine if pain is severe.
6. Send quickly to a base hospital.

### Lime burns

The lime powder that people chew with betelnut may get into a child's eye. Lime powder is a strong chemical and it will burn the eye.

### Treatment

1. Put amethocaine sterile eye drops into the eye. This is a local anaesthetic for the eye and will stop the pain. (It should not be provided to the patient of carer- and should only be used once)
2. Then keep washing out the eye with sterile saline or cold previously boiled water, for at least ten minutes. This will wash out any pieces of lime that are still in the eye.
3. If you can see any pieces of lime still in the eye after washing out the eye for ten minutes, remove them gently with some cotton wool or a piece of gauze.
4. Put antibiotic compound or tetracycline, or sulphacetamide or chloramphenicol eye ointment into the eye 4 times a day.
5. Send the child to a base hospital if there is much cloudiness of the cornea (corneal opacity), or if the eye is not a lot better after two days of treatment.

First aid at the time the lime goes into the eyes is very important. This consists of washing out the lime with lots of water. It is important that communities know this first aid.

who does these things may hurt another person's eyes, or he may fall over and hurt his own eye. Teach parents to keep lime in a safe container.

## Removal of foreign bodies in the eye

1. Foreign bodies such bits of dust or soil or sand can often be removed by washing the eye with clean water or Saline. If this is not successful
2. Put amethocaine sterile eye drops into the eye. This is a local anaesthetic for the eye. (It should not be provided to the patient of carer- and should only be used once)
3. Remove the foreign body gently with some cotton wool or a piece of gauze.
4. Put antibiotic compound or tetracycline, or sulphacetamide or chloramphenicol eye ointment into the eye 4 times a day.
5. Send the child to a base hospital if you cannot remove the foreign body with cotton wool or a gauze swab, if there is much cloudiness of the cornea (corneal opacity), or if the eye is not a lot better after two days of treatment.

## Prevention of eye injuries

Teach parents not to allow young children to play with knives, or sharp sticks, or to throw stones. The child

## Chapter 24: Skin diseases

### Impetigo

- ◆ Impetigo is an infection of the skin caused by bacteria, usually *Staphylococcus* or Group A *streptococcus*. The bacteria produce small blisters or sores with pus on top of the skin. The pus dries to form crusts or scabs. Impetigo often occurs on the head or face, especially around the mouth.
- ◆ Impetigo spreads easily from one child to another, on hands contaminated by the bacteria, or by other skin contact. It is also spread by flies, or through insect bites. Impetigo is more common in malnourished children.
- ◆ Bacterial skin infection can have serious consequences in children, it can spread to bones or joints causing osteomyelitis and septic arthritis, or to the lungs causing pneumonia, cause nephritis (kidney inflammation due to Group A *Streptococcus*), or acute rheumatic fever.

#### Treatment

1. Remove scabs and crusts with antiseptic, e.g. chlorhexidine (Savlon) or normal saline.
2. Cut hair away from scalp lesions.
3. Put gentian violet (crystal violet) or antibiotic compound ointment or powder onto the sores.
4. If the sore is large or has pus, put a dressing over the sore to keep the flies away.
5. Give IM benzylpenicillin or oral flucloxacillin QID for 5 days. If impetigo is not treated properly the child may develop acute nephritis or rheumatic fever weeks later (see page 153).
6. If there is no improvement after 5 days, refer to a paediatrician or doctor skilled in child health.

### Boils, abscesses

These occur commonly in children.

#### Treatment

1. If pus is present (the boil is fluctuant) it must be incised and drained. Antibiotics are less important than draining the pus.
2. If pus is not yet present and the child does not look sick, check the abscess every day. When pus has formed, incise and drain it.
3. If the child has a high fever or looks sick or has several abscesses, give Flucloxacillin oral or IM every 6 hours. Incise and drain the abscesses when pus has formed.
4. Remember that a febrile child with a hot swollen painful limb probably has osteomyelitis (see page 158).

### Prickly Heat (Miliaria)

Children often get rashes which are very itchy, especially in the hotter seasons. The affected part of the skin

often becomes infected. Prickly heat is due to the skin being wet with sweat all the time.

### Treatment

1. Try to keep the baby cool. Don't let him wear clothes that make him too hot.
2. Put calamine lotion on the rash 2 or 3 times a day.

## Tropical ulcers

Tropical ulcers grow more quickly in children than in adults. However, they also heal more quickly.

### Cause

- ◆ Tropical ulcers usually follow a cut or sore which becomes infected with bacteria. They are common in malnourished people.
- ◆ Early treatment of small sores prevents development of tropical ulcers

### Treatment

1. Clean the ulcer each day with antiseptic lotion e.g. chlorhexidine (Savlon), or saline.
2. Cover the ulcer with acriflavine emulsion on a dry gauze dressing. Do this each day until the ulcer is clean and pink.
3. When the ulcer is clean, cover it each day with moist gauze. Then put a dry gauze dressing on top.
4. Give oral amoxycillin t.d.s. for 5 days.
5. If the ulcer does not get better after 5 days of amoxycillin, change to cotrimoxazole (septrin) b.d. for 5

days and give tinidazole daily for 3 days.

6. An ulcer that is larger than a one kina coin will need to be skin grafted when it is clean. This is to prevent skin cancer developing in the sore tissue many years later.
7. Check the child's Hb. Treat his anaemia if present.
8. Advise the parents on a better nutritional diet for the child.

Dose of tinidazole:

Weight (kg)	Dose
3 - 5 kg	125 mg ( ¼ tab) daily for 3 days
6 - 9 kg	250 mg ( ½ tab) daily for 3 days
10 - 14 kg	500 mg (1 tab) daily for 3 days
15 - 19 kg	750 mg (1 ½ tab) daily for 3 days
20 - 29 kg	1 g (2 tab) daily for 3 days
30 - 39 kg	1.5g (3 tab) daily for 3
Days 40 kg and over	2 g (4 tab) daily for 3 days

## Mycobacterium Ulcerans

- ◆ These ulcers occur in certain areas near rivers, e.g. in Oro Province near Kumusi River and in East and West Sepik Provinces. The ulcers may occur on the limbs, body or head.
- ◆ They are deeply undermined (spread under the skin) and spread rapidly. Swabs taken from under the undermined skin show acid fast bacilli (A.F.B.) The ulcer may grow to a very large size, or it may cause a severe contracture.
- ◆ So, send children with these ulcers to a base hospital for surgery and skin grafting. Sometimes clofazimine or a combination of streptomycin, INAH and dapsone helps the ulcer to heal.

## Yaws

- ◆ Severe Yaws infections were previously common but became much less common following the introduction of penicillin. However, Yaws still occurs quite commonly in some areas of the country, although the severe manifestations resulting in deformities are rare.
- ◆ The primary lesion (first sore) is about 2.5 cm (one inch) in size, red and heaped up. Yellow serum is crusted on top of it. In the secondary stage of the disease, many sores may occur all over the body.
- ◆ The primary lesion is often misdiagnosed and missed, and the secondary stage may not only cause multiple sores but can also

cause aching limbs from chronic osteomyelitis.

- ◆ Yaws can be cured by penicillin or azithromycin. Give benzylpenicillin IV 6 hourly for 5 days, or azithromycin orally.

## Scabies

- ◆ This common skin infection is caused by a very small insect-like mite which digs into the skin. It is often complicated by bacterial skin infections.
- ◆ Diagnose scabies if there is an itchy rash between the fingers and toes or on the arms, legs, buttocks or penis and scrotum. It may also affect other parts of the body. The severe itch may keep the child awake at night. This loss of sleep and continual scratching can lead to loss of energy and malnutrition.
- ◆ Scabies often becomes infected because the child scratches his skin. Infected skin sores can cause impetigo, acute nephritis or osteomyelitis.

For scabies - treat the whole family

### Treatment

1. Remove all clothes.
2. Wash the child with soap and water all over and dry.
3. Rub scabies lotion (1% gamma benzene hexachloride) all over the body except the face.
4. Explain to the mother that the lotion must remain on the skin for 24 hours. If the child washes part of themselves before the 24 hours is

over, scabies lotion must be reapplied to the part of the body it was washed off.

5. Tell the mother to wash the medicine off after 24 hours and to put clean clothes on the child.
6. The treatment must be repeated 4 days later because the scabies eggs in the burrows can hatch even after the adult mites have been killed by the scabies lotion.
7. If the scabies are infected, give amoxycillin t.d.s. or flucloxacillin q.i.d for five days.
8. Treat all other members of the family the same way with scabies lotion.
9. Explain to the mother that the family's clothes and bed linen (blankets) must be washed and put out in the sun to dry each day.



**Figure 45 - For scabies, treat the whole family.**

## Ringworm (Tinea, Grili)

Ringworm or Grille is very common in children. It occurs anywhere on the skin and on the head.

### Cause

It is due to a number of fungus infections.

### Treatment

1. Wash the child each day with soap and water. Also wash the child's clothes each day.
2. Put half strength Whitfield's ointment (Benzoic acid compound ointment) on the affected parts of the skin once a day. Rub the ointment well into the skin.
  - ◆ Salicylic acid paint (Sipoma paint or Grillei lotion) can be used instead of Whitfield's ointment.
  - ◆ Never cover more than one-quarter of the body surface in any day with Whitfield's ointment or Salicylic acid paint. If you do, poisoning may occur due to absorption of the drug, salicylate, through the skin. Use the ointment or paint once a day for 4 weeks. Grille cream can be purchased in some urban pharmacies
3. Cut away the hair over any ringworm on the head to a distance of 5 mm (1/4 inch) from the edge.
4. Griseofulvin is now available but and is very useful for treating

ringworm. It must be given each day for 4-6 weeks.

Dose of Griseofulvin (fine particle):

Weight (kg)	Dose
Under 12 kg	125 mg daily (one 125 mg tablet)
12 - 23 Kg	250 mg daily (two 125 mg tablets)
24 - 35 kg	375 mg daily (three 125 mg tablets)
36 kg and over	500 mg daily (one 500 mg tablet)

There are 2 types of griseofulvin: griseofulvin (fine particle) and griseofulvin regular size.

Griseofulvin (fine particle) is the one that should be used. Griseofulvin (fine particle) tablets come in 2 strengths - 125 mg and 500 mg tablets.

## Tinea Versicolor (White spot)

- ◆ This is a very common fungus infection of the skin. There are many small depigmented spots and patches on the skin, especially on the chest, neck, back and upper part of the arms.

- ◆ Usually there is no itch. This fungus infection does no harm to the person. Some people do not like to have these depigmented spots on their skin.
- ◆ Unfortunately, the usual treatment for fungus diseases, such as Whitfield's ointment, salicylic acid paint or griseofulvin is not effective for treating the fungus that causes white spot.
- ◆ The best way to get rid of these depigmented patches, if the person wants to do so, is to rub on Selsun suspension. The patient will have to buy Selsun suspension himself from a pharmacist. A few drops of Selsun suspension are rubbed on to each of the depigmented spots at night. The Selsun will lather like soap. Leave this lather on the spots overnight, then rinse off the next morning. This is repeated twice a week for one month. The Selsun will darken the depigmented spots.
- ◆ Remember to warn the patient to wash his hands well after using the Selsun. Selsun is a poison and must not be swallowed or contaminate food.

### Treatment

- ◆ 1% gamma benzene hexachloride (scabies lotion) rubbed on the scalp. Do not get the medicine in the eyes. Part the hair and apply the lotion along about 10 different partings and not just to the surface of the hair.
- ◆ The head should then be covered with a towel or cloth for several hours. Then comb the hair.
- ◆ Wash the hair after 24 hours. This allows the medicine to stay on the scalp.
- ◆ After one week, wash the hair and put more gamma benzene hexachloride lotion on the hair. Cover the head for several hours then comb the hair. Wash the hair after 24 hours.
- ◆ If there is a lot of secondary infection due to scratching, cut the hair short. Antiseptic ointment is then put on each day.
- ◆ Give oral amoxycillin t.d.s., for 5 days if there is any secondary infection.

### Head lice (Pediculosis)

- ◆ Children often have head lice. These parasites may cause severe itching. The child scratches his head and this can cause infection of the scalp.
- ◆ The lice lay eggs (nits) which are firmly attached to the hair. The eggs look like small grey-white spots.

### Molluscum contagiosum (Soft Warts)

- ◆ These are small round lesions which may be the size of a pin's head or a pea. The centre of each lesion is pushed in and contains whitish material. The lesions are



found most often on the face, neck, thighs, forearms, or genitals.

- ◆ They stay for many months before disappearing. It is best to leave them alone as they cause no harm.

## Cradle cap

This is the name given to the condition in which scabs or crusts form on the top of the head in babies.

### Treatment

- ◆ Rub some baby oil on to the head. Then gently dry the head with a towel or cloth. This helps to remove the scabs.

## Infantile eczema

- ◆ Some babies develop an itchy red rash on the cheeks and scalp. It often spreads to the limbs, especially the skin around the wrists, elbows, knees and ankles. Because it is so itchy the child scratches or rubs it a lot. This condition usually starts when the baby is 3 or 4 months old. It is a chronic condition, and usually recurs many times until the child is 2 or 3 years old.
- ◆ Then it becomes less common and disappears when the child is older.
- ◆ Infantile eczema is an allergic disease. It occurs more often in some families than others. Often there is a family history of asthma, hay fever or eczema. It is much more common in babies fed cow's

milk (artificially fed babies) than in breast fed babies.

### Treatment

1. Use wool fat hydrous (Lanolin) instead of soap for washing the baby. Ordinary soap tends to dry the skin and makes the eczema worse.
2. If hard scabs are present, remove the scabs with baby oil.
3. Put 1% hydrocortisone ointment or cream 3 times a day on the worst areas and rub in gently. Reduce the hydrocortisone ointment to twice a day after 2 or 3 days, and then stop it altogether when the rash is better (usually after a week).
4. If the itch is very severe, give diphenhydramine (Benadryl) elixir 3 times a day for a few days.

Dose of diphenhydramine (Benadryl) elixir:

Weight (kg)	Dose
3 - 5 kg	2 ml t.d.s.
6 - 9 kg	4ml t.d.s.
10 - 14 kg	6 ml t.d.s
15 - 19 kg	8 ml t.d.s.
20 kg and over	10 ml t.d.s.

5. Keep the baby's finger nails cut short. This will prevent injury to the skin when he scratches.

6. Refer to a doctor if the rash is not improved after 3 days.

## Nappy rash (Napkin Dermatitis)

Babies who wear nappies often get red patches on the buttocks and lower abdomen. This is caused by the urine soaking into the nappies and irritating the skin.

### Treatment

1. Remove the nappies and leave the buttocks exposed to air.
2. Apply Zinc cream to the red areas 3 times a day if it is available.
3. If the skin in the groin and between the buttocks is involved, apply gentian violet (crystal violet) 3 times a day. Sometimes the fungus infection monilia, or thrush, causes a nappy rash. If the rash is due to thrush, there is also thrush in the baby's mouth. So apply gentian violet to the mouth and tongue as well as to the nappy area.
4. Teach the mother, when the nappy rash is better, to change the nappies and wash and dry the baby's buttocks whenever the nappies get wet or dirty.

Cloth nappies must be thoroughly washed and dried in the sunlight. Advise the mother to use nappies as little as possible, and never to use plastic pants on the baby. Plastic pants

will keep the urine in the nappy and cause severe irritation of the skin.

## Prevention of skin diseases

- ◆ Washing the whole body each day with soap and water helps prevent skin diseases. Teach parents good skin hygiene and to keep the skin clean by regular use of soap and water.
- ◆ Small sores should be treated early before they become larger sores. Use of medicated soaps may prevent small skin sores becoming serious.

## Chapter 25: Leprosy

- ◆ Leprosy is an endemic disease (disease that is present all the time) in some parts of Papua New Guinea. The prevalence (number of cases of the disease per 1000 of the population) is different from place to place. The problems of isolated villages and poor transport make it difficult to find and treat all the people who have leprosy.
- ◆ Leprosy is caused by an acid fast bacillus (A.F.B.) called *Mycobacterium leprae* (M. leprae). So, it is another *Mycobacterium*, similar to tuberculosis, which also causes a slow developing, chronic illness.
- ◆ The incubation period is very long, between several months and many years.
- ◆ Leprosy is often caught during childhood.
- ◆ Children are often picked up and closely held by older children or adults. Because of this a child may have close contact with a relative who has untreated leprosy.

### Classification of leprosy

#### Indeterminate Leprosy

- ◆ This is the early type of leprosy. It is often found in children who have contact with a case of leprosy. A pale or red macule (flat patch or spot) appears on the skin. A.F.B. are not found in skin smears in this type of leprosy.

- ◆ There is no loss of sensation (feeling) in that patch, unlike in more advanced types of leprosy.
- ◆ Often the macule disappears after a few months. This shows that the child's body has strong resistance to leprosy and is able to fight off the disease. Sometimes this early type of leprosy stays unchanged for a long time. It may at any time progress (go on) to a more serious type of leprosy. This happens if the child's resistance is not strong enough to defeat the disease.
- ◆ The type of leprosy that the disease progresses to depends on the child's resistance.

#### Tuberculoid leprosy

- ◆ The person with this type of leprosy has quite a lot of immune resistance. Her tissues are able to stop the M. leprae bacteria spreading much in her body. Skin patches are found on a few parts of the body only. These skin patches are anaesthetic (have lost their sensation or feeling). This means that hot and cold, pain and touch are not felt over the patches. The nerves are affected as well as the skin. The nerves, which are under the skin, become thickened and can often be felt. The swelling of the nerves may damage them and cause weakness of the hands and feet as well as anaesthesia (loss of sensation).
- ◆ It is often difficult to find A.F.B. in skin smears in this type of leprosy.
- ◆ Tuberculoid leprosy is not infectious. The danger of this type of leprosy is the anaesthesia the

patient often has in his hands or feet. Because she cannot feel pain in her anaesthetic part, the patient may burn or injure her hand or foot without knowing it. These injuries get infected. Deformities of the fingers and toes and chronic ulcers are caused by these injuries.

- ◆ These deformities often look bad and may frighten other people who see them. However, these patients are not infectious. So, there is no need for people to be frightened of them. The deformities they have can usually be prevented. They can be prevented if treatment is taken regularly and if patients are taught to take proper care of their hands and feet.

### Lepromatous Leprosy

- ◆ The person with this type of leprosy has very little immune resistance. The disease spreads all over the body. The skin is swollen in patches. There is no clear boundary (line) between the edge of the diseased skin patch and normal skin. The patches may not be anaesthetic. Nodules (lumps) are often present, especially on the face and ear lobes. In late cases the outer part of the eyebrows is often lost. The nose may be sunken (pushed in) because of loss of nose cartilage.
- ◆ Lepromatous leprosy is infectious while untreated. Household contacts of patients with lepromatous leprosy are much more likely to catch leprosy than are household contacts of patients with tuberculoid leprosy.

- ◆ Skin smears from the swollen skin patches or from the ear lobes or nasal discharge show many A.F.B. in this type of leprosy.



Figure 46 - Lepromatous leprosy, showing nodules of the face and ear lobes.

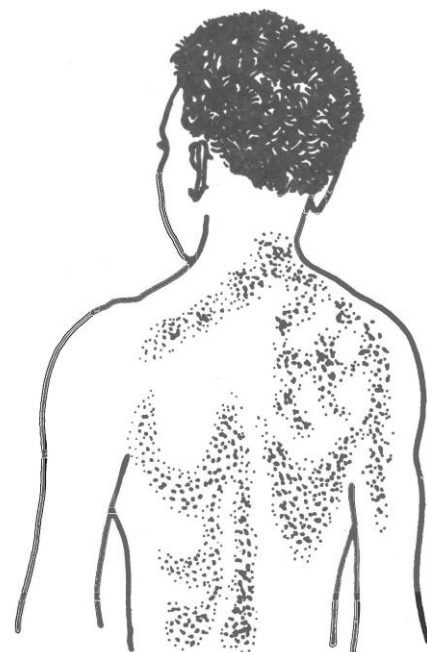


Figure 47 - Tuberculoid leprosy, showing anaesthetic patches.

### Borderline leprosy

- ◆ This is a type of leprosy that is in between tuberculoid and lepromatous leprosy. The skin and nerves are affected. It can look either like lepromatous or tuberculoid leprosy. The disease may affect only a few areas of the body, or it may be widespread over the body. Skin smears may show few or many A.F.B.
- ◆ Like lepromatous leprosy, this type of leprosy is also infectious while the patient is untreated.
- ◆ Patients with borderline leprosy often go on to get lepromatous leprosy if treatment is not taken regularly.

### Neuritic Leprosy

This is an uncommon type of leprosy. There are no skin patches. Only the nerves seem to be affected. Deformities of the hands or feet may occur.

### Diagnosis of Leprosy

1. Household contacts
  - ◆ Children who are known household contacts of leprosy cases, especially the infectious types of leprosy (lepomatous and borderline leprosy), should be carefully examined all over in clear light. Look for any patches of changed skin colour or other signs of leprosy.
  - ◆ They must be followed up for many years.
2. **Testing for anaesthesia** (loss of sensation or feeling). Skin patches that might be leprosy, and also hands and feet, should be tested for anaesthesia using a small piece of cotton wool. The same part of the opposite side of the body should always be tested as well.
  - ◆ The child is told to point to the part of her body which is lightly touched with the cotton wool. At first the child keeps her eyes open and normal areas of skin are tested. When the child fully understands what she is expected to do, she is told to close her eyes and keep them shut. The suspected patch and the same part on the opposite side of the body are now tested.
  - ◆ The patch is anaesthetic if the child fails to point to it when it is touched, but points to the same part on the opposite side of the body when that is touched.
  - ◆ Loss of feeling in a patch of light or reddish skin is a sure sign of leprosy.
3. Thickened nerves
  - ◆ The skin around suspected patches should be carefully felt with the back of your index or middle fingernail for any enlarged superficial nerves (nerves near the skin).
  - ◆ Some large nerves are easily felt when thickened. These are:
    - a. The ulnar nerve on the inner side of the arm above the elbow.
    - b. The peroneal nerve on the outer side of the leg just below the knee.
    - c. The great auricular nerve on the side of the neck.

- ◆ Obvious thickening and enlargement of these nerves is a sure sign of leprosy.
- 4. Skin smears for A.F.B.
  - ◆ Smears are taken from suspected skin lesions or nodules from 6 sites, (see page 289).
  - ◆ The presence of A.F.B. in a skin smear is a sure sign of leprosy.
- 5. **Skin biopsy.**
  - ◆ When none of the 3 sure signs of leprosy (skin patches, loss of sensation, and thickened nerves) are present, it may be necessary to make sure of the diagnosis by doing a skin biopsy (see page 290).

Notify suspected cases of leprosy to your Provincial Leprosy Control Unit for further advice.

Register confirmed cases of leprosy at the nearest Supervising Centre.

## Treatment

### Drugs

1. **Multi bacillary disease**  
(Lepromatous or Borderline Leprosy). Give 3 drugs- Rifampicin and Clofazimine and Dapsone.

- a) **Rifampicin**: Given once a month under supervision. Rifampicin cap = 150 mg.

Rifampicin suspension = 100mg/5ml.

Weight (kg)	Dose
3 - 5 kg	2 ½ ml
6 - 10 kg	5 ml
11 - 15 kg	7 ½ ml
16 - 20 kg	10 ml
21 - 30 kg	2 cap
31 - 45 kg	3 cap

- b) Clofazimine (Lamprene)

1 cap= 50 mg.

- a) Dapsone

1 tab= 50mg. Dose is taken every day at home

Weight (kg)	Dose
Under 20 kg	25mg (½ tab) daily
20 - 29 kg	50mg (1 tab) daily
30 - 49 kg	75mg (1 ½ tab) daily

These 3 drugs are given for at least 2 years in multibacillary disease. Treatment is stopped after 2 years if the skin smears are negative.

## Clofazimine dose

Weight (kg)	Dose
5 - 10 kg	1 cap each month under supervision, plus 1 cap every second day given at home.
11 - 15 kg	2 caps each month under supervision, plus 1 cap every second day given at home.
16 - 20 kg	3 caps each month under supervision, plus 1 cap every day given at home.
Over 20 kg	6 caps each month under supervision, plus 1 cap each day given at home.



## 2. Paucibacillary disease

(Indeterminate and Tuberculoid Leprosy)

- ◆ Give 2 drugs: Rifampicin and Dapsone.
- ◆ Rifampicin is given once a month under supervision. The same doses as for multibacillary disease.
- ◆ Dapsone is given daily at home. The same doses as for multibacillary disease. These 2 drugs are given for at least 6 months in paucibacillary disease. Treatment is stopped after 6 months if the signs of leprosy are decreasing.

### Side effects (reactions) of dapsone

- ◆ Patients on domiciliary (outpatient) treatment must understand that serious side effects, or even death, may occur if too many of the tablets are taken at one time. These side effects include neuritis (pain and tingling in the nerves), anaemia, dermatitis (skin rash), hepatitis jaundice) and psychosis (mental disease).
- ◆ A few patients may have side effects even on the normal dose of dapsone. But this is rare in Papua New Guinea.

### Reactions in leprosy

- ◆ A few patients get reactions in leprosy (lepra reactions). These reactions can happen whether a patient is on treatment or not. A leprosy reaction is an inflammatory reaction; where the immune system is responding to leprosy. There is pain and swelling of skin

lesions, nerves and other parts of the body. It is not a drug reaction.

- ◆ Leprosy reaction is not a drug reaction

### There are two types of leprosy reaction:

**Type 1 leprosy reaction.** This occurs in borderline leprosy. There is pain, swelling and redness of the skin lesions and nerves. It means there is a change taking place in the body's immunity or resistance. Because the body's immunity to leprosy is changing the leprosy may improve or get worse during type 1 leprosy reaction.

**Type 2 leprosy reaction.** This occurs mainly in lepromatous leprosy. There is fever and painful swollen joints (arthritis). The patient feels very ill. Small red painful nodules come up under the skin. These nodules are called erythema nodosum leprosy (ENL). They last about a week then go away leaving dark marks. New nodules then appear. The patient may also have painful swollen testes (orchitis), or inflammation of the eyes (iritis).

### Treatment of reactions

1. Admit to health centre or hospital for bed rest
2. Paracetamol or aspirin in usual doses
3. Good nursing care with plenty of fluids
4. Continue regular treatment with dapsone and clofazimine
5. Refer urgently to a doctor if the nerves or eyes are involved in the

reaction. Patients with severe reactions often require treatment with other drugs including steroids and are best treated under supervision in a hospital. Leprosy reactions are quite common in older children, especially around the age of puberty.

### Isolation

- ◆ It is not necessary to isolate patients. Once treatment is started, patients are no longer infectious. Leprosy patients may be admitted to health centre or hospital if special care is needed, e.g. at the start of treatment, or if there is a leprosy reaction.
- ◆ A mother with leprosy must not be separated from her newborn baby. B.C.G. given to the baby will give her some protection against leprosy. Some of the dapsone which the mother takes will get into her breast milk. This will also protect the baby. Remember that if a baby is removed from her supply of breast milk, she is likely to die from diarrhoea and marasmus, so never remove a baby from a mother with leprosy (or TB or HIV, or any other disease).

### Deformities

Most deformities in leprosy can be prevented. As soon as leprosy is diagnosed in a patient examine her carefully for early signs of nerve damage. Start teaching her to look after her hands and feet. Any anaesthesia or weakness in the hands or feet means that the patient must

take special care to prevent deformities occurring.

### Protection of anaesthetic fingers or hands (fingers or hands that cannot feel)

#### 1. Burns and cuts.

- ◆ It is easy for fingers to be hurt by burns or cuts when pain is not felt. Girls and boys must be taught to take special care when cooking. They should never use their hands to put wood in the fire or to touch cooking pots. They must be taught how to use tongs and bamboo handles instead of the hands. They must also be careful when collecting firewood that they do not injure their hands with splinters or thorns. If they must collect firewood, their hands should be protected by leather gloves.
- ◆ Boys must be careful of their hands when using tools. Nails should be held with pliers.
- ◆ Rubber cut from the soft inner tube of a car tyre should be wrapped around the handle of a hammer. Patients should take special precaution when handling things that may burn their fingers. This includes cigarette smoking.

#### 2. Resting hands after injury.

- ◆ After any cut, burn, or thorn injury, a clean dressing should be put on. The injured finger should then be bandaged on a splint to keep it at rest.
- ◆ Splints can easily be made by a patient from a piece of bamboo and a strip of cloth.

- ◆ Patients must be taught to take great care of even the smallest injury to their hands.
  - ◆ They must be taught to inspect their hands and feet each morning as soon as they get up. Any sore or ulcer must have a clean dressing put on. The injured part should then be bandaged on a splint to keep it at rest.
3. **Using hands too strongly.**
- ◆ People with anaesthetic hands do not know how tightly they hold things. They easily hurt their hands by pressing too hard.
  - ◆ Tools they use should always have rubber wrapped around the handles. They should not do heavy work like building fences, cutting down trees or clearing land.
4. **Reactions.**
- ◆ Leprosy patients who get fever and swollen hand joints should take extra care of their hands. Work should not be done.
  - ◆ The hand should be gently rubbed with oil (vegetable oil, peanut oil, coconut oil or palm oil) and kept on a splint.
5. **Stiff fingers.**
- ◆ The daily rubbing in of oil and exercise of the fingers helps prevent them getting stiff. Patients should be taught to do these exercises themselves at home.



**Figure 48 - Teach leprosy patients to look after their hands and feet.**

#### Protection of anaesthetic feet (feet that cannot feel)

##### **Ulcers.**

- ◆ Someone with an anaesthetic foot does not feel an injury. If he hurts his foot, he goes on walking because it does not hurt him. In this way he may get a deep sore or ulcer. The sore easily gets infected. It is very slow to heal because the person goes on walking. When the ulcer does heal it leaves a thin layer of skin over a thick piece of scar tissue.
- ◆ New ulcers come easily because the skin is no longer healthy. If a leprosy patient gets a sore on his foot, he must rest in bed until the sore heals. The sore should be covered with a dressing.

- ◆ The foot should be kept on a footrest. A footrest can be easily made by filling an empty rice or flour bag with dried grass or leaves.
- ◆ If a leprosy patient has a foot ulcer he must rest in bed and have the ulcer cleaned with chlorhexidine (Savlon) or saline. When the ulcer is clean the lower leg and foot is put in plaster-of-Paris for 6 weeks.

### Shoes.

- ◆ The leprosy patient must be taught to take special care of his feet. The aim is to prevent the first ulcer ever happening.
- ◆ Protection of his feet means he must wear shoes, and they must be the right kind of shoes. A good type of shoe is a strong plastic sandal. Soft foam rubber is stuck inside the sandal. Strong tyre rubber is stuck underneath the sole. These sandals are very cheap. They are sold to patients who can afford to buy them or given to those who have no money.
- ◆ Patients with ulcers must have the ulcers healed first by plaster-of-Paris treatment.
- ◆ When the ulcer is healed, they can be given shoes. Do not give them shoes until the ulcers are healed.

### Reconstructive surgery

- ◆ This is unlikely to be needed if leprosy is diagnosed and treated early, and the patient taught to

take good care of her hands and feet. Patients with severe deformities of their hands, feet or face can often be helped by reconstructive surgery.

### Health Education

- ◆ You must remember that the successful treatment of leprosy needs early diagnosis and regular treatment, plus education of the patient to take care of his hands and feet. This is especially important for children. A child has most of his life yet to go. It is also easier for a child to change his way of life and take special care of his hands and feet.
- ◆ Drugs may get rid of the bacteria, but they do not, by themselves, prevent deformities. It is not much help to a child to be told she is cured of leprosy, if she is left with hands and feet that she cannot use. She needs to be able to walk and to work using her hands.

There are four things about leprosy that must be taught to people. School children, particularly, should learn them. They should also be well known to parents and teachers.

1. *Leprosy is an illness.* The person who has leprosy is not different to any other sick patient.
2. *Most people who have leprosy are not infectious.* Patients with bad deformities of their hands and feet are almost certainly not infectious.
3. *Leprosy can be treated and can be cured.* The earlier a patient comes

for treatment, the better is his chance of complete recovery.

4. *The deformities of leprosy can be prevented.* If patients come early for treatment, they can be taught how to take good care of their hands and feet. This means they will not be left with deformities.
5. The care of the hands and feet must continue for life.

### Follow-up

- ◆ **Contacts** should be regularly examined every 6 months so that if they develop leprosy it will be diagnosed and treated early.
- ◆ Supervising Health Centres keep a register of all patients. This allows domiciliary (outpatient) treatment to be supervised. It makes sure that regular treatment is continued.
- ◆ The register allows contacts to be found and regularly checked. It is important for H.E.O.s and Nurses to follow-up leprosy patients and their contacts. This means that H.E.O.s and Nurses must follow-up leprosy patients to make sure that they are getting their domiciliary (out-patient) treatment regularly. They must also examine the household contacts of leprosy patients every 6 months.

## Chapter 26: Dental health

- ◆ Primary (baby) teeth usually start coming through at the age of six months, while permanent teeth usually start coming in at about age six. From 6 months of age, for every 6 months of life, about 4 teeth will erupt (break through). All 20 primary teeth (10 in upper jaw and 10 on lower jaw) are erupted by 2 ½ to 3 ½ years of age. The primary teeth start to be replaced by permanent teeth about the age of 6. Between the ages of 6 and 12 years, the child has a mixture of both primary teeth and permanent teeth in her mouth. By the age of 13, most of the 28 permanent teeth will be grown and break through.
- ◆ You should look after the primary teeth, even though they will fall out, because it teaches children how to care for their teeth. Also decay in the primary teeth can spread to the permanent teeth as they come through.
- ◆ Dental caries (holes in the teeth) is a common disease in children, particularly children of school age, in Papua New Guinea. It is important for H.E.O.s and Nurses to know how tooth decay in children can be prevented.
- ◆ Disease of teeth and their management are taught in your course in dentistry and will not be discussed here.
- ◆ There are five main ways by which dental caries in children can be prevented.

### 1. Dental health education

People often do not know how to keep their teeth healthy. They need to know such things as the following:

- ◆ Poor mouth (oral) hygiene is one of the main causes of dental caries. Better oral hygiene means brushing the teeth, and washing out the mouth, after each meal.
- ◆ The eating of sugar, sweet biscuits, cheese pops, lollies and other sugary foods by children is the other main cause of dental caries. Carbonated (fizzy) drinks (like Coca cola, Sprite, Solo and Fanta) and cordial (lolly water) also contain a lot of sugar. Sugary foods form acids, which break down the protective outer covering of teeth, and allow bacteria to invade the inside of teeth. Sugar cane is safe to eat because the fibres in it protect the teeth.

Teach parents *not* to give their children sweet biscuits, cheese pops and other sugary foods to eat between meals. Parents should be encouraged to give their children pieces of fruit or coconut instead. Encourage the parents to give the children water to drink instead of fizzy drinks and lolly water (cordial).

- ◆ Early preventive care is more useful than late treatment, which may be too late for anything except removal of the teeth. Children's teeth should be checked regularly by the School Dental Service.
- ◆ Bad nutrition leads to bad teeth. Bad teeth do not allow the person to chew his food properly. This

makes digestion and absorption of food more difficult.

Teaching about dental health needs to be given both in and outside schools. Children should learn at school how to keep their teeth healthy. But parents and teachers must also know about dental health.

## 2. Oral hygiene

Children must learn the habit of brushing their teeth and washing out their mouths after each meal. Parents and teachers need to understand the importance of this. They are the people who help children to learn habits.

## 3. Food

- ◆ It is well known that as villages get trade stores, the children get more dental caries. The reason is that children's food habits change with the coming of a trade store. Lolly-water, cheese pops, and sweet biscuits become favourite foods. These foods contain sugar which, as already mentioned, has a bad effect on teeth.
- ◆ Foods such as fish, sweet potato, taro, fruit, coconut, sugar cane have good nutritional value and help to keep the teeth healthy. Lolly water, cheese pops and sweet biscuits have poor nutritional value and cause dental caries. Also these trade store foods are expensive. Parents waste a lot of money on these bad trade store foods because they do not know which foods good and which foods are

bad for their children. Also, it is “convenience food” or “fast food”, and these are bad for health overall – apart from dental health, they cause obesity, and they fill children up so that they do not want other foods which have more nutritional value.

- ◆ You must remember that parents want the best for their children and would like them to have strong teeth. You should help parents save their children's teeth, as well as save their money, by teaching them about the bad effects of sugary foods. Parents like to give their children special things to eat at times. They should give their children protective foods, such as fresh fruit or coconut or sugar cane, which will not harm their teeth and not contribute to obesity.

## 4. Fluoride

- ◆ Fluoride is a chemical which is present in very small amounts in water. The water in some villages has more fluoride than the water in other villages. Young children who drink water which has more fluoride have stronger teeth, and less dental caries, than the children who drink water which has less fluoride. Because of this, towns which have large stores of drinking water add a small amount of fluoride to their drinking water. This is called fluoridation.
- ◆ In Papua New Guinea enough fluoride is added to a town's drinking water so that the total amount of fluoride in the water is 7 parts in 10 million (or 0.7 parts per



million). This is a very small amount of fluoride. It is completely safe to add this very small amount of fluoride to the drinking water.

## 5. Dental check-ups

- ◆ The School Dental Service regularly examines the teeth of school children. This is an important job.
- ◆ Early treatment is really prevention as it prevents a small hole in a tooth becoming a big one, requiring removal of the tooth.



## Chapter 27: Community health services

Mothers and children make up a large part (about two-thirds) of the population. They are likely to get illnesses and need special care to keep them healthy. Because of this, the Maternal and Child Health (MCH) or Family Health Section of the Health Department was started many years ago to look after the health of mothers and children. Many nurses joined the MH Section. Their work was to look after the health of mothers and children. Many churches also helped – and are still helping-with this work.

### Family Health

- ◆ Mothers and children live in families. Their health is affected by illness in other members of their families, e.g. if the father has tuberculosis.
- ◆ The way the family lives - their hygiene, food, housing, employment, education - affects the health of the mother and children in the family. Because of this, the whole family must be included in health services for mothers and children.

### Community Health

- ◆ Families live in a community. The health of a family is affected by the health of the community in which the family lives. If the sanitation of a community is poor, this will affect the health of families including the mothers and children. This means

that we must think about the community and not just mothers and children. Because of this, MCH nurses are now called Community Health Nurses.

- ◆ Looking after the health of mothers and children is a large part of community health work. But community health workers also do other things as well.
- ◆ Community health workers are extension (outreach) workers. They take health services to communities and to people where they live. They have regular contact with people in their own village or town environment.

Community health workers have three main functions (jobs):

1. To educate families about healthy ways of living.
2. To prevent illness and malnutrition.
3. To treat people when they are sick.

Community health workers give two kinds of health services:

1. Health services to individual people (personal health services).
2. Health services to a whole group of people (community health services).

### Personal health services

These include:

- ◆ Teaching parents about health, hygiene, nutrition, and family spacing.
- ◆ Care of the mother during pregnancy, encouraging mothers to deliver their babies at a Health

Centre or Hospital, care during labour if mother delivers at home, and after the birth of the baby.

- ◆ Regular care of the infant (baby) and young child.
- ◆ Ensuring the children are vaccinated
- ◆ Care of the school child.
- ◆ Family planning.
- ◆ Treatment of mild illnesses.
- ◆ Sending to hospital people who have serious illnesses.
- ◆ Giving outpatient or domiciliary (home) treatment to people with chronic (long) illness, e.g. malnutrition, tuberculosis, HIV, asthma, epilepsy, leprosy.
- ◆ Home visiting and follow-up of patients discharged from hospital

### Community health services

These include:

- ◆ Teaching the community about health,
- ◆ Helping the community to obtain safe water supplies and sanitation.
- ◆ Helping the community to ensure good housing.
- ◆ Control of communicable diseases.
- ◆ Collection of information about the community.
- ◆ Educating community leaders and councils that it is their job to look after the health of their community.

The aim of community health is to prevent diseases, cure diseases early before they become serious and promote health by health education

Those parts of community health work that are mostly to do with children will be described in this book. The other parts of community health work, which you have studied in other subjects, will not be discussed.

### Home visiting

This is an important part of community health work. It allows you to:

1. Make friends with the family.
2. See how the family lives and what special problems they have.
3. Give advice that is right for the particular family.
4. Learn about the people's customs and beliefs, hygiene, water supply and sanitation, nutrition and family planning.

The health worker uses home visiting to:

1. Teach the whole family about living healthier, happier lives
2. Learn about the people among whom she is working.
3. Follow up special patients e.g. low birth weight babies, those with malnutrition, tuberculosis, asthma, epilepsy, HIV and leprosy, and children with other chronic conditions. Check that they are being well fed and taking their medicines regularly.
4. Find out about children and mothers who are not attending community health clinics.

## The Home

The health worker wants to find out things about the home such as:

- ◆ The kind of home it is. Whether it is clean or dirty, large, or small.
- ◆ Where the family live, eat and sleep.
- ◆ Where the cooking is done, and how it is done. Is there smoke from cooking fires in the house?
- ◆ Where the water comes from, and how it is stored. Is it clean or contaminated water?
- ◆ Whether a latrine is used, and what kind it is, and where it is.
- ◆ Is there a tap and soap for washing hands?
- ◆ How the family gets rid of rubbish.
- ◆ Whether there are flies, mosquitoes, pigs or other animals in or around the house.
- ◆ The gardens. How far away they are? What foods are grown?

## The Family

The health worker wants to know such things about the family as:

- ◆ *The Leader*: Is the father, mother or other relative the leader?
- ◆ *The mother*: Is she healthy and well? Is she pregnant and is she having antenatal care? What work does she do? (eg. gardening, collecting firewood, working in an office). What food does she get for the family and how is it prepared? How does she look after the children? Is she breast feeding the

baby? Has she started the baby on educational diet? Does she need help or advice on family planning?

- ◆ *The Father*: What work does he do, and does he earn money? What does he spend his money on? Is he well and healthy?
- ◆ *The children*: Are the children clean, healthy and happy? Do they attend a clinic, and have they been immunized? Are they growing well? Are they having a good diet? Do they go to school? Have they had any serious illness? Do they have any mild diseases that can be treated now at home? What accidents may happen at home to the child, e.g. ingesting kerosene or other poisons not locked up. Injuries from fires, or knives, falling into the sea, etc. Are they protected from being exposed to inappropriate things that may harm them?
- ◆ *Other people living in the house*: Who are they, and what work they do? Are they well and healthy?
- ◆ Is the environment unhealthy or unsafe, for example is there excessive alcohol or drugs used in the home? Is the child exposed to cigarette smoke?

## What community health clinics do

1. Teach the importance of clean body and clean home.
2. Help pregnant mothers remain healthy during pregnancy. If mothers are healthy in pregnancy, their babies are more likely to be healthy.

3. Teach how to have babies safely at home but encourage the mothers to deliver their babies in a Health Centre or Hospital.
4. Find out which mothers are likely to have difficult labours. Then persuade these mothers to go to a health centre or a hospital to have their babies.
5. Protect young babies from common infectious diseases by immunizing them.
6. Treat mild illnesses. Refer more serious ones to hospital or health centres.
7. Teach mothers about the right kind of food for their young children.
8. Find cases of poor nutrition and diseases which need hospital or health centre treatment. It is better if you can prevent these diseases by health education.
9. Follow up cases who have been discharged or absconded (run away) from hospital or health centre. Find those who have not been attending the clinic regularly by home visiting.
10. Make sure all children are vaccinated
11. Educate parents about family planning. Provide them with a suitable method.
12. Look at health conditions in villages and towns. Report poor health conditions to the HEO or OIC for action.
13. Learn local beliefs and customs about health and disease. Then more effective health education can be given. You should write down this knowledge so that health workers new to the area can learn

about beliefs and customs straight away.

### To start a clinic

1. You must have at least one community health nurse
2. The people must know why clinics are held. They must be educated to want a clinic. This is part of health education.
3. You do not need transport to start a station or town clinic. If there is somebody trained in community health work at a health centre, there should be a clinic.
4. Most clinics are held by the roadside, or in villages and towns where big population groups are found. This requires transport.
5. Clinic House. Rain and strong sun are common in Papua New Guinea.

Therefore, shelter should be provided. Clinic houses should be:

- ◆ Simple
- ◆ Cheap
- ◆ Provide enough light to see
- ◆ Big enough

Too many councils waste a lot of money on permanent material clinic buildings which are only used once a month.

When people ask for a clinic in their area they should, if possible, build a clinic house first, before the clinic starts.

The people should pick the site and the type of building. They should build it with advice from you and the community health nurses. Any

materials required, e.g., nails, should be supplied by the council or the community. A 6 metre diameter round house or a 5 metre square house is a good size, with a part walled off for antenatal examinations.

### To keep a clinic going

1. Clinic must be regular.
2. The people must know when the clinic will be at their place. It is best if the Aid Post Orderly reminds all women leaders a day or two before. Therefore, the Aid Post Orderly must have a community health roster.
3. Clinics must not be held on special days, e.g., market days, church festivals, unless these days are easier for the people to come to the clinic.
4. Staff must arrive on time. This is often difficult if roads are muddy, or the outboard motor breaks down.
5. Staff must really want to help the people.

running costs of such vehicles. The PHO's approval is needed first.

3. Make sure Aid Post Orderlies know when clinics are being held in their areas. They can act as interpreters and help community health nurses.
4. Make sure transport is available on time and serviced regularly.
5. At health centres the HEO is often able to go out on village clinics with the community health nurses. He can then do village inspections, check water supplies, or inspect Aid Posts, while the community health nurses hold the clinics. He should also talk with the community health nurse about which mothers need to have their babies born in the health centre or hospital. He can also talk with the men about health and family planning.
6. School health. Both the HEO and the community health nurse can visit the schools together.

### Health extension officers and community health services

The following are things that HEOs can do to help community health services.

1. Encourage people and their local government council to help build clinic houses.
2. Encourage the council to purchase a vehicle which can be used by clinic nurses. The Health Department can usually pay for the

## Chapter 28. Maternal health

- ◆ For the foetus and the baby to be healthy, the mother must also be healthy. She must be healthy during pregnancy and labour and while the baby is breast feeding.
- ◆ So, you must always think of both mother and foetus or baby. Community health clinics (previously called MCH clinics) are a vital component of the Health System and should serve the majority of the mothers of Papua New Guinea. However, less than half of the mothers receive any trained care during childbirth.
- ◆ The maternal mortality (deaths of mothers during childbirth) in Papua New Guinea is about 100 times greater than it is in Australia. But where clinics and midwifery services are available the maternal mortality is greatly reduced.
- ◆ For money spent and time used, the community health clinics are very effective ways of saving life. The community health staff may well save more lives than do all the hospital doctors. It is the duty of every doctor, health extension officer and nurse to encourage and help the work of the community health clinics as much as possible.
- ◆ Community health clinics save more lives than do hospitals.



**Figure 51 - Community Health Clinics save more lives than do hospitals.**



## Antenatal care

(Care of mothers during pregnancy)

The things that community health clinics can do for mothers who are pregnant are:

1. Find out if the mother is likely to have any difficulty during delivery (the birth of the baby). The clues that a mother might have difficulty are listed below. Arrange for the mother to have her baby at a hospital if she is likely to have any difficulty during delivery. Even if not likely to have difficulty, encourage her to have the baby at the health centre or hospital where there is a midwife or skilled birth attendant.
2. The mother should avoid carrying heavy loads during pregnancy.
3. Teach the mother about nutrition, health and hygiene for herself, her new baby and her older children.
4. Prevent the mother getting malaria and anaemia, by making sure she takes antimalarial prophylaxis and iron and folic acid (fefol) tablets regularly.
5. Immunize the mother with tetanus toxoid so that the baby will not get neonatal tetanus. If the mother has not had any tetanus toxoid before, she should be given 2 doses with a gap of 2 months between each dose.
6. Tell the mother about family planning so that she and her husband can choose to use a family planning method after the baby has been born, if they want to.
7. Treat any mild illness that the mother has.
8. Send the mother to a doctor if she has any serious illness.
9. Find out if the mother has any disease or trouble with her pregnancy. If she has, she may need to go to hospital or health centre.
10. Help the mother understand that doctors, health extension officers and nurses can help her if she has any troubles during pregnancy or delivery. If this is done, the mother will not be frightened if she has to be sent quickly to hospital or health centre.



**Figure 50 - Baby's health depends on his mother. The mother should avoid carrying heavy loads during pregnancy.**

Teach the mother what to do for the safe delivery if she is going to have the baby born at home. Tell her how to prepare the place and things for birth before labour starts. Teach her to keep herself and the baby clean. Teach her how to tie the cord and cut it cleanly. Make sure she will be able to get help quickly if it is needed. But also encourage her to have her baby at a health centre or hospital where there is skilled assistance if anything goes wrong.

### How to find out if the mother is likely to have trouble during pregnancy or delivery

1. Ask the mother questions about previous pregnancies and deliveries (obstetric history)
    - a) Did the baby have to be helped to be born with vacuum extraction or forceps?
    - b) Did the mother have her abdomen cut to get the baby born (Caesarean section)?
    - c) Did the mother have a lot of bleeding after the delivery (post-partum haemorrhage)?
    - d) Was there any trouble in getting the placenta out (retained placenta)?
    - e) Did the mother have any bleeding during a previous pregnancy (ante-partum haemorrhage)?
    - f) Did the mother have any oedema (swelling) during a previous pregnancy?
    - g) How many of her babies were born dead (stillbirths)?
    - h) How many of her babies died before they were one month old (neonatal deaths)?
- If the mother has had any troubles like these before, she should have her baby born in hospital.
2. Look at the mother (examination)
    - a) Is she smaller than other women in her area?
      - ◆ Put a mark on the door of the clinic, or on a tree, if the clinic is held outside under a tree. In coastal areas put the mark 150cm (60 inches or 5 feet) from the ground.
      - ◆ In the Highlands put the mark 140 cm (56 inches or 4 feet 8 inches) from the ground. Women who are not as tall as the mark are likely to have trouble during delivery.
      - ◆ A very small woman has a small pelvis. The baby may not be able to get through it to be born (disproportion). Small women should have their babies born in hospital.
    - b) *Is she pale (anaemic)?* If the mother's Hb is under 7g/dL she should be sent to hospital.
    - c) *Does she look old, weak or sick?* Mothers who look old, weak or sick, especially if they have already had four babies born, should have their babies born in hospital or health centre.
      - Does she have any signs of pre-eclampsia?
    - ◆ If the mother's blood pressure is 140/90 or more, or if she has a lot of swelling (oedema), or if she has protein in her urine, she



should rest in bed and be given phenobarbitone 60mg (2 tabs). If the signs of pre-eclampsia have not gone after 2 days of this treatment, the mother should be sent to hospital. But if she has a high blood pressure and has a headache, give the phenobarbitone and refer her to hospital straight away.

- d) *Feel the mother's abdomen (palpation)*. The mother should have the baby born in hospital if:
- The foetus lies across the abdomen (transverse lie) and can't be turned into a head downwards (vertex) position.
  - The foetus lies with his buttocks downwards (breech) and can't be turned into a vertex position.
  - There is more than one foetus (twins).
  - The abdomen feels very large due to twins, big baby or hydramnios (too much amniotic fluid).

## The H.E.O. and antenatal clinics

- ◆ Mothers usually do not like men to feel their abdomen. This is why female nurses usually do antenatal clinics. Sometimes mothers don't even like female nurses, if they come from another area, examining them. If a male health worker examines a woman, he must have another female present with him.
- ◆ If you are a male H.E.O. you must not think that you cannot do

antenatal clinics because you do not have a female nurse. You can still do the most important things in antenatal care without touching the mother.

### Things that are most important

1. Find out if the mother had any trouble with other pregnancies or deliveries
2. See if she is smaller than other women in her area
3. See if she looks pale, old, weak, or sick
4. Check her blood pressure
5. See if she has any swelling (oedema) of the ankles
6. Make sure she has her baby in hospital or health centre if she is likely to have trouble. All mothers should be encouraged to have their baby in the health centre or hospital where there is a midwife or skilled birth attendant.
7. Prevent her getting malaria and anaemia. Make sure she has a full course of antimalarials at her first visit and then takes prophylaxis if she lives in a malaria area. Make sure she takes iron and folic acid (Fefol).
8. Immunize her with tetanus toxoid
9. Teach her about nutrition, health hygiene and family planning
10. Teach her how to have her baby safely at home but encourage her to deliver her baby at a health centre or clinic where there is skilled assistance if there are problems. All these things can be done under a shady tree. A clinic house is not necessary for these important parts of antenatal care.

The treatment of complications of pregnancy, childbirth, and the puerperium (time after childbirth) are dealt with in the course on obstetrics (see your book. Obstetrics for Health Extension Officers).

Prevention and cure of maternal illness are very important as they can save a lot of lives.

## Chapter 29: The health of young children at community health clinics

Community health clinics (previously called MCH or clinics) play a major part in looking after the health of children in Papua New Guinea. . The most important thing for a community health clinic is regular attendance by the sister, nurses, mothers and children. They should be held at least once every four weeks, always in the same place.

There should be a building to work in if possible. Some shelter for the people who are waiting, in case it rains, is important. Clinics should not be more than one hour's walk from the mothers' homes. If possible, the clinic should be near a road.

Treatment must be provided at the clinic as well as preventive measures, such as immunizations, and teaching about health. The community health nurse must ask about everybody who is absent from the clinic. If the absence is due to sickness, the child should be seen. Home visiting is a very important part of community health work.

The community health nurse needs to have the co-operation of the local aid post orderly and village councillors. In order to get the co-operation of the men of the area it is best for the doctor or health extension officer to explain things to them before any new clinic is started.

If the clinics start out right, they are very successful. But it is difficult to turn a bad clinic into a good one. There are both good and bad clinics in Papua New Guinea. How good a clinic is often depends upon the doctor or health extension officer or nurse. Clinic staff need encouragement, administrative help and good medical care for patients they send into hospital or health centre. If these things are not provided by the doctor or HEO, the clinic will not be a good one.

### What community health clinics do to keep babies and young children healthy

1. Make sure that the child is growing well
  - ◆ If a young child grows well, she is not malnourished. Babies and young children should be weighed regularly, and their weights recorded on the weight chart. In this way you can make sure that the weight is going up and that the young child is growing well. The earliest sign of malnutrition is when the child's weight curve goes flat instead of going up.
  - ◆ The child's weight must be put on her weight chart at the time she is weighed. If you find her weight is not going up, you will know you have to start treating her for early malnutrition.
  - ◆ Also, the nurse must let the mother see her put the child's weight on the weight chart. She must explain to the mother about the child's weight. She should tell the mother she is feeding the child well if her

weight goes up properly. We must get the mother interested in the child's growth and in the food that she needs for good growth. This is a very important part of teaching the mother how to keep her child strong and healthy.

- ◆ It is also important to measure the child's mid-arm circumference if he is aged between 1 to 5 years. A mid-arm circumference of under 14 cm in a child aged 1 - 5 years means that she is malnourished.

## 2. Teach the mother

Community Health Clinics should:

- a) Teach the mothers about the right kinds of food to give to their children. Get them to start getting their babies some solids by the time the babies are 4-6 months old.
- b) Encourage the mothers to continue breast feeding their babies. Teach mothers to give clean food to their babies.
- c) Teach mothers about keeping themselves, their children, their houses and their villages clean.
- d) Teach mothers about the early signs of illness in their children. Tell them how to treat these at home, e.g. give extra fluids if the child has diarrhoea.
- e) Teach mothers to come regularly with their children to the clinics.
- f) Teach mothers and fathers about the family planning services that are available.

Make sure that the mother understands that we are interested in her children and want them to be healthy and strong.

Health staff must be friendly with mothers, and not get cross if they seem stupid or do not do what they have been told to do.

We must make mothers feel happy to come to the clinic. If the mother feels that we take good care of her children and look after them well when they are sick, she will trust us. She will then take her children, if they get very sick, to the health centre or hospital, if we tell her they need to go there. Also, she will start to do some of the things that we try to teach her to do.

3. Protect the children against diseases by immunizations.
  - ◆ Give all babies BCG, and first dose of Hepatitis B vaccines soon after birth.
  - ◆ Give Pentavalent, to protect against whooping cough, tetanus and diphtheria, hepatitis B and Haemophilus influenzae type b (Hib) to all babies.
  - ◆ First dose of Pentavalent is given when the baby is 1 month old.
  - ◆ Second dose of Pentavalent is given one month after the first dose.
  - ◆ Third dose of Pentavalent is given one month after the second dose.
  - ◆ Give Sabin vaccine, to protect against polio, at the same time that you give pentavalent. Give one dose of the inactivated polio vaccine (IPV) at the same time as the third dose of Sabin

- ◆ Give Pneumococcal conjugate vaccine (PCV) to protect against pneumococcal pneumonia and meningitis at the same time that you give pentavalent.
- ◆ Give measles rubella vaccine when the baby is 6 months old. Give a second dose of measles vaccine 3 months after the first dose.
- ◆ Make sure that the mother has a record of the immunizations that you give to her children.
- ◆ Record it in the child's Health Record Book.

#### 4. Prevent malaria

- ◆ If malaria is common in the area make sure the mother has an insecticide treated bed-net to sleep under with her baby, and that she understands what this is for and how to use it. An insecticide-treated bed net is the most effective way to prevent malaria in young infants. Mothers should sleep under a net during pregnancy also, as this can protect her unborn baby from congenital malaria. It also protects the newborn from prematurity and anaemia, which are more common if the mother has malaria during pregnancy.
- ◆ In some parts of Papua New Guinea malaria causes more young children to die than any other disease. Prevention of malaria will stop lots of young children dying.
- ◆ If malaria prophylaxis is given it must be given regularly each week

5. Take special care of children likely to become ill or malnourished.
  - ◆ Some babies and young children are especially likely to become malnourished or sick.
  - ◆ These children are called an "at risk" group. They are "at risk" of becoming malnourished or sick. Clinics must give extra time to these children and their families to prevent them getting malnourished or sick.

Young children are at risk of getting malnutrition when:

- ◆ They are artificially fed (babies who are not breast fed)
- ◆ They are twins
- ◆ The mother already has 5 or more children.
- ◆ Another baby is born before the child is 3 years old. (The older child is at risk).
- ◆ The mother is old or ill.
- ◆ The family live in a town and the mother has to go to work.
- ◆ The family live in a town and the father has no job.
- ◆ The family live in a town and the father earns less than 100 kina per week.
- ◆ The mother or father has died or does not live at home.
- ◆ The mother is not married
- ◆ A young child in the family has previously died.

These children are at risk and must be watched carefully. Teach the families about good food and watch the child's weight chart.

6. Make sure the child is not ill

- ◆ Check the babies and young children each time they come to the clinic. Ask the mother how the child is. Does he feed well?
- ◆ What food is he eating? Does he have a cough? Does he have diarrhoea? Has he had a fever? Does he have any sores? Ask the mother if there is anything that worries her about the baby.
- ◆ If he has a fever, examine the child carefully to find out the cause of his fever. Remember to look at his ears and throat if he has a fever.
- ◆ Small children can't tell you that they have earache or sore throat.
- ◆ For any child with fever without a clear focus (such as an upper respiratory tract infection) do a Rapid Diagnostic Test (RDT) for malaria, and if it is positive give a treatment dose of antimalarials. If you cannot do an RDT and the child is from an area where malaria is common, give a treatment dose of antimalarials.
- ◆ Even if the mother says the child is well, check to make sure he is well. Feel his forehead to see if he feels hot. Look at his ears and nose for any discharge. Look in his mouth to see how many teeth he has, and whether he has thrush. Look at the inside of his lower lip to see if he is pale. Look at his eyes to see if he has conjunctivitis. Look at his chest to see if he is breathing right or if he has any signs of pneumonia. If he has a cold, cough or fever, look carefully for signs of pneumonia. Remember that it is easier to diagnose pneumonia by looking at

the child's chest than by listening with a stethoscope.

- ◆ Feel his abdomen to see if he has an enlarged spleen, liver or other abdominal swelling.
- ◆ Look at his skin and head to see if he has any sores or scabies or tinea.
- ◆ Treat the child for any illnesses that you find.

#### 7. Make sure the child is developing well

- ◆ Check the baby's development.
- ◆ Is he holding his head up? Can he sit up, stand up or walk? Is he using his hands to hold things? Does he smile at his mother? Is he chewing his food? Is he talking? What does he say? Look at page 12 to see the average age at which babies reach these milestones of their development.

#### 8. Treat children who are sick

- ◆ As well as preventing illnesses and teaching mothers how to keep their children healthy, clinics must also give treatment if the child is sick. When her child is sick the mother wants him to be treated. She is not interested in hearing talk about how to keep him healthy.
- ◆ She knows her child has a fever or a cough, and she wants him to be given treatment so that he becomes well again. Treat the child when he is sick and make him better. Then the mother will be

interested in your talk about how to keep her child healthy.

- ◆ If the child has a mild illness, he may only need the treatment given at the clinic. Further treatment, if necessary, can be given at the aid post. If it is a serious illness, the nurse should start his treatment at the clinic and send him to hospital or health centre.

9. Visit the homes of some of the children.

- ◆ Home visiting is an important part of community health work. If possible, the nurse should visit the homes of young children who she knows are "at risk" but who have not come to the clinic.

10. Follow-up of patients discharged from hospital or health centres.

- ◆ The mothers of all children who are discharged from hospital or health centre should have a short note written in their health record books to show to the community health nurse at the next clinic. This note should say:
  - a) What the diagnosis was, the admission number
  - b) What treatment was given
- ◆ This is especially important for children discharged after being treated in hospital for malnutrition.
- ◆ Remind the mother to take the health record book with her when she next goes to the clinic.
- ◆ Hospital and health centre staff should also let the clinic staff know

about children needing follow-up who have been discharged from hospital or health centre.

- ◆ Then, if the mothers don't bring their children to the clinic, the community health nurse can visit the homes and make sure the children are well.

11. Give treatment to other people in the family who are sick

- ◆ Clinics should not just treat young children. If an older child or the mother or the father is sick, they should also be treated.
- ◆ Clinic workers should also check up on patients with tuberculosis, HIV, leprosy or other chronic condition who have been discharged home on outpatient treatment. They should make sure that these patients are continuing to get their treatment from the aid post.

12. Check the sanitation of the village

- ◆ Clinic workers should not leave a village without having a look around the village to see how the village hygiene and sanitation is. Water supplies, latrines and rubbish disposal places should be looked at. If pumps or taps are used in the supply of water to the village, these should also be looked at. It should be reported if these are not working properly.



- ◆ Take the aid post orderly with you when you look around the village. Explain to him what you are looking for and why.

### 13. Keep records.

- ◆ Keeping records is an important part of clinic work. Each child needs a record of his weight put on a weight chart. Each child also needs a record of immunizations he has been given.
- ◆ Clinics need to keep a record of how many babies and young children there are in the village. They need to know how many of these children come to the clinic. They need to know how many immunizations they give and how many children have been fully immunized. They need to know how many children are malnourished and the kinds of illnesses the children have. They must know which the children “at risk” are and which children need follow-up after treatment in hospital or health centre.
- ◆ They must know which people in the village are on outpatient treatment for tuberculosis, HIV leprosy or other chronic conditions. Then they can make sure that these people get their treatment regularly.
- ◆ They should keep a record of the number of homes they visit. They need to keep a record of all babies born. They also need to keep a record of deaths in each age group:
  - i) Babies born dead (still-births).

- ii) Babies born alive who died under one month old (neonatal deaths).
- iii) Babies born alive who died under one year old (infant deaths).
- iv) Young children who died aged one to four years old (one to four year deaths).
- v) Children aged 5 years and more who died.
- vi) Mothers who died because of trouble with pregnancy or delivery (maternal deaths).
- vii) Adults who died.

These records help community health workers know what the main health problems are. The records help them plan what they should do to improve the health of the community. The records also show how successful the clinics are in doing their work.

### The ten steps for young child care at community health clinics

1. Greet the mother. Make her feel happy that she has come. Make sure she is comfortable while you examine the child. If you are sitting down on a chair, the mother should also have a chair to sit down on.
2. Weigh the baby. Put the weight on the child's weight chart. Show the mother the weight chart and explain to her how her child is growing. This is the time to talk to her about feeding her child.
3. History. Ask how the child has been. Take a more detailed history if the child has had any symptoms.
4. Examination. Always do a quick examination:



- ◆ Look at the child's general condition
- ◆ Feel his forehead to see if he has a fever
- ◆ Look at his skin for sores
- ◆ Look to see if he has any discharge from the nose or ears
- ◆ Look at his conjunctiva or lips to see if he is pale
- ◆ Look to see if he is breathing normally
- ◆ Feel his abdomen for a spleen

A more detailed examination will be necessary if the child has some symptoms e.g. look for signs of dehydration if the child has diarrhoea.

1. **Diagnosis.** The weight, history and examination will tell you the diagnosis - e.g. healthy child, under-nutrition, skin sores, URTI, pneumonia, etc.
2. **Treatment.** Treat the child for any illness that he has. If more treatment is needed next day arrange for the child to receive it at the aid post. If the child is very sick start his treatment at the clinic. Then send him to hospital or health centre.
3. **Explanation and education.** Talk to the mother about her child. If he is strong and well, tell her so. Tell her to go on feeding him as she is doing. If he has some illness explain to her about his illness. Tell her what treatment is necessary. Advise her how the illness can be prevented. This individual health education between the nurse and the mother about the child is very important. As well as talking to the mother, the nurse must also listen

to the mother. Let the mother do some of the talking.

4. **Immunizations.** Check whether the child is due for any immunizations. Always give these unless the child is very sick or has high fever (temperature over 38°C.) It is quite safe to immunize a child with URTI and a slight fever. Measles vaccine should always be given if it is due.
5. **Family planning.** Make sure the mother has access to family planning. Encourage her to space her children.
6. **Records.** A record of clinic attendance and immunizations given must be kept.

These are the 10 steps that should be followed for every young child (under 5 years) whom a health worker sees at a Community Health Clinic. Remember each of these 10 steps for every young child that you see. These 10 steps do not include other important work that you do at community health clinics.

### Other work: ten more important things to do

1. Antenatal care.
2. Home visiting, especially for "at risk" children
3. Follow-up of children recently discharged from hospital or health centre.
4. Treatment of older people in the family who are sick.
5. Checking up on patients who are receiving outpatient treatment for tuberculosis, HIV or leprosy.
6. Check up on sanitation of the village.

7. Group health education and demonstration.
8. Discussion with councillors and women's groups.
9. Create interest in the clinic among the village mothers. Teach one or two of the village mothers to act as volunteers. Let them assist in running the clinic.
10. Provide continuing education for the A.P.O. in the care of young children.

## Chapter 30. School Health

- ◆ The aim of school health is to protect and improve the health of children who go to school. This helps their growth and development. It makes sure that they get the most out of going to school.
- ◆ It is a government priority that all children aged 7-12 years (community or primary school age children) should go to school. It is easy to look after the health of children who go to school because they all come together in the schools.
- ◆ It is much more difficult to look after the health of school age children who do not go to school. They can't be found together in a group. Unless their parents think they are sick they are not usually taken to a clinic. Community health clinics should continue to be interested in children as they grow older. It is wrong to think that clinics are not interested in children over the age of five years. Clinics should be interested in the whole family.
- ◆ A child's health record book has many useful things written in it. It tells you about the child's past health and what immunizations she has had. When a child starts to go to school her health record book must be kept. Then it can be used by the health worker who is looking after the school.

- ◆ School Health services are very important but have not been happening as they should in many areas of the country. Opportunities for improving children's health have therefore been missed.

### Why school health is important

1. Community (primary) school and high school age children make up a quarter of the population in Papua New Guinea. So, they are a large group.
2. School is a good place to teach about health. The children are all together in one place. They expect to learn new things at school. School teachers are trained to teach children. One of the important things that children should learn about at school is health.
3. The school is part of the community. From teaching children good health at schools, new ideas of health can spread through the community. The child can take what she has learnt at school back to her home and her family.
4. Improvement of a child's health when he is at school can help him for the rest of his life. For example, a child with an ear infection may become deaf if it is not treated properly. This deafness will prevent him doing well at school. When he leaves school, his deafness will prevent him getting a good job. If the ear infection is treated correctly at school, all of this trouble is prevented.

5. Examination of school children finds many children who need treatment.
6. If a child is healthy, he will learn well at school. If he is sick, he will not do well at school. Then, when he leaves school, he will not get such a good job.
7. At school the child comes into contact with many people. This means she may catch common viruses and other infections. These are usually very minor, and exposure to these viruses helps to strengthen the child's immune system. School health service nurses and HEOs can distinguish between children with minor illness (colds and mild coughs) and those with serious problems (malnutrition and weight loss, chronic cough, severe anaemia) and provide appropriate medication and refer for appropriate investigation and treatment

### School health services

Every school should be visited at least once a year.

Health workers must co-operate well with school teachers. No school health programme can be successful if there is not good co-operation. Always tell the teachers about the problems that you find in the children. Tell them what treatment is necessary.

#### What to do on a School Health Visit:

1. Talk with the teachers about school hygiene, water supply, toilets and

hand-washing, the safety of the school and playground.

2. Ask about the teaching of health at the school. It may be given by teachers, radio, or health workers.
3. Make a medical examination of:
  - a) New children at the school (Grade 1).
  - b) Children who will soon be leaving school (Grade 6).
  - c) Children who the teachers are worried about.
  - d) Children who were found to have something wrong at a previous medical examination.
4. Continue the care of children who need long term treatment, e.g. children who are on treatment for tuberculosis, epilepsy or leprosy. Also, children who have had rheumatic fever and need to take one penicillin tablet each day for prophylaxis.
5. Make sure the teachers and other school staff do not have infectious disease like tuberculosis or leprosy which may spread to the school children. Teachers should have a chest x-ray every 3 years. This can be done when they are either going or returning from leave.
6. School dental service. This is done by dental therapists when they are available.
7. School children should be given necessary immunizations with tetanus toxoid.
8. School teachers should be able to recognise and treat simple diseases (colds, skin sores, fever). School teachers should be able to give first aid including the treatment of minor injuries in their school

children. The school should have first aid equipment. You can help the school teacher with this work by giving them advice on first aid. Teachers may also be able to identify if a child is poorly nourished or has a chronic cough, which might indicate a more serious illness.

9. School teachers should watch for signs of emotional or mental illness (maladjustment) in the children. This is usually shown by changes in the child's behaviour or appearance. She may lose interest in her work, become lonely, unhappy and have no friends, be unkind and bad tempered or show some other unusual behaviour. Teachers should tell the health workers about any children who have physical, mental, or emotional problems. Emotional, behavioural, or mental illness can occur because of problems at home, problems in school, problems in the community, or they may be related to a physical or mental illness within the child.
10. Teachers should test children in their class each year to make sure they can see and hear well.

### Healthy living in schools

Children learn rules of health by seeing them done and by doing them themselves. Without this, lessons about health will not teach children about healthy ways of living.

Every school must be a healthy place and this will teach children to be healthy

### Environmental hygiene (School sanitation)

1. Water
  - ◆ It is important to have plenty of water close to where it is needed (e.g. toilets). The Local Government Council, with assistance from the Rural Improvement Fund or the Board of Management of the school can raise money for a school well or a piped water supply. The Board of Management of the school can also motivate the community to provide the labour to build it.
2. Toilets
  - ◆ There must be enough toilets for the number of children and staff. They must be kept clean.
  - ◆ Properly constructed deep pit latrines are best. They must have a concrete floor and be fitted with lids. They should have a water seal if possible. There must be water close by for hand washing.
3. Kitchens
  - ◆ Places where food is prepared must be kept clean. A clean water supply should be close by.
4. Dormitories
  - ◆ These must not be overcrowded. Overcrowding spreads diseases. In coastal areas ventilation is important to prevent dormitories getting too hot.
5. Washing
  - ◆ Hand washing facilities must be provided. This allows children and

teachers to wash their hands after going to the toilet and before eating. Boarding schools must have enough showers, and they must be clean.

6. Rubbish disposal

- ◆ Good rubbish disposal is important to prevent the breeding of flies, mosquitoes, and rats.

7. Classrooms.

- ◆ These must not be overcrowded. There should be enough light and ventilation.

8. Safety.

- ◆ School buildings and grounds should be safe. School children and staff must know what to do if there is a fire. Dormitories must have a fire escape. If the school is near a main road, care must be taken to prevent traffic accidents.
- ◆ Poisons at the school (e.g. medicines, duplicating spirits, agricultural pesticides, rat poison) must be kept locked up. Never keep such poisons in drink containers, such as a Coke bottle - there is a very big risk a child will drink it and be poisoned.

9. School feeding

- ◆ If children are hungry, they cannot study well. Food given at school should be what is grown fresh, locally available and acceptable. It can be used as an aid to the teaching of nutrition and as a lesson in agriculture (if the school has a garden to produce enough

food).

10. Sport

- ◆ Sport is useful to improve strength, coordination, fitness, and ability to play. It also helps the child learn team-spirit, how to work together and cooperate with their peers. In some societies school sport is needed to reduce obesity.

11. Promotion of mental health

- ◆ Teachers should be happy and satisfied people who enjoy their work. They should try to understand the children and encourage them to develop in their own ways. They should encourage children for the talents they have. They should promote the education and learning of girls as much as boys.
- ◆ Children should also learn to co-operate and work together as a group. Teachers should be on the lookout for children who are vulnerable, different, or quieter, or those who may be bullied by others. Bullying is a common reason for children being unhappy at school, and it should not be tolerated.

12. Health Teaching

- ◆ This should be fitted in with the health programmes for the community as well as following the health syllabus. This may require co-operation with other departments.

For example

- 1) If the malaria spray team is going to visit the area soon, the school children should learn about malaria.
  - 2) If the Department of Primary Industry is introducing fishponds into the area, the school children should learn about these and how they can help improve nutrition.
- ◆ More commonly there is 'everyday learning', learning the importance of handwashing before eating, and after going to the toilet is part of everyday learning. Teachers and school nurses should emphasise this, but also model this behaviour. To teach children about the importance of cleanliness the school has to be a clean and healthy place also.
  - ◆ In order that the child may learn how to improve her own health she must know how her body works. She should know the causes and prevention of important diseases, and what health services are available.

#### Important things about health to learn at school:

1. Cleanliness of the child, his home, the school, and the village.
2. The best use of local foods, and how to cook food so that it is healthy.
3. Insects and germs that cause disease.
4. Normal growth and health needs of children.
5. First aid and home treatments.
6. How to prevent diseases.
7. How to prevent accidents.

8. Community sanitation.
9. Use of health services available.
10. Sex education and family planning.
11. The importance of looking after your body, personal privacy and not letting other people interfere with it.
12. Dangers of alcohol, smoking, marijuana and other drugs and sexually transmitted diseases including HIV.
13. Dental health, teeth cleaning and avoiding processed foods that are high in sugar
14. Healthy living and mental health.

**Note:** The child learns best by what she sees and does, and by having healthy surroundings at school. Without these, special lessons on health are of little use.

## Immunisations given to school children

### Tetanus Toxoid

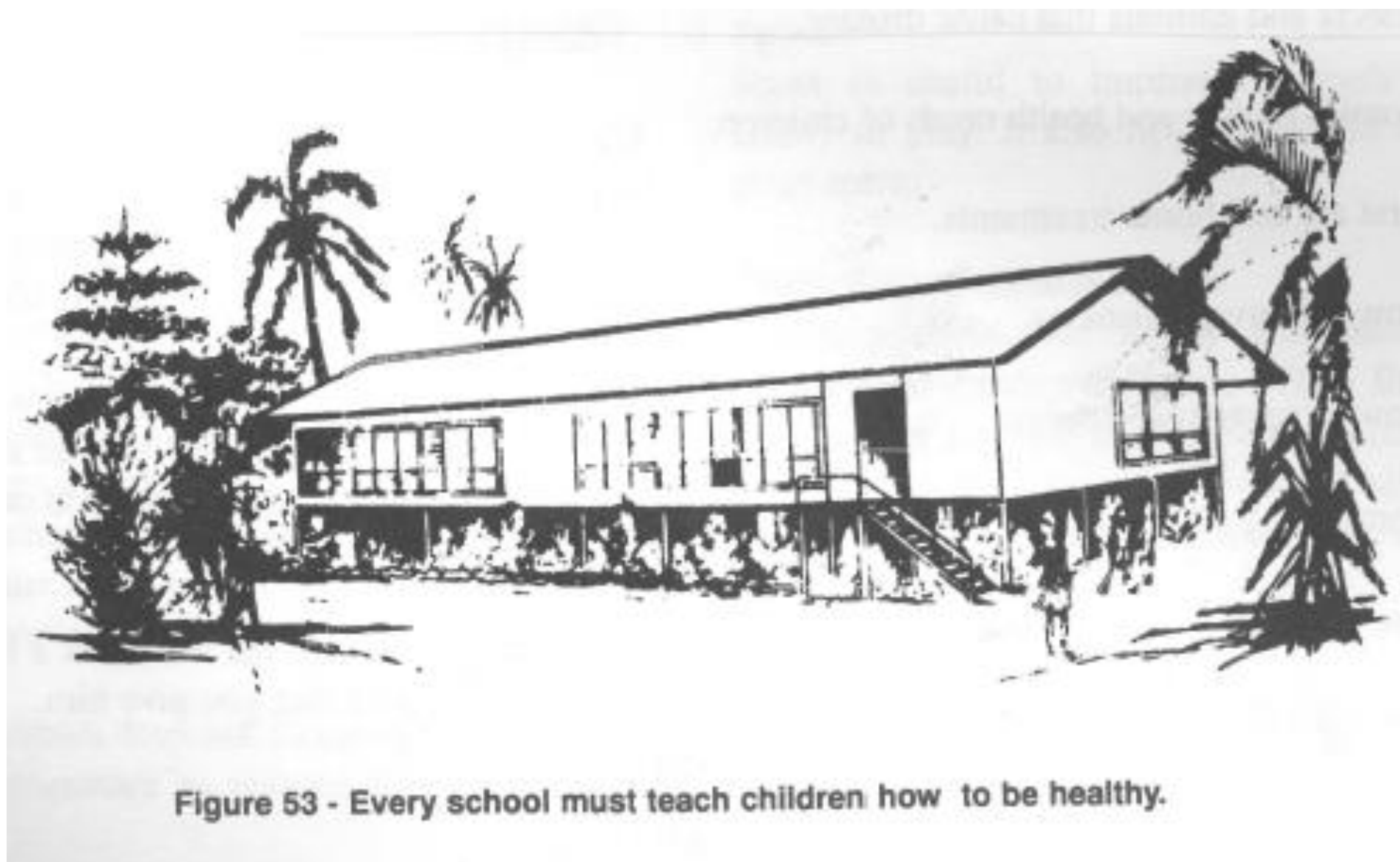
- ◆ All children should be given a booster dose of tetanus toxoid when they start school. They should receive another dose of tetanus toxoid during their last year at primary school (about age 12 years).
- ◆ If a school child has not been immunized against tetanus before (i.e. not been given the Pentavalent vaccine when a young child), he should be immunized at school. Give two doses of tetanus toxoid two months apart.

- ◆ **Records.** Make sure the child has a record of the immunizations that you give him.

### School visits

1. Arrange the school visit with the head teacher about one week before. Ask him to let the parents know that you will be looking at the children.
2. Introduce yourself on arrival. Look around the school area with the head teacher if he is available. Do a thorough inspection, especially of water supply, rubbish and excreta disposal, lighting, ventilation, and safety.
3. Ask the head teacher about any health problems. Ask him if there are any children, he or other teachers would like you to see.
4. Examine the children who have started school this year. Also examine children who will be leaving school this year. Examine any children the head teacher or other teachers want you to see.
5. Immunize children who have started school and those who are leaving school that year with tetanus toxoid.
6. If the Human Papilloma Virus (HPV) vaccine is available, give this to children at the age of 12.
7. Talk to the children. You probably won't be able to talk to the whole school. Talk about something related to what you have seen at the school. Therefore, go prepared to talk about any one of several things.
8. Talk to the head teacher about what you have seen. Talk about the health needs and the health education needs of his school.
9. Try to encourage the head teacher to continue an active health education programme, backed up by practice e.g., checking on personal hygiene, hand washing drills, proper use of toilets, etc.
10. Offer to help, or provide help, to make any improvements needed. Offer to support the head teacher in his efforts to get funds and materials.
11. **Follow-up.** Arrange a date with the head teacher, for about 1 or 2 months' time, when you will come back to the school. On your return visit to the school, you can check up on children who you found needed treatment. You can also see those children who were away from school on your first visit. You can also see how well the teachers are doing in improving the health of their school and whether they are following your advice.





**Figure 53 - Every school must teach children how to be healthy.**

## School health examination

There is no need to weigh or measure the height of school children whom you examine. Measuring a child's weight or height is usually of no use unless it is done regularly and accurately. Sometimes it is done as part of a survey. You will be told to do it if it is wanted. There is also no need to test the urine of school children unless you think a child may have some kidney disease (because of oedema). It is useful to look for the following things when examining school children:

### Nutrition

The general appearance of the child is important. A child who is happy and strong in his play is not malnourished.

### Eyes

It is important for school children to be able to see well.

1. Seeing. If squint (eyes don't look straight) or poor vision is found, the child should be referred to an eye doctor. Poor sight can be made better by spectacles (glasses).

Test for vision (Eye Sight)

Child should stand 6 metres away from the vision chart. See chart in Appendix (Chapter 40)

Rules of using vision chart:

- i) Place chart in a good light.

- ii) Place chart at level of child's eyes.
- iii) Always examine the right eye first to avoid mistakes in records.
- iv) Use a card to cover the eye not being tested.
- v) Tell the child to keep both eyes open.
- vi) If spectacles are worn, check the vision with and without the spectacles.

Normal eyesight is 6/6. Children whose eyesight is 6/12 or worse in either eye should be referred to an eye doctor. They may need spectacles. You should tell the teacher to let these children sit in the front of the class so that they can see the blackboard clearly. Spectacles may be provided free to school children who need them.

2. You should also look for other eye diseases, e.g. conjunctivitis, and treat them.

It is important to tell the teachers that children whose eye infections do not start to get better after two days of treatment should be sent to a doctor.

### Ears

It is important for school children to hear well.

Hearing: causes of deafness

1. External ear canal blocked by wax or foreign bodies.
2. Middle ear disease (otitis media).
3. Congenital (child born with it).

**To test for deafness,** use the whisper test or voice test.

- ◆ Whisper test: Breathe out first, then whisper a number.

Rules for whisper test:

- i) The child turns his head away from you so he cannot lip read.
- ii) Test at arm's length.
- iii) Tell the child to put his hand over the ear not being tested.
- iv) Always examine the right ear first to avoid mistakes in records.

The child should hear the whispered voice at a distance of about 1 metre.

- ◆ Voice test:

The child stands 5 metres away facing you. Let him now repeat some words you say. Say each word with your mouth covered by a piece of paper so that he does not lip read. If he can't tell you what words you say, try again without your mouth being covered by a piece of paper. This will show you if he can lip read. Children who are found to be deaf should be referred to a doctor.

You should tell the teacher to let children who are deaf sit in the front of the class so that they can hear well.

You should also look for other ear diseases e.g. otitis media and treat them.

### Nose

Purulent nasal discharge should be noted on the school health examination record sheet. If it is persistent, the child should be referred for examination

### Mouth

1. **Pallor.** Roll the lower lip inside out with your fingers and thumbs and look to see if the child is pale. If she is pale, she has anaemia, and this must be treated.
2. **Teeth.** Look at his teeth to see if she has any holes in them (dental caries).
3. **Gums.** Look to see if her gums are swollen or bleeding (gingivitis).

Tell the dental health workers in your area about school children with dental caries or gingivitis.

4. **Throat.** Look at the throat to see if the child has a red throat or swollen tonsils with spots of pus on them (tonsillitis). If he has tonsillitis you must treat her with a course of penicillin.

### Neck

1. **Enlarged cervical (neck) glands** should be treated with a course of penicillin. If the swollen glands are not better after 2 weeks, the child must be referred to a health centre

or hospital. She may have tuberculosis.

2. **Goitre** - enlarged thyroid gland. You should let your paediatrician know about school children who have goitres.

### Chest infections

Children with chest infections should be given a course of penicillin. If they do not get better after a week, or if they get worse, they should be referred to the health centre or hospital.

### Heart

- ◆ Children with heart murmurs should be referred to a doctor. Some children who look healthy are found by school health workers to have heart murmurs. Often the heart murmur is due to an attack of rheumatic fever some time before, which was not diagnosed at the time.
- ◆ These children need to take one tablet of penicillin each day for many years to prevent them getting more attacks of rheumatic fever. It is important for school health workers to find these children, and then make sure that they take their penicillin tablets regularly.

### Abdomen

1. **Spleen.** You should record the number of children who have enlarged spleens.

If a child has an easily palpable spleen, he should be warned against playing

football or boxing. His spleen may rupture (break) and bleed if he is hit in the abdomen. He should take malaria prophylaxis each week. This will slowly make the spleen become smaller

2. **Other swellings.** Children with other swellings found in the abdomen should be referred to a doctor.

### Limbs (arms and legs).

Children whose limbs are deformed (not straight), or weak because of polio, or burns or other injuries may need surgery to straighten them. So, refer them to a doctor.

### Skin

- ◆ Many school children have skin diseases like sores, tinea, scabies, head lice (pediculosis) and tropical ulcers. These should be treated. You should make sure that the teacher knows how to continue the treatment.
- ◆ You should also look at the child's skin to see if he has any patches (areas of skin) that look like leprosy. If you think he has leprosy you should either diagnose it yourself or else refer him to a doctor.

### Maladjustment (emotional or mental illness).

Ask the teachers if they are worried about the behaviour of any of the children. Signs of maladjustment:

- ◆ Loss of interest in work, or

- ◆ Lonely, unhappy child with no friends,
- ◆ Unkind and bad tempered, or
- ◆ Other unusual behaviour.

Check these children carefully for physical handicaps like not seeing well, not hearing well or not being able to run well. If you can't find a physical handicap you should discuss the child with the head teacher. It may be possible for the child to be referred to the Department of Education's Psychological Assessment Service.

The child may be behaving badly because he is not able to keep up with his schoolwork, or it may be because of troubles at home with his family, or he may be being bullied at school.

#### Acute illness

Sometimes, when you visit a school, you will find a child who has just become ill. Often, he has a fever. Examine him and treat him just like you would for any child who is ill or has a fever.

## Chapter 31: Immunisation

The protection of babies and children against illness and disease is a most important part of community health work.

There are several ways of doing this, e.g. by:

1. Teaching parents and children about healthy living, good food and family planning.
2. Making a clean water supply available close to each house.
3. Good faeces and rubbish disposal (sanitation).
4. Well planned immunization programmes.

An immunization programme is a very important way to protect children, but it is not the only way. Immunizations must always be used as part of a wider programme of health education and prevention.

Immunizations must be given wisely. Health workers must know the immunization vaccines they use and how to look after them so that the vaccines do not lose their strength (potency).

The protection given by immunizations only lasts a certain time. So, you must know how long the protection lasts, and how often booster or strengthening doses are needed.

In order to be protected against a disease, a person must have antibodies (immunity) against it. There are two

kinds of immunity (ways of being protected).

1. **Passive Immunity** - Antibodies given to the children are ready made
  - ◆ e.g.: Patients ill with snake bite are given snake anti-venom.
  - ◆ Congenital immunity. When the baby is born, she has received antibodies from the mother through the placenta. This protects the baby in the early months of life against diseases such as tetanus, measles, malaria, and common viruses.
  - ◆ Immunity provided by antibodies in breast milk help to protect the baby against intestinal infections.
2. **Active Immunity** - The child makes her own antibodies.
  - ◆ To produce her own antibodies, she must either have the disease or be given a vaccine which contains parts of the causative bacteria or virus or its toxin in a harmless form. Active immunity lasts a long time.
  - ◆ For some diseases the protection is lifelong. Sometimes several doses of vaccine are needed to get full immunity, and further booster doses may be needed after some years.

Active immunization can be given against:

- ◆ Whooping cough (pertussis), contained within the Pentavalent vaccine

- ◆ Tetanus: by using Tetanus Toxoid and the Pentavalent vaccine.
- ◆ Diphtheria: contained within the Pentavalent vaccine
- ◆ Hepatitis B: by using Hepatitis B vaccine at birth and the pentavalent vaccine which also contains the Hepatitis B vaccine.
- ◆ Haemophilus influenzae type b, a bacterium which commonly causes pneumonia and meningitis.

Pentavalent, protects against the above five diseases (Whooping Cough, Tetanus, Diphtheria, Hepatitis B, Haemophilus influenzae type b).

- ◆ Tuberculosis: by using B.C.G.
- ◆ Poliomyelitis (Polio): by using 3 doses of Sabin oral vaccine and one dose of the injectable polio vaccine (IPV).
- ◆ Measles and Rubella: by using Measles-rubella vaccine (MR).
- ◆ Streptococcus pneumonia, or pneumococci (Pneumococcal vaccine), the bacteria commonly causing pneumonia and meningitis.

BCG, Hepatitis B, Sabin vaccine, IPV, Pentavalent, Pneumococcal vaccine and Measles-Rubella vaccines are given routinely to all young children in Papua New Guinea.

Tetanus toxoid is given to children when they enter and before they leave school. It is also given to mothers during pregnancy. You should know a lot about these eight vaccines - Pentavalent, Pneumococcal, tetanus toxoid, B.C.G., Sabin oral vaccine, IPV hepatitis B vaccine, and measles-rubella vaccine.

## Dose and site of administration of vaccines

Vaccine	Dose	Site
BCG	0.05ml	Intradermal left upper arm
Hepatitis B	0.5ml	Intramuscular right anterolateral mid-thigh
Oral Polio	2 drops	Oral
Inactivated Polio	0.5ml	Intramuscular right anterolateral mid-thigh
Measles/ Rubella	0.5ml	<b>Subcutaneous</b> right upper arm
Pentavalent	0.5ml	Intramuscular right anterolateral mid-thigh
Pneumococcal	0.5ml	Intramuscular left anterolateral mid-thigh
Tetanus Toxoid	0.5ml	Intramuscular left upper arm

## PNG immunisation schedule in 2019



## Immunization Schedule for Papua New Guinea

Immunization	Age at vaccination								
To be given at	Birth	1 month	2 months	3 months	6 months	9 -12 months	18 -24 months	7 years	13 years.
BCG	√								
Hepatitis B	√								
OPV		√	√	√					
IPV				√					
Pentavalent		√	√	√					
Pneumococcal PCV-13		√	√	√					
Measles- Rubella (MR)					√	√	√	√	
Tetanus toxoid								√	√
Vitamin A					√	√	√		

Remember the mothers' tetanus injection



In the next few years, a vaccine against the virus which causes cervical cancer (the In In the next few years a vaccine against the virus which causes cervical cancer (the human papilloma virus or HPV) will be introduced.

#### For each vaccine you must know:

1. Usage:
  - a. What disease it protects against.
  - b. The dose of the vaccine.
  - c. How it is given.
  - d. When it is given.
  - e. Who you give it to.
  - f. How often you give it.
2. **Storage:** How to keep the vaccine so it does not spoil and lose its potency (strength). This includes how to look after the vaccine in a hospital or health centre and when at clinic or on patrol.
3. **Contra-indications:** When the vaccine should not be given.
4. **Side effects:** The reactions (bad effects) that may happen to the patient after receiving the vaccine.

### Pentavalent vaccine

#### 1. Usage

- ◆ Protects against five diseases: Whooping cough, tetanus, diphtheria, hepatitis B, Haemophilus influenzae type b.
- ◆ Dose is 0.5 ml.
- ◆ Given by intramuscular injection into the mid anterolateral right thigh.

- ◆ First injection is given when the baby is 1 month old, or as soon as possible after this age.
- ◆ Second injection is given one month after the first injection.
- ◆ Third injection is given one month after the second injection.
- ◆ The first injection of Pentavalent does not give the baby much immunity. So it is important that he gets his second injection as soon as he is ready for it (1 month after the first injection). This second injection of Pentavalent will give the baby good immunity. If the child does not get his second injection of pentavalent vaccine till many months after the first injection, he will still get good immunity when the second injection of triple antigen is given. A third dose of pentavalent vaccine gives the best protection. Vaccines should be given on time to provide the best immunity and protection against diseases.

#### 2. Storage

- ◆ In the clinic or hospital, keep Pentavalent in the refrigerator, but not in the freezer compartment. The vaccine is spoilt if it is frozen, or if it gets too hot. The date of expiry is marked on the packet.
- ◆ On patrol, or in a village clinic, keep Pentavalent packed in ice packs in a vaccine carrier. Keep the vaccine in a refrigerator each night, if possible. Keep the vaccine carrier in a cool place during the day and keep it out of the sun. Under tropical conditions, Pentavalent

and other vaccines rapidly lose their potency (strength) if not kept cool.

- ◆ Therefore, on a long patrol use the vaccine within five days of taking it out of the refrigerator. Any vaccine left over after five days must be thrown away. When vaccine is packed with ice packs in a vaccine carrier and used for just a day or so, check the ice packs when you return to your health centre. If the packs are still frozen, you can put any unopened vaccine back in your health centre refrigerator. But always mark the ampoule and use this ampoule next. Opened vials can be put in the refrigerator and used the following day but only if the Ice packs in the vaccine carrier are still frozen and the Vaccine Vial Monitors show that the vaccine is still good to use. If the ice packs have melted and the Vaccine Vial monitors indicate that the vaccines are not in good condition all the vaccine vials- opened and unopened should be thrown away

### 3. Contra-indications

- ◆ If a baby has a high fever (above 38.0 °C) or a serious illness she should not be given Pentavalent. This is because Pentavalent may make the fever go higher. Also, if he has a high fever, she may be getting a serious illness. Her parents may wrongly blame the injection as the cause of his illness.
- ◆ A slight fever and mild illness, like a cold or cough, must not stop you giving the baby her pentavalent vaccine.

### 4. Side effects

- a) Many babies get a slight fever a few hours after the injection. This does not cause any harm. The thigh where the injection was given may be painful for a day.
- b) Very occasionally Pentavalent may cause a serious reaction such as a convulsion, or severe screaming for many hours, or shock and collapse. If this happens, do not give the baby any more doses of Pentavalent. Send the baby to see a paediatrician who can discuss the next vaccines that are needed with the parents.
- c) If the needle or syringe is dirty, the injection site may become infected. Never re-use a needle and never use one which is not sterile.

## Pneumococcal vaccine

### 1. Usage

- ◆ Protects against infection with Pneumococcus bacteria- which cause pneumonia and meningitis.
- ◆ Dose is 0.5ml
- ◆ Given by intramuscular injection into the left anterolateral mid-thigh
- ◆ First injection is given when the baby is 1 month old, or as soon as possible after this age.
- ◆ Second injection is given one month after the first injection.
- ◆ Third injection is given one month after the second injection.

2. Storage
  - ◆ Pneumococcal vaccine is stored in the same way as pentavalent vaccine
3. Contra-indication: The pneumococcal vaccine should not be given if the child has a temperature of  $>38^{\circ}\text{C}$ .
4. Side effects: Very uncommon.

## Tetanus Toxoid

1. Usage
  - ◆ Protects against Tetanus.
  - ◆ Dose is 0.5 ml.
  - ◆ Given by intramuscular injection into the left upper arm.

Given to:

- a. All school children during the year that they enter and the year that they leave community (primary) school.
- b. All women who are pregnant. They should be given two doses of tetanus toxoid during the first pregnancy. The first dose should be given at the first antenatal visit. The second dose should be given 2 months later. Give a booster dose of tetanus toxoid in every subsequent pregnancy.
- c. Patients who have a deep cut puncture wound of skin, or burn should be protected with tetanus toxoid. They should also have the wound cleaned and be given penicillin or flucloxacillin if there is pus. If the patient has not been

fully immunized against tetanus before, she should be given 2 doses of tetanus toxoid. The first dose is given straight away. The second dose is given 2 months later.

Patients who have been immunized with 2 or more doses of tetanus toxoid or pentavalent vaccine before only need a booster injection of tetanus toxoid at the time of the injury.

### 2. Storage

The same as for Pentavalent. Tetanus toxoid can be packed with ice in a vaccine carrier and used up to five days after it has been taken out of the refrigerator.

3. Contra-indication: None.
4. Side effects: Very uncommon.

If the needle or syringe is dirty, the injection site may become infected.

## BCG

### 1. Usage

- ◆ Protects against tuberculosis. Also gives some protection against leprosy.
- ◆ Dose is 0.1 ml. Use a special tuberculin syringe and 26 gauge needle.
- ◆ Given by intradermal injection into the skin of the left arm at the bottom of the deltoid muscle. The intradermal injection should make a lump in the skin about 5mm ( $\frac{1}{4}$  inch) in diameter.
- ◆ Do not use an alcohol swab or other disinfectant to clean the arm before giving B.C.G. B.C.G. vaccine

is a living vaccine and it will be killed by a disinfectant. If the arm is dirty, clean it with cooled boiled water and allow it to dry before giving the BCG

Given to:

- a. All newborn babies if born in hospital or health centre.
- b. Babies not born in hospital or health centre are given BCG when they are first seen by a health worker.

Storage

- ◆ In the clinic or hospital - keep in the refrigerator. The vaccine will remain potent for 2 years from date of manufacture if kept refrigerated. If kept out of the refrigerator, but not mixed, the potency will last for one month. When mixed with the diluent the vaccine must be protected from sunlight and must be used immediately. Any unused mixed vaccine (fluid) must be thrown away after six hours.
- ◆ Don't mix BCG vaccine until you are ready to use it.
- ◆ On patrol or the village clinic - the dried vaccine is usually packed in ice in a vaccine carrier and kept in the dark. However, dried BCG vaccine will keep for one month at ordinary temperatures outside the refrigerator.
- ◆ BCG must be kept in the dark at all times since it very quickly loses its potency (strength) if exposed to light.

- ◆ Protect every newborn baby with B.C.G.

3. Contra-indications: It should not be given to babies who are likely to be infected with HIV (see chapter).

4. Side effects

- ◆ Complications usually occur because the injection was given subcutaneously, and not intradermally as it should have been. There may be enlarged glands in the axilla or above the clavicle. These may break down and discharge. Chronic ulceration (sore) at the site of immunization may also occur.
- ◆ These complications are not dangerous.
- ◆ They can be treated by giving the patient a course of Isoniazid (INAH) for two months. If the ulcer does not heal with this treatment send the child to base hospital.
- ◆ Secondary infection may occur, especially if dirty syringes or needles are used. This is treated by a course of penicillin or flucloxacillin if there is pus or redness.

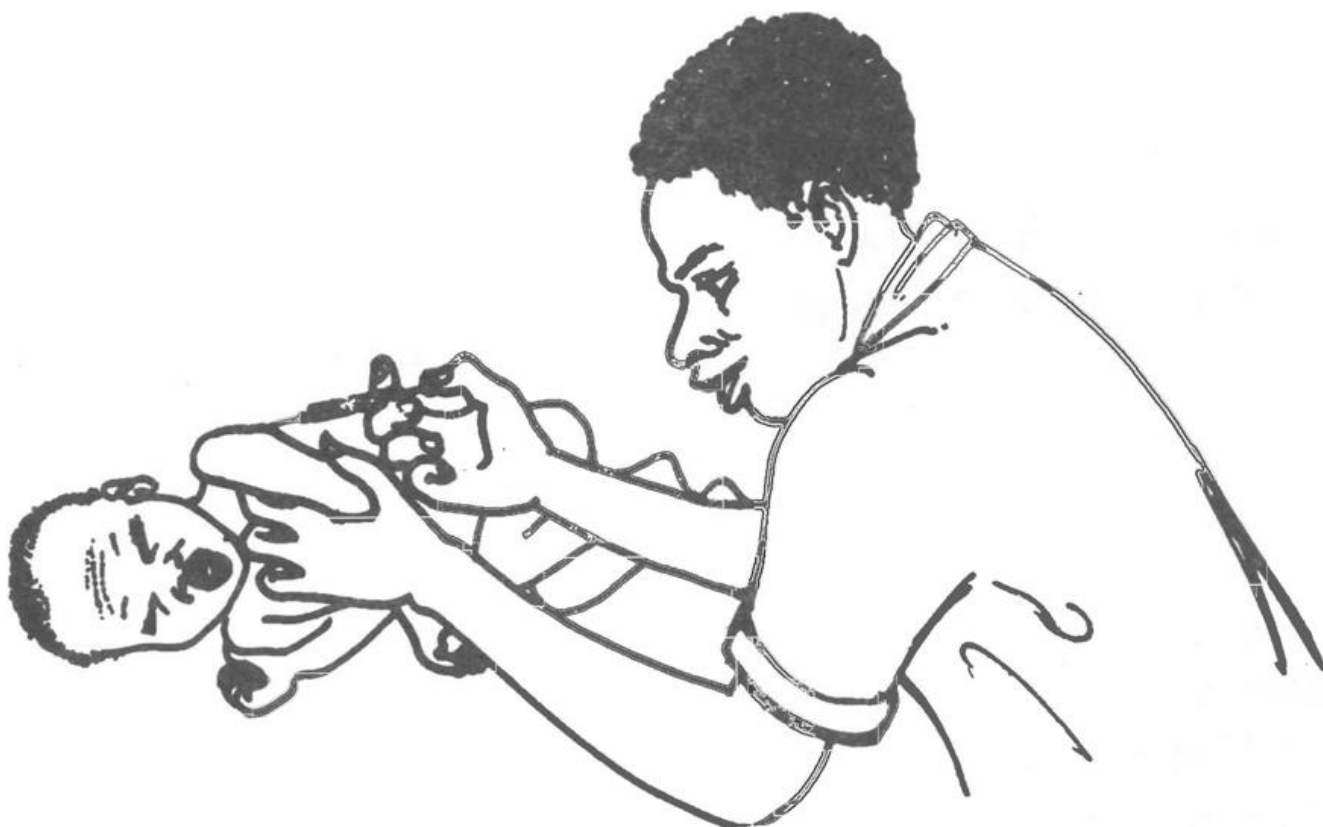


Figure 54 - Protect every newborn baby with B.C.G.

### Sabin oral polio vaccine (OPV) and injectable (inactivated) polio vaccine (IPV)

#### 1. Usage

- ◆ Protects against poliomyelitis.
- ◆ The dose of OPV is 2 drops (0.2 ml), i.e. to the mark on the dropper supplied with vaccine. Use the dropper to measure the dose of vaccine.
- ◆ Given by mouth. Do not allow the dropper to come into contact with the child's mouth. Allow the drops of vaccine to fall into the child's open mouth
- ◆ The first dose of OPV should be given at 1 month old, or as soon as

possible after this. It is given at the same time as first pentavalent vaccine is given. The second dose, one month later. The third dose is given at 3 months (with the third pentavalent vaccine).

- ◆ The dose of IPV is 0.5ml,
- ◆ Given by intramuscular injection into the mid anterolateral right thigh.

#### Given to:

- ◆ A single dose of injectable polio vaccine (IPV) is given at the same time as the third dose of OPV (usually at 3 months of age)
- ◆ **Note:** Each child should receive 3 doses of Sabin (OPV) and one dose of injectable polio vaccine (IPV). The first OPV dose at one month and two other doses at monthly intervals. The single dose of IPV is

given at the same time as the 3<sup>rd</sup> dose of OPV.

## 2. Storage

- ◆ The OPV vaccine must be kept in the refrigerator. It lasts one year from the date of manufacture if it is kept refrigerated. Outside the refrigerator, the vaccine, if unopened, will last for 5 days if it is packed with ice packs in a vaccine carrier.
- ◆ Opened vials can be used for up to 5 days provided that the ice packs in the Vaccine Carrier are still frozen.

## 3. Contra-indications

Sabin vaccine should not be given to babies if they have severe diarrhoea. Severe diarrhoea will stop the vaccine producing immunity.

## 4. Side effects: Extremely rare.

Hepatitis B Vaccine, a single vaccine for newborns and part of the Pentavalent vaccine for older infants

## 1. Usage

- ◆ Protects against hepatitis B infection.
- ◆ Because it prevents hepatitis B it will also help prevent cirrhosis and hepatoma (liver cancer) occurring later in life.
- ◆ Dose is 0.25 ml (10 micrograms).
- ◆ Given by intramuscular injection into the mid anterolateral right thigh.

Given to:

- All newborn babies if born in hospital or health centre.
- Babies not born in hospital or health centre are given hepatitis B vaccine when they are first seen by a health worker.
  - ◆ First injection is given soon after birth (or when the baby is first seen).
  - ◆ The second, third and fourth doses of Hepatitis B vaccine are included in the pentavalent vaccine

## 2. Storage

- ◆ It must be kept in the refrigerator, but not in the freezer compartment. Hepatitis B vaccine is a very stable vaccine and keeps its potency for about one month when taken out of the refrigerator.
- ◆ However, for practical purposes, it should be treated the same as pentavalent vaccine.

## 3. Contra-indications: Do not give it if the child has a fever more than 38°C or a serious illness.

- Side effects: Uncommon. Occasionally, there is mild pain at the site of the injection or mild fever. If the needle or syringe is dirty, the injection site may become infected.

Measles-rubella (MR) vaccine

## 1. Usage



- ◆ Protects against measles and rubella.
- ◆ Dose is 0.5 ml. Measles-rubella (MR) vaccine, like BCG vaccine, does not come as a liquid. MR vaccine comes in a 10-dose vial and has to be mixed (diluted) with a diluent that comes with the vaccine. Add the diluent just before giving the vaccine.
- ◆ Given by subcutaneous injection into the right upper arm. Do *not* use an alcohol swab or other disinfectant to clean the arm before giving measles vaccine. MR vaccine is a living vaccine and is inactivated by alcohol or disinfectant. The skin can be cleaned with cooled boiled water.
- ◆ Give measles-rubella vaccine to all children at the age of 6 months, between 9 and 12 months and between 18-24 months. A fourth dose should be given at around 7 years of age at the start of primary school.

## 2. Storage

- ◆ Measles-rubella vaccine and its diluent must be stored in the refrigerator. If kept in the refrigerator, the unmixed vaccine lasts 2 years after the date of manufacture.
  - ◆ Outside the refrigerator, the unmixed vaccine and its diluent must be packed with ice packs in a vaccine carrier. It will then last for five days.
  - ◆ Measles-rubella vaccine is mixed with diluent just before it is given. When the vaccine is mixed it must be kept out of the sunlight and given within six hours.
  - ◆ Don't mix measles vaccine until you are ready to use it.
  - ◆ Any mixed measles vaccine not used within 6 hours must be thrown away.
3. Contra-indications - None.
  4. Side effects.
    - a. Fever, cough and nasal discharge often occur about one week after measles rubella vaccine has been given. Warn the parents that this often happens, and only lasts for one or two days. Advise them to keep the child cool and give her plenty of fluids if she gets a fever. Tell them to bring the child to the health centre or hospital if the fever is high or the child does not quickly become better.
    - b. Occasionally the child may get a slight rash for one or two days about one week after the vaccine was given.
    - c. Infection at the site of the injection may occur if the needle or syringe was dirty.

## Storage of vaccines

- ◆ Vaccines spoil very quickly if they are not kept cold. The journey of the vaccine from the manufacturer to the child is often very complex and involves many stops along the way - ports, central vaccine stores, air cargo stores, hospital and health centre stores and refrigerators and vaccine containers.

- ◆ The way of keeping the vaccines at the correct temperature on this journey is called the “Cold Chain”. If the temperature goes above 8 deg C at any point during the journey from the factory to the child, the “Cold Chain” has been broken and the vaccines have been spoiled. It is a waste of time and money to use vaccines which are spoilt and no longer potent (strong).
- ◆ People given a spoilt vaccine are not immunized. This means you must be very careful in the way you store vaccines. They should be stored in the refrigerator and kept at a temperature between 2 and 8 degrees.
- ◆ Vaccine vials have a Vaccine Vial Monitor (VVM) which changes colour if the temperature has gone above 8 degrees at any time (this means the cold chain has been broken). If the VVM has changed colour it means the vaccine is no longer useful and should be discarded.

#### The following will help you keep vaccines potent

1. Never use any vaccine after the expiry date.
2. Never open a new bottle of vaccine until you have finished or thrown away the previous one.
3. Never take more vaccines than necessary on clinic visits or patrols.
4. Never store more than 2 months’ supply of any vaccine in your Health Centre refrigerator.
5. Never store vaccine in the door of the refrigerator (as the

temperature in the door is not as cold as on a shelf inside the refrigerator).

6. Never freeze the vaccines.
7. Keep vaccines out of direct sunlight.
8. Store the diluent for measles-rubella vaccine and BCG vaccine in the refrigerator with the vaccines. The diluent will then be cold when the vaccine is mixed.
9. After mixing BCG or measles-rubella vaccine, keep it out of sunlight and use within six hours
10. Pack vaccine with ice packs inside a vaccine carrier when going on a clinic visit or patrol.
11. Pentavalent, Pneumococcal, tetanus toxoid, Sabin, IPV and unmixed measles-rubella vaccine will last five days when packed with ice packs in a vaccine carrier.
12. Never use an alcohol swab or disinfectant to clean the arm before giving a living vaccine (BCG. or measles-rubella vaccine). Use cooled boiled water to clean the arm if it is dirty. Then allow the arm to dry before giving the vaccine.
13. Never contaminate the bottle of Sabin vaccine by putting the dropper inside the child’s mouth
14. Keep your Health Centre refrigerator in good working order.
15. Health Centres should order fresh supplies of vaccines every 2 months.

Treat vaccines like fresh meat or fish. They spoil if out of the fridge or vaccine carrier too long

## Rules for immunisation

- ◆ Always check the expiry date on the ampoule or vial and check the vaccine vial monitor to make sure the vaccine is still in good condition.
- ◆ Never use vaccines that have expired or whose vaccine vial monitor shows they have not been kept cold.
- ◆ Keep all vaccines in the main compartment of the refrigerator (temperature 2-8° C), not in the freezer. Only ice packs are kept in the freezer compartment. Do not store the vaccines in the door of the fridge.
- ◆ Use cool boiled water to clean the skin before giving an injection. Do not use alcohol or an alcohol swab.

## On patrol

- ◆ Pack vaccines with Ice packs in a vaccine carrier.
- ◆ If the ice packs have melted by the end of the day, all remaining vaccines whether opened or not should be discarded
- ◆ If ice packs are still partly frozen at the end of the day, put all unopened vaccine vials back in the refrigerator and use these first at the next immunisation session provided that the Vaccine Vial Monitors have not changed colour.
- ◆ Write the date on the vials before returning them to the refrigerator.
- ◆ Don't forget to check whether the child's brothers and sisters and mother need immunisation also.
- ◆ The only vaccines ever to be withheld are Pentavalent,

pneumococcal and hepatitis B if the child has a fever of more than 38°C. (These should be given when the temperature returns to normal).

- ◆ You must always immunise a child even though you may have to open a new vial for only one child. Order more vaccine to make sure you have sufficient for all the children expected at the clinic plus a little extra as well.
- ◆ At the end of each immunisation session return the opened Pentavalent, hepatitis B, pneumococcal, bOPV and IPV, and tetanus toxoid vials with any remaining vaccine to the refrigerator. These vaccines can be used within the next 5 days but only if the Ice packs are still frozen and the vaccine vial monitors have not changed colour.
- ◆ Discard reconstituted BCG and measles vaccines at the end of each immunisation session

## Notes

Children whose vaccination is late or incomplete- or who have not been vaccinated at all.

**If the child is late for the first injection**, give one dose for each injection due. For example, a child seen first at 5 months receives BCG, 1st dose of Sabin, Pentavalent and PCV, and should return in one month for measles and 2nd dose of Sabin, Pentavalent and PCV.

**Children with incomplete vaccination.**

Catch up vaccination should be done so that the child completes the full immunisation schedule. For example, a child of two who has not received the third dose of Pentavalent, PCV and Sabin, should be given these vaccines plus a dose of IPV and MR vaccine. A second dose of MR vaccine should be given at some stage in the following 12 months.

**Previously unvaccinated children.** For children under the age of 5 who have not been previously vaccinated, a full course of vaccines should be given, starting on the date when seen. For example, a child seen first at 5 months receives BCG, 1stdose of Sabin, Pentavalent and PCV, and should return in one month for measles and 2nd dose of Sabin, Pentavalent and PCV and return again after one month to receive the third dose of Sabin, Pentavalent and PCV and a single dose of IPV. An unvaccinated child of 3 years old should receive BCG, 1st dose of Sabin, Pentavalent, PCV and MR vaccine, and should return in one month to receive second doses and then again after a further month to receive third doses and IPV. A second dose of MR vaccine should be given at some stage in the following 12 months

record of all immunizations that you give for your monthly reports.

## USE EVERY OPPORTUNITY TO IMMUNIZE CHILDREN

Whenever you see a child check the child's health record book to see if he or she is due for an immunization. Check the child's immunization record even though the mother did not bring the child to see you. For example, the child may be visiting a sibling in the health centre or accompanying his mother to an antenatal clinic. If the child is due for an immunisation, give the immunisation NOW and record it in the child's health record book.

## Immunization records

All people who have received immunizations must be given a record of the immunizations that have been given. For children, write all immunizations given in their Health Record Book. You should also keep a

## Chapter 32: Accidents

Accidents are common in young children.

This is because:

- 1) Children are very active
- 2) They do not have complete balance or coordination or ability to be fully aware of all their surroundings
- 3) They are curious (want to find things out)
- 4) They are becoming independent (doing things for themselves)
- 5) They do not know what is dangerous

### BURNS AND SCALDS

A scald means a burn from a hot liquid. Small children may fall into an open fire. They may pull a container of boiling water or hot food over themselves.

Burns or scalds may kill the child if they affect a large part of the body. They often leave serious scars causing contractures and disfigurement.

They are always painful.

Treatment

- 1) Relieve the pain. Give I.M. pethidine every 6 hours for severe pain.
- 2) Protect against tetanus by giving tetanus toxoid.
- 3) Give extra fluids.

If 10 percent or more of the body's surface area is burnt, the child needs I. V. fluids. He may quickly go into shock if he is not given I.V. fluids.

Give him quickly 20 ml/kg of 0.9% sodium chloride (normal saline)

Weight (kg)	Dose
3- 5 kg	100 ml
6- 9kg	150 ml
10 - 14 kg	250 ml
15 - 19 kg	350 ml
20 -29 kg	500 ml
30 - 49 kg	700 ml

- 4) After giving the child 20 ml/kg of normal saline fast, slow the I.V. drip down to:

Weight (kg)	Dose
3 - 5 kg	25 ml/hr ( 7 drops/min)
6 - 9 kg	50 ml/hr (13 drops/min)

10 - 14kg	75 ml/hr (20 drops/min)
15 - 19 kg	100 ml/hr (25 drops/min)
30 - 49 kg	150 ml/hr (40 drops/min)

- 5) Transfer the child quickly to hospital if the burn is large (more than 5% of the body area), or if the burn is deep or if the burn is on the face.
- 6) Give penicillin if the burn looks infected.
- 7) Clean and dress the burn.
  - a) If there is no sign of infection (no pus or inflammation):
    - i) Clean with antiseptic solution, e.g. chlorhexidine (Savlon) or normal saline
    - ii) Cover with paraffin gauze and a dry gauze dressing.
    - iii) Change the dressing every 3 days.

Or apply silver sulphadiazine cream to the burnt area every day.

- b) *If the burn is infected* (pus or inflammation present):
  - i) Clean away the dirt and dead tissue with antiseptic solution, e.g. chlorhexidine (Savlon), or with normal saline.
  - ii) Cover with a moist gauze and a dry gauze dressing.

iii) Change the dressing once or twice daily.

iv) When the burnt area is clean, change the dressing every 3 days.

Or silver sulphadiazine, if available, should be applied daily to the burn. If silver sulphadiazine is used, the burns are left open, and not covered with dressings.

8) Nurse the child under a mosquito net, to keep the flies away.

Accidents can be prevented

#### Prevention

- 1) There should always be a responsible adult present to look after the fire. Young children should not be left alone near a fire.
- 2) Nylon and other flammable material (material that easily catches fire) should not be used as clothing for children.
- 3) Handles of pots should be turned inwards so that the child cannot grab them.
- 4) Cold water should be put into a baby's bath before hot water. The temperature should be tested with your elbow before putting the baby in the water.

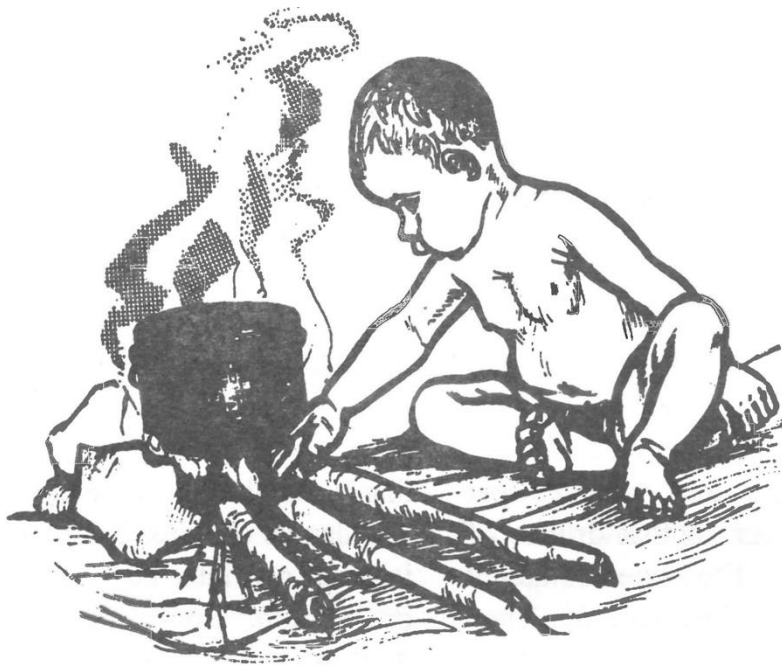


Figure 55 - Accidents are preventable

## OTHER INJURIES

### Road Accidents

Young children should not ride bicycles along busy roads. They must be shown how to walk along roads and cross roads safely. If there is no foot path, they should walk on the right hand side of the road. This means that they will face the cars coming towards them. At night they should wear something bright in colour so that drivers of motor cars can see them. They must be taught never to go across a road without looking both ways. They must not walk across the road immediately behind or in front of a truck or bus that has stopped. They should look carefully to their right, then to their left, then to their right

again, before crossing a road. They should walk, and never run, across a road.

Teach parents not to drive if they have been drinking alcohol and not to risk travelling in a vehicle driven by someone who has been drinking alcohol.

Children should never be allowed to travel in the front passenger seat of a car. This is the most dangerous place in the vehicle and passengers in this seat in a vehicle which has an accident have the highest chance of being killed or severely injured.

Mothers should never hold their babies on their lap if they are sitting in the front passenger seat of a car.

Parents should always show a good example to their children by wearing the car seat belts.

Speed and alcohol are the main causes of traffic accident deaths



Children may be bitten by animals, e.g. pigs, dogs, cassowaries. Falls from heights (e.g. trees) and wounds from sharp instruments, knives, scissors, broken bottles, arrows, and thorns) are other dangers. Electricity supply can bring many benefits- but electricity can also kill children. Children should never be allowed to play with electrical switches or sockets, wires or electrical appliance such as jugs, irons and lights.

## DROWNING

Young children should not be allowed in water alone. They must be watched carefully while they are in water. Unless a child is being watched continuously in water they can submerge and drown within seconds. They must learn to never enter a fast flowing river. All children should learn how to swim in safe water. All parents and older children who live near the sea or a river should learn how to do mouth to mouth resuscitation. Then, if a child who can't swim falls into the water they can resuscitate him.

## POISONING

### Kerosene poisoning

In Papua New Guinea, kerosene is the commonest poison young children drink because it is in almost every home. Kerosene is kept in houses for lamps or primus stoves. Adults often wrongly put kerosene in old lolly water or beer bottles. This should never be done because a child will not know

that the bottle contains kerosene. The child usually does not drink more than a mouthful because of the unpleasant taste, but this can still be very dangerous. The danger of drinking kerosene is that some of it may get into the lungs. This will cause pneumonia. For this reason, if a child has drunk kerosene do not cause the child to vomit as the kerosene may go back into the child's lungs.

Do not cause vomiting and do not wash out the stomach if the child has swallowed kerosene

Give the child some milk to drink. Penicillin should be given for five days if there are any signs of pneumonia.

Berries, seeds, leaves, and roots

Some of these are poisonous

Other common poisons are:

Antimalarials, (chloroquine, infant Camoquin), paracetamol, aspirin, iron tablets, insecticides (eg. DDT), agricultural chemicals (eg. Grammoxone or Paraquat, and methylated spirits.

Figure 56 - Kerosene and other poisons should be kept locked up, never in soft drink bottles or beer bottles.





## TREATMENT OF POISONING

- 1) **History.** Try and find out:
  - a) What drug or poison was swallowed
  - b) How much was taken
  - c) How long ago this happened.
- 2) **As a general rule, make the child vomit** (see exceptions below). A useful drug to make a child vomit is ipecacuanha syrup.

Give 15 ml of ipecacuanha syrup followed by a cupful of water. If the child does not vomit in 10 minutes, put a spatula or handle of a spoon (not your finger) at the back of the child's throat.

If you do not have any ipecacuanha syrup, give the child a cupful of milk or water to drink and rub the back of the child's throat with a spatula or a handle of a spoon. This is likely to make him vomit.

Do not make the child vomit if:

- a) He has swallowed kerosene or other oily substances
- b) He has swallowed an acid or alkali
- c) He is unconscious

- 3) **Give activated charcoal**, if available, by mouth or nasogastric tube after the child has vomited. 5 grams of charcoal are mixed with 100 ml drinking water. 1 packet of Medicoal, containing 5 grams of charcoal, or 25 tablets of charcoal each containing 200 mg, can be mixed with 100 ml drinking water. Locally prepared powdered charcoal, 5 grams mixed with 100 ml water, can also be used. If you are giving it by a nasogastric tube make sure the NG tube is in the stomach, never give charcoal down a NG tube if you are unsure of its position, as charcoal in the lungs will cause death.

Dose of activated charcoal:

Weight (kg)	Dose
3- 5 kg	20 ml
6- 9 kg	40ml
10 -14 kg	60ml
15- 19 kg	80ml
20- 29 kg	100ml
30-39 kg	130 ml

Give 3 doses, 20 minutes between each dose.

- 4) **Keep the child under observation** for 4 to 24 hours depending on the poison swallowed.
- 5) **Transfer to hospital or health centre** as soon as possible any child with poisoning who:
  - a) Is unconscious on admission.
  - b) Is becoming drowsy or semiconscious or has a convulsion.
  - c) Has burns of the mouth or throat.
  - d) Is in respiratory distress, or cyanosed, or has any danger signs.
  - e) Has signs of heart failure.
  - f) Has haematemesis (vomiting blood)
- 6) If you have a poison's book available, check for any special treatment required.

#### Prevention

- 1) All drugs should be kept clearly labelled in a locked cupboard. This includes such common drugs as antimalarials, aspirin, and iron tablets.
- 2) Kerosene should be kept locked up or kept high up on a shelf where a child cannot reach it. It should never be stored in lolly water (soft drink) bottles or beer bottles.
- 3) Teach parents about the dangers of poisons for children.
- 4) It is illegal (against the law) in Papua New Guinea for shops or trade stores to sell kerosene in bottles that are not clearly labelled kerosene.

**Note:** Coloured and sugar-coated tablets (such as iron tablets), and

tasteless tablets are especially dangerous.

Poisons must be kept locked up.

The main things to remember about accidents is that they should not happen; they are a failure of safety measures, in the home or community. When a child has an accident find out why. Then make sure the parents understand why it occurred so that it will not happen again. But it should not have happened.

An accident shows that more teaching is needed about safety. The young child should be protected from accidents. Some protection is always needed at least until five years, and often older. Children learn gradually, not all at once, so they will know some things but not others that they have not been taught. You should try to teach children about safety and dangers, so that they will learn by what you show them and by experience. But even after 5 years of age they still need protection from serious injuries.

Health workers must set a good example themselves to the community. Keep poisons locked up. Never store kerosene in a lolly water or beer bottle. Never drive if you have been drinking alcohol.

#### ANIMAL BITES

Animal bites are common. They should be treated as dirty wounds. They should be cleaned as thoroughly as possible. Run some clean water over the bite site and then clean with antiseptic (Chlorhexidine solution) or

Normal Saline. As a general rule animal bites should not be sutured, but should be cleaned and dressed daily.

Give Tetanus toxoid and antibiotic (Amoxycillin oral or Crystapen if the child is admitted).

## SNAKE BITE

There are several poisonous (venomous) snakes in Papua New Guinea. In the New Guinea mainland and Highlands provinces the main poisonous snake is the Death Adder. In the Papuan region there are several poisonous snakes the most common of which are the Taipan and the Death Adder. When a snake bites a person it may inject venom (poison). A person who has been injected with snake venom will show signs of envenomation (snake bite poisoning).

Signs of envenomation:

- 1) General signs:
  - a) Abdominal pain, vomiting
  - b) Enlarged painful lymph glands near the snake bite.
  - c) Shock, collapse.
- 2) *Neurological signs.* The nerves may be affected by the venom and cause paralysis of muscles:
  - a) Ptosis (drooping eyelids)
  - b) Difficulty seeing properly
  - c) Unable to move eyeballs
  - d) Unable to open mouth widely
  - e) Unable to push out tongue
  - f) Thick speech (like a drunken man)
  - g) Unable to swallow - so dribbling of saliva
  - h) Weakness of limbs, paralysis

- i) Weakness of breathing, respiratory paralysis
- 3) Coagulation (blood clotting) problems:
    - a) Vomiting blood (haematemesis)
    - b) Coughing up blood (haemoptysis)
    - c) Passing blood in urine (haematuria)
    - d) Cuts continue to bleed
    - e) Blood collected from the patient and put in a glass bottle takes longer than 20 minutes to clot

## Anti-venom

A patient who has been bitten by a snake and who develops any of these signs must be given anti-venom. Anti-venom contains antibodies which destroy the snake venom. If given early enough the anti-venom will prevent the patient developing more signs of envenomation.

In the Papuan region polyvalent anti-venom is normally given as the exact identity of the venomous snake is not usually known. But if the snake is identified as a Taipan, or a Death Adder the specific antivenom will be given. In New Guinea Mainland and Highlands Provinces, Death Adder anti-venom is usually given as almost all poisonous snake bites in these provinces are due to the Death Adder.

Anti-venom must only be given if the patient has signs of envenomation. The anti-venom is a foreign protein made from horse serum, and can cause serious, even fatal, reactions in the patient, e.g. anaphylaxis. So do not give anti-venom to a patient bitten by

a snake who has no signs of envenomation.

Only give antivenom to snake bite patients with signs of envenomation.

Also, anti-venom is very expensive. One ampoule of polyvalent anti-venom costs about 4000 Kina. So, it must only be used when it is necessary.

### First Aid

- 1) *Keep the bitten limb at rest.* Make the patient sit or lie down. He must not move. Bring transport to the patient or carry the patient on a stretcher to the transport or the health centre.
- 2) *Wash the wound with water if water is immediately available.* Do not cut the wound, and do not suck the wound. Cutting and sucking will introduce infection but will not remove the venom.
- 3) *Bandage and splint the limb.* Bandage the bitten limb firmly with a crepe bandage or with whatever is available. Start bandaging from the hand or foot and go up towards the shoulder or hip. Put the bandage on as firmly as you would for a sprained ankle. Bandage the whole limb, not just the part where the bite marks are. The firm bandage and splint prevent the venom being absorbed through the lymphatics into the blood supply and travelling up the limb to the rest of the body.

Do *not* use a tourniquet. If you obstruct the blood supply to the limb you may cause gangrene and the limb may have to be amputated.

Do *not* remove the bandage and splint until the patient has reached hospital or health centre. Then, only remove the bandage and splint when the anti-venom and all equipment necessary for resuscitation is ready. When the bandage and splint are removed there may be sudden absorption of venom into the blood. The patient may suddenly collapse and need resuscitation, or he may quickly develop signs of envenomation and need anti-venom.

So do *not* remove the bandage and splint until the anti-venom and resuscitation equipment are ready.

### Treatment

- 1) All patients who say they have been bitten, or may have been bitten by a snake, must be admitted to hospital or health centre. Patients with suspected snakebite must stay for 12 hours observation. Patients with definite snakebite must stay for 24 hours observation.
- 2) Reassure the patient.
- 3) Set up an intravenous drip of normal saline at the standard rate (see page 279)
- 4) Collect 5 ml venous blood into a glass bottle and see how long it takes to clot. (Collect the blood when setting up the drip).
- 5) Give tetanus toxoid 0.5 ml I.M. stat.

- 6) Give amoxycillin t.d.s. oral for 5 days.
- 7) Observe hourly for signs of envenomation.

Continue observation for 12 hours if suspected snakebite, and for 24 hours if definite snakebite.

Chart the following observations:

- a) General
  - i) Pulse
  - ii) Blood pressure
  - iii) Respiratory rate
  - iv) Level of consciousness
  - v) Abdominal pain, vomiting
  - vi) Swelling and tenderness of lymph gland
- b) Neurological signs
  - i) Ptosis (drooping eyelids)
  - ii) Difficulty in seeing properly
  - iii) Unable to move eyeballs
  - iv) Unable to open mouth widely
  - v) Unable to push tongue out of mouth
  - vi) Thick speech (like a drunken man)
  - vii) Unable to move limbs
  - viii) Unable to swallow, or dribbling saliva
  - ix) Unable to take a deep breath and cough
- c) Coagulation problems
  - i) Bleeding from site (place) of snake bite venepuncture sites.
  - ii) Blood in vomit, urine, sputum
  - iii) Venous blood taken in a glass bottle has not clotted by 20 minutes. This test is usually only done once on

admission. But it can be repeated later if necessary.

These observations must be charted regularly every hour. If the patient is asleep you must wake the patient up to carry out the observations properly.

- 8) If any signs of envenomation develop, you must give snake anti-venom.

Before giving the anti-venom make sure you have everything ready to treat severe reactions like anaphylaxis. You must have the following available:

- a) Adrenaline 1 in 10000 - Mix  $\frac{1}{4}$  ml adrenaline 1 in 1 000 with 2  $\frac{1}{4}$  ml water for injection. This will give you 2  $\frac{1}{2}$  ml of adrenaline 1 in 10 000.
- b) Hydrocortisone 100 mg
- c) 2 ml syringes and needles
- d) Oxygen and nasal catheter
- e) Suction machine and catheter
- f) Pharyngeal airway
- g) Ambu bag for artificial respiration

Check your equipment to make sure it is working properly, and make sure the I.V. drip is running properly. When you have everything ready for resuscitation you can give the anti-venom.

Giving snake antivenom:

- Rest the child in bed. Nurse on the side and keep airway clear.
- Set up a drip: with Normal saline, Hartmann's solution or dextrose/saline

- Give **diluted** adrenaline **subcutaneously**: Draw up ¼ ml of 1 in 1000 adrenaline in a syringe and make it up to 2 ½ml with sterile water. Give the correct dose over 1 minute.

Doses of **diluted** adrenaline

Age (years)	Weight kg	Dose (ml)
1-3	Less than 11	1
4-7	11-15	1 ½
8-11	16-20	2

- Add 1 vial of snake antivenom to 100mls of IV fluid in a burette and infuse over 30-60 minutes. Then run drip at maintenance rate
- Give tetanus toxoid ½ml IM stat.
- Do not touch the site of the bite.
- Give benzylpenicillin (crystapen) IV (p. 165) or amoxicillin for 5 days
- If there is a mild reaction to the antivenom: (fever, skin rash), Give promethazine (Phenergan) IM

- Continue giving the antivenom slowly over 1 hour, but if the symptoms become severe (wheezing, shock with weak pulse) **STOP**
- Immediately stop giving the antivenom.
- Replace the flask with the antivenom with a new flask
- Give another dose of **diluted adrenaline** intramuscularly
- Give hydrocortisone 100mg IV
- Give oxygen if available, and use an Ambu bag if patient stops breathing

When the child is stabilized continue giving the antivenom slowly. If there are no signs of the severe reaction subsiding after 30 minutes give one more dose of **diluted adrenaline** intramuscularly.

**Note: Nursing care is very important.** Keep the **airway clear** and nurse the child in the left lateral position. Early referral of severely envenomated patients, patients who are deteriorating after antivenom, and in situations where antivenom is not available may be lifesaving. Ensure the child is nursed properly during transport.

## Chapter 33. Sexually transmitted infections

### CONGENITAL SYPHILIS

A pregnant woman infected with syphilis, who is not fully treated, will pass the infection on to her foetus through the placenta.

The infected foetus may:

- 1) Be born dead (still birth) or
- 2) Be born swollen with oedema (hydrops); or
- 3) Develop signs of the disease soon after birth (early congenital syphilis); or
- 4) Develop signs of the disease after the age of 2 years (late congenital syphilis).

### EARLY CONGENITAL SYPHILIS

Symptoms and signs

At any time during the first few weeks of life the baby develops one or more of the following:

- 1) Snuffles - A persistent nasal discharge which is often blood-stained. Noisy breathing may be the first sign.
- 2) Skin rash - This may be a blistery (bullous) rash or a dark red slightly raised rash which peels (desquamates) after 1-3 weeks. The rash is most severe on the palms of the hands and the soles of the feet.

- 3) Jaundice, enlarged liver and spleen, and sometimes enlarged lymph glands.
- 4) "Sepsis"- Fever, ill baby who does not feed well.
- 5) Anaemia.
- 6) Fissures (cracks) at the corners of the mouth, nose or anus. These fissures bleed easily and heal with scars ("rhagades").

### DIAGNOSIS

If the baby is born with syphilis the mother must also be infected. A blood test on the mother for syphilis (VDRL) will be reactive.

VDRL is just a screening test for Reagin, so it will be reactive in the presence of syphilis or yaws but also in the presence of many other conditions [false reactive]]. A diagnosis of syphilis/yaws can only be made by a reactive VDRL (or RPR) AND a positive TPHA. The "syphilis RDT" is TPHA based. Once a person has had either syphilis or yaws at any time in their lives, the TPHA (or rapid test) will be positive for life, even with no current disease. Thus, the importance of both a reactive VDRL **and** a positive TPHA to make a definitive diagnosis of syphilis/yaws.)

An X-ray of the baby's bones is helpful if X-ray facilities are available. Usually an X-ray of the limbs shows characteristic changes in the bones.

Treatment

- 1) Ten day course of penicillin, using benzyl (crystalline) penicillin.

**Dose of benzyl penicillin** IM twice a day for 10 days:

Under 2.5 kg: 125 000 units ( $\frac{1}{4}$  ml) b.d.

2.5 kg & over: 250 000 units ( $\frac{1}{2}$  ml) b.d.

2) **Benzathine penicillin**, along acting penicillin is given as well on the first day, in case the mother absconds before the ten day course of benzyl penicillin is completed.

**Dose of Benzathine penicillin**, IM single (stat) dose only.

Weight (kg)	Dose
Under 2.5 kg	$\frac{1}{2}$ ml (120 000 units)
2.5kg & over	1 ml (240 000 units)

3) Treat both mother and father for syphilis.

Management of baby whose mother had a reactive VDRL and positive TPHA / RDT test for syphilis during pregnancy: Check the baby for any signs of congenital syphilis.

- a) If baby is well:
  - i) Give baby single dose of benzathine penicillin.
  - ii) Check that mother and father have both been treated.
- b) If baby has any signs of congenital syphilis:

- i) Give full treatment - benzyl penicillin for 10 days and benzathine penicillin stat.
- ii) Check that both mother and father have been treated.

## GONORRHOEA

### NEONATES

Neonatal Gonococcal Conjunctivitis (See page 55).

### IN YOUNG AND SCHOOL AGED CHILDREN

Gonococcal and Chlamydial infection in pre-school and school aged children are nearly always transmitted sexually through child abuse. It is only very occasionally transmitted by fingers or towels. You should, therefore, suspect that any young child with genital discharge has been the victim of child sexual abuse (see page 246).

But there are other causes of vaginal discharge. There may, for example, be a foreign body such as a coffee bean so it is always important to try and make a definite diagnosis by taking a swab for microbiology.

In PNG, most cases of genital discharge are mixed infections of gonorrhoea and Chlamydia, so both infections must be treated.

#### Symptoms and signs

There is usually a vaginal discharge, which is often purulent



(vulvovaginitis). Pain or burning on passing urine is quite common.

Sometimes, in boys and in girls, the rectum or pharynx is the site of the infection.

## Treatment

1. Take a swab from the vagina (or rectum or pharynx). Put it in Stuart's Transport Medium and send it to the laboratory for Gram stain and culture. If doing a gram stain it is important to state if the swab came from the pharynx because there are commensals which can mimic gonococcus on gram stain e.g. N. pharynges.
2. Give single dose treatment with amoxicillin, Augmentin (amoxicillin/clavulanic acid) and probenecid tablets, plus Azithromycin.

Dose:

Weight (kg)	Dose
Under 10 kg	1g amoxicillin (2 X 500 mg or 4 X 250 mg)
	Plus ½ tablet Augmentin
	Plus Azithromycin ½ tablet (250mg)

	Plus ½ tablet probenecid
10 - 19 kg	1.5g amoxicillin (3 X 500 mg or 6 X 250 mg)
	Plus 1 tablet Augmentin
	Plus Azithromycin 1 tab (500mg)
	Plus 1 tablet probenecid
20 - 29 kg	2g amoxicillin (4 X 500 mg or 8 X 250 mg)
	Plus 1 ½ tablets Augmentin
	Plus Azithromycin 1 ½ tab (750 mg)
	Plus 1 ½ tablets probenecid
30 kg and over	2g amoxicillin (4 X 500 mg or 8 X 250 mg)
	Plus 2 tablets Augmentin
	Plus Azithromycin 2 tab (1g)

	Plus 2 tablets probenecid
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1. Check child for other sexually transmitted diseases. Explain this to the parents and child. Send blood to the laboratory for VDRL (and do a TPHA if the VDRL is reactive) and HIV tests. These blood tests may have to be repeated in 3 months to make sure the child is negative for syphilis and human immunodeficiency virus.
2. Examine all family (household) members. Investigate and treat these people as necessary.
3. If the family members are negative, try to find the source of the infection outside the family.

Report any case of gonococcal infection in children to child protection services. It is urgent that such children are protected from sexual abuse.

## GONNORHOEA IN SEXUALLY ACTIVE ADOLESCENTS

The infection is the same in adolescents as in adults. Remember that in genital discharge, mixed infections are common so treat for both gonorrhoea and Chlamydia, with oral amoxicillin, Augmentin and probenecid, plus oral Azithromycin stat to treat their probable associated chlamydial infection.

Adolescents who have STIs often are reluctant or ashamed to attend a clinic.

You should make them feel welcome, never judge them, but tell them that they need to protect themselves from STIs, including HIV, and protect themselves from an unwanted pregnancy. Ask adolescents about their need for contraceptives, offer to provide this. If you think an adolescent is being forced into sex by a partner or abuser, offer to help them.

(See chapter on adolescent health)

## Chapter 34. Human immunodeficiency virus infection and children living with AIDS

Infection with HIV, which progresses several years later as AIDS, was first reported in Papua New Guinea in 1987. Since then many thousands of adults, children and adolescents have been affected.

The HIV attacks the body's immune (protective) system. It attacks the T4 lymphocytes which the body needs to fight off infections and malignancies. The damage to the T4 lymphocytes allows those infected with HIV to become severely affected with infections like thrush, pneumonia, diarrhoea, and tuberculosis, and with malignancies.

### TRANSMISSION

(Means of spread)

HIV can be spread in 3 ways:

- 1) *Through sex*: either heterosexual or homosexual. It spreads more easily when the infected semen or cervical secretions come into contact with a raw or bleeding surface of the body. This explains why anal sex or the presence of genital ulceration (e.g. syphilis, donovanosis) makes transmission more likely.

- 2) *Through blood*. Blood infected with HIV can spread the infection through:
  - a) Blood transfusions or blood products, if they are not screened for HIV.
  - b) Unsterilised needles or syringes.
  - c) Skin piercing practices, e.g. tattoos.
- 3) *Mother to baby*. HIV may be spread from the mother to her baby, either
  - a) During pregnancy- through the placenta;

or

- b) During birth - through contact with infected blood or cervical secretions; or
- c) Soon after birth. Very occasionally HIV is spread through breast milk.

### PATTERNS OF HIV INFECTION

The pattern of HIV infection is not the same throughout the world.

- 1) In developing *countries*, e.g. Papua New Guinea, Africa, Asia, HIV is mostly spread by heterosexual sex.

It is also spread by blood transfusion if the blood is not screened for HIV.

Mother to baby transmission is common because females and males are equally infected with HIV.

- 2) In *developed countries*, e.g. Australia, USA, Europe, HIV is mostly spread by homosexual sex.

- 3) It is also spread by intravenous drug use. Mother to baby transmission is uncommon because it is mainly males in these countries who are infected with HIV.

## MOTHER TO BABY TRANSMISSION

If the mother who is infected with HIV is not given ART, there is a one-third risk that the baby will be infected.

If HIV-infected babies do not receive ART, one quarter die during infancy, and most will die before the age of 5 years. But now treatment is available that can reduce the effect of the virus on the body's immune system, and other organs. If treatment is taken every day, children with HIV infection can grow and develop and be free of infections. But it is still far better to prevent HIV transmission in the first place.

Because antibodies pass across the placenta, a baby born to an infected mother will have HIV antibodies in his blood, whether he has been infected or not. These maternally-acquired antibodies may take up to 15 months to disappear from the baby's blood. This means that you cannot tell from an antibody test if a baby born to a HIV positive mother has been infected or not. You can tell this by doing another test called a PCR test for the virus in the baby. This can be done on a dried blood spot from the baby. The other way to say a baby under 15 months of age has been infected is if he has definite signs of the infection. In babies over 15 months of age HIV antibodies

in the blood mean the baby has HIV infection, because these antibodies have come from the baby not the mother.

In countries where HIV infection in mothers is common, many children will become orphans. It is essential for the health of the mother and of her unborn baby that mothers get onto ART as soon as they are diagnosed. Fathers who are infected also need to be on ART – it is treatment that should be offered to all HIV infected members of a family, to keep the whole family healthy.

## STAGES OF HIV INFECTION

HIV infection is divided into different stages. However, patients do not always go through each stage.

- 1) **Acute infection.** Most patients do not know they have been infected with HIV. Some patients have an acute illness (fever, headache, enlarged lymph nodes) 1-4 weeks after they have been infected. This illness soon goes and the person feels completely well. All infected persons develop antibodies to HIV six or more weeks after they have been infected. This means there is a short period (the "window period") between when the person got the infection and when his blood test will be positive for HIV. It is during this "window period" that an infected person (who is

infectious) can have an HIV-negative blood test.

- 2) **Asymptomatic infection.** During this stage, the infected person appears completely well. There are no symptoms or signs. The only way to tell that the person has HIV infection is test his blood for HIV antibodies. Even though the person appears completely well, he is infectious and can spread HIV.
- 3) **Persistent Generalised Lymphadenopathy (PGL).** The patient has enlarged lymph glands (lymphadenopathy), which do not go away (persistent), and affect many glands (generalised). Fever may also occur.
- 4) End-stage conditions:
  - a. **Constitutional Disease.**  
This was previously called AIDS Related Complex (ARC). It consists of most or all of the following:

Fever, fatigue, malaise, weight loss, itching and generalised lymphadenopathy.

- b. **Neurological Disease (AIDS Dementia).** The HIV affects the brain. In children this can lead to developmental delay or regression (failure of development of motor skills or cognitive - thinking ability, or loss of these skills that the child has previously learnt)

c. **Opportunistic Infections.**

The patient develops infections that he would not have caught if his T4 lymphocytes were working properly. These include persistent diarrhoea, pneumonia, thrush, tuberculosis and systemic viral and fungal infections.

d. **Malignancies (cancers or tumours).** Cancers or tumours develop because the T4 lymphocytes are not working properly. These are often on the skin, a cancer called Kaposi sarcoma.

e. **Other Conditions, e.g. wasting disease.** Severe malnutrition is very common in children with HIV because of the effect of HIV on the muscles and brain, because of chronic diarrhoea, and poor appetite (from abdominal pains and nausea from drugs), and because HIV virus consumes so much energy that would otherwise be used for growth.

By definition, all patients with stage 3 or 4 HIV infection have AIDS.

Much more important, however, is that all persons, from stage 1 to stage 4, **have HIV infection and are infectious.** But HIV is not easy to catch

like a cold or the flu. You cannot catch HIV from just being in the same room or normal touching of someone with HIV.

The progression of HIV infection to AIDS may take many years. Without anti-retroviral treatment (ART) about half the adults infected with HIV develop AIDS within 5 years. Babies infected from their mothers, however, progress much faster to AIDS, and need ART from as soon as they are diagnosed as being infected.

#### SYMPTOMS AND SIGNS OF AIDS IN YOUNG CHILDREN

Common features are malnutrition, chronic diarrhoea, persistent fever, severe oro-pharyngeal thrush, persistent cough, generalised lymphadenopathy and generalised rash (dermatitis).

Many of the children also have tuberculosis.

Some children present with repeated common infections (e.g. otitis media, diarrhoea, moderate pneumonia). Others present with repeated severe infections (e.g. septicaemia, osteomyelitis, severe pneumonia, chronic diarrhoea).

Most of the children have malnutrition which does not improve with nutrition treatment.

These symptoms and signs are not specific for AIDS. Many young children have malnutrition and pneumonia, or chronic diarrhoea and severe thrush,

or malnutrition and tuberculosis. Most of these children do not have AIDS.

**Suspect AIDS** in a young child who has some of the above symptoms and signs if:

- 1) The child does not improve as expected with treatment; or
- 2) The child has repeated illnesses and his weight line is going down; or
- 3) The mother is known to have HIV infection (HIV antibodies positive).

#### DIAGNOSIS

Send blood from either the child or the mother for HIV antibodies or a PCR test for the HIV virus if the child is under 15 months of age. If the child is infected, the mother will also be infected (unless the child got the infection from infected blood).

#### TREATMENT

- 1) **Treatment opportunistic infections.** Give the usual treatments for the child's problems, e.g. diarrhoea, pneumonia, thrush, malnutrition, tuberculosis.
- 2) **Antiretroviral therapy.** Since 2000, drugs that suppress the HIV virus have been introduced. These do not cure the infection, which remains in the person's body, but they reverse the progression of the disease, improve the immune system so it can protect from infection, and improve growth by

reducing the causes of the wasting syndrome of HIV. But these beneficial effects only occur if the child takes ART every day. Even while children are on ART their immune system is not normal, so they are still at some risk of developing infections.

### 3) Symptomatic treatment

Itchy rash, if present, can be helped by giving diphenhydramine (Benadryl) three times a day.

Fever, headache and body pains can be helped by giving paracetamol four times a day.

Nausea and poor feeding are common. It generally improves when the child is properly on ART, but requires small, frequent feeds, and sometimes Maxolon (metoclopramide).

- 4) **Nutrition.** Encourage the parents to give the child plenty of good food. They should also make sure the child drinks plenty of fluids, especially when he has diarrhoea or fever.
- 5) **Nursing Care.** Good nursing care by sympathetic staff is very important. Frequent mouth washes and sponging the child after night sweats will make him more comfortable. Health staff must treat patients with AIDS the same as other patients. They must be non-judgemental, and show kindness, not fear.
- 6) **Infection control.** Because most patients with HIV infection are not diagnosed, health staff should treat all patients the same - as possibly

infected with HIV (Universal precautions). This means they must wear gloves when carrying out procedures in all patients that may involve touching blood or other body fluids. Any blood from any patient that gets on the staff's skin should be immediately washed off with soap and water.

Any cut or sore on the staff's hands should be covered with a dressing.

These procedures must be done routinely with all patients. This will prevent HIV, if it is present in patient's blood, comes into contact with the staff's blood, and infecting the staff member.

Routine precautions after all deliveries:

- a) Wash the baby and mother with soap and water.
  - b) Wash and then disinfect any surfaces that are contaminated with blood or other body fluids.
  - c) Soak all blood-stained linen in disinfectant for one hour, or boil it, before sending it to the laundry.
  - d) Send the placenta and any dressings to the incinerator.
- 7) **Education.** Many people have wrong ideas about HIV infection and AIDS. These wrong ideas make them frightened unnecessarily about the disease.

You must explain to the parents that HIV infection (and AIDS) can only be spread from the patient by sex or through his blood. It cannot be spread by using the same plates or cups, or by

touching, hugging, kissing, or playing with the child.

It cannot be spread by living in the same room or house as the child. It is not spread by coughing or sneezing. Mosquitoes do not spread it.

Explain that the HIV is easily killed when it leaves the body. Any clothes or bedding that the child gets blood on, or soils, should be put into a bucket containing 1 part of ordinary household bleach diluted in 10 parts of water, and left in this solution for one hour. This will kill the HIV.

8) **Immunizations.** Young children with HIV infection or AIDS should be given all the usual immunizations, the same as other children. They are more likely than other children to get infections, and so need all the protection they can get.

The only exception is that HIV-positive children who are symptomatic should not be given BCG. If symptomatic HIV-positive children given BCG, may get severe complications from the BCG vaccine. It is completely safe to give BCG to newborn babies of mothers who are HIV-positive. This is because these newborn babies, if infected, will not yet be symptomatic from their HIV infection.

9) **Breastfeeding.** Very occasionally, HIV has been spread from the mother to the baby by breastfeeding. This has only occurred when the mother has been infected just before or while breastfeeding.

This has been due to blood transfusion around the time of delivery or sex with an infected person during the time that she is breastfeeding.

In the usual situation, the mother has been infected before the pregnancy. If the baby is infected he will be infected during the pregnancy or the delivery.

It is important to remember the big advantages of breastfeeding, especially protection from infection and good nutrition in the early months of life. These advantages are much more important for the health of the baby than the possible very small risk of HIV transmission through breast milk. HIV positive mothers should, therefore, be encouraged to breast feed their babies - the same as all babies.

10) **Confidentiality.** Because many people are so frightened (unnecessarily) of HIV and AIDS, it is important that you do not tell any other people except the parents that the child has HIV infection or AIDS. You must make sure that other staff do not talk about the patient with their Wantoks.

Take care, when you tell your medical officer or provincial health officer that your patient has HIV infection or suspected AIDS, which you do this confidentially.

11) **Follow up.** Patients with HIV infection or AIDS get frequent infections. You should arrange regular follow up for these patients.



## PREVENTION

Prevention of mv infection should be easy if you remember how it is spread.

- 1) **Through sex.** The only "safe sex" is to have sex with only one partner, who is uninfected, and who only has sex with you. This is the only way you can be sure you will not catch HIV through sex.

If you cannot be sure about this, the risk of getting HIV infection can be greatly reduced by always using a condom while having sex. Condoms make sex safer, but not completely safe. Condoms do not always work as contraceptives, and they will not always prevent infection with mv. They may break during sex, or not be put on properly, or may come off too soon.

- 2) Through blood
  - a) Only give blood transfusions when really necessary. Make sure the blood has been tested for HIV antibodies and is negative.
  - b) Only give injections when really necessary. Never use the same needle or syringe for more than one patient. Use disposable needles, or sterilise them after each use.

## Chapter 35: Social problems affecting children

Papua New Guinean society is changing very rapidly. Only 50 years ago, most communities were isolated and had their own ways of keeping peace and good order. The extended family and clan systems ensured that everyone "belonged" and was a part of the community.

Societies were well organised, and everyone had a role to play. With the rapid development of transport systems, and the introduction of newspapers, films, radio and television, and now mobile phones, the Internet and social media, communities are no longer isolated. There is increased migration to towns and the development within and around the major towns of large settlements - many of which are overcrowded with poor sanitation, hygiene and water supplies.

Within the towns there is a move towards nuclear families (families which consist just of the parents and children). Traditional organisation and values have been disrupted by the social changes which have occurred over the last 50 years. Pressures to survive in the new environment are certainly different and probably greater than those in traditional village communities. The disruptive influence of alcohol (and more recently of marijuana and other drugs), and unemployment are only too obvious,

and crime is a major worry in present day Papua New Guinea.

However, there have been a lot of positive changes too. There are opportunities for health for some children today that most did not have 50 years ago. It is now widely accepted that every child has the right to education and primary school education is free at least in theory if not always in practice. Access to education is clearly linked to improved child health. There is an increasing middle- and working-class whose children will go further in education than their parents and grandparents. Towns may be better constructed to provide houses and recreation facilities for families and children. Whilst the Internet provides risks, it also provides many opportunities for being in touch with the wider world and for education for economic and social development, and for better health.

This chapter deals with some aspects of "Social Paediatrics" - the effects of social conditions on children which are not the direct result of infectious or other easily understood disease processes.

It is probably true that although "social paediatric" problems have always occurred - even in traditional societies, they now occur more commonly and are being more often recognised in Western countries, and the same is true in Papua New Guinea. As time goes by, "social paediatric problems" will become more common, and health workers looking after children need to be aware of them and how to deal

with them. On the other hand, improving social conditions may also lead to opportunities for better health, and health workers need to encourage this.

## CHILD ABUSE

Child abuse occurs when an adult causes harm to a child. The harm may be caused by an act of commission (doing something to the child) or by omission of normal caretaking duties (failing to look after the child properly). There are many ways in which adults may harm children. They can be divided into 4 main groups.

- 1) **Physical abuse - non-accidental injury.** In this case, an adult inflicts physical damage to the child. Most often the damage results from beating with fists, or blunt objects such as a piece of wood, metal belt, or rope. Sometimes the damage is caused in other ways such as burning the child, banging the child's head against a wall, or shaking the child.

Some people think it is important to draw a distinction between socially acceptable physical punishment and non-accidental injury. However, in some countries, any physical punishment of a child is against the law. Many people in Papua New Guinea believe that it is OK for a parent to smack a naughty child. But society has unwritten laws against physical punishment which causes tissue damage - bruising, lacerations, or fractures, and it is a criminal offence to abuse a child. Sometimes even

what people think is acceptable physical punishment teaches the child to react violently or leads to psychological distress or fear in the child. The effect of such physical, psychological distress and fear on children as they grow older is only being understood now. Children need to learn about behavioural boundaries but it is best to strongly discourage physical punishment of a child. There are other ways to teach a child to behave in an acceptable way.

- 2) **Sexual abuse.** Rape is the most obvious form of sexual abuse - but the term also includes any use of children by adults for sexual pleasure. It thus includes "fondling" the child's sexual organs, the use of children in pornography including pictures transmitted on the Internet, exposing children to indecent acts, forcing children to stimulate adults, and using various parts of the child's body for sexual pleasure. Sexual abuse of children may also lead to physical injury of the genitals, and often results in the transmission to the child of sexually transmitted infections, which can have long term consequences such as infertility. Sexual abuse of children has serious and long-standing consequences for their mental health and it can lead to depression and fear. All forms of sexual abuse or exploitation of children is against the law and should never be tolerated or hidden.
- 3) **Emotional abuse.** This is much more difficult to define than physical or sexual abuse, but it

refers to consistent upsetting of the child by unkind, hurtful, sarcastic and critical verbal comments. It also includes other means of hurting the child mentally without causing physical harm. It is also clear that the other forms of child abuse – sexual and physical abuse - cause major short term and long term emotional trauma to the child, so they are also forms of emotional abuse.

- 4) **Neglect.** This term means failing to provide the normal care, nutrition and supervision that a child requires and failing to help the child to develop normally. Sometimes this is done deliberately, but most often it is because the parents are ignorant and do not understand how to be a good parent, and the consequences for the child. Sometimes neglect occurs because of marital breakdown and a single parent is unable to adequately care for his or her child. Children with chronic illnesses may also be neglected if their health care needs are not met. Extreme forms of child neglect include abandonment and child selling.

How does child abuse present to health workers?

In some cases, child abuse is obvious but in many cases it is not. Nobody really wants to think that adults cause harm to children, but the facts are that they do so in all societies and in every country. It is very important for health workers to be aware of this.

There are certain injuries and presentations which are very suggestive of child abuse.

These include:

- Injuries for which there is an explanation which sounds unlikely - or for which details of the explanation are not the same when given by different persons or by the same person at different times.
- Multiple injuries to the child
- Recurrent injuries to the child
- Bilateral periorbital bruising
- Torn frenulum of the upper lip (the thin 'cord' in the middle of the inner lip)
- Fractures at different stages of healing (this is often revealed by X-raying all the bones of the body)
- Burns in unlikely places (e.g. on the chest, buttocks and face)
- Multiple burns
- Well-marked hot water burns of the hands or feet suggesting the child's limbs have been put in hot water
- Marks which could be caused by beating with a piece of wood, a belt or a rope

All these suggest non-accidental injury (N.A.I.) to the child.

Signs which suggest sexual abuse include:

- Vaginal discharges in girls (although there are other causes)
- Sexually transmitted diseases

## Damage to the genitalia

- Vaginal bleeding in pre-pubertal girls
- Sores or tears around the genital and anal area.

These are some of the physical signs of sexual abuse. There are other things which should make you think of the possibility of sexual abuse. They include:

- Inappropriate knowledge about sex in a young child, such as "sexual" behaviour by a child towards other children
- A change in behaviour - such as being abnormally quiet, depressed or unusually noisy or aggressive.
- Unexplained abdominal pain or headaches

Children whose mental state has been damaged by emotional abuse are less likely to present to medical attention initially, but emotional neglect or abuse should be considered if a child has any of the following:

- Very shy, withdrawn behaviour
- Inability to play with other children normally
- Behaviour, which is over friendly, particularly with adults.
- Unusual patterns of defaecation and/or urination
- Failure to develop normally, particularly in areas of social development

There are other causes of these behavioural patterns however,

including Autism and developmental delay.

In considering a diagnosis of neglect in a child it is important to determine the background - particularly the socioeconomic background of the family. For example, multiple skin sores and nappy rash and unexplained malnutrition in a child from a well-educated, well housed family would be suspicious. On the other hand, multiple skin sores and malnutrition would not be unusual in children from some of the poorer squatter settlements or villages where soap and water are difficult to get, and where food is in short supply. Keeping this in mind the possibility of neglect should be considered when the child:

- Has malnutrition for no obvious reason
- Is very dirty
- Has multiple skin sores
- Is not developing normally

Although child abuse is classified into different types, in reality children may be abused in ways which include all forms. Emotional abuse inevitably occurs as part of physical or sexual abuse, and the mental effects of physical and sexual abuse or neglect persist for many years, often for the rest of the child's life **How common is child abuse in Papua New Guinea?**

Because most cases of child abuse are hidden it is very difficult to know how common child abuse is in Papua New Guinea. Obvious cases of non-accidental injury occur from time to time, but it is very likely that in many

cases the diagnosis is missed, particularly as many of the affected children will present to busy outpatient departments and will be regarded as having surgical problems.

It is clear that at least in city areas of Papua New Guinea sexual abuse of children is common. But it is certainly not limited to city areas and the breakdown of traditional society in villages, and the misuse of alcohol and marijuana contribute to the increase of sexual abuse in rural communities also. If health workers are aware of this, they are more likely to think of the possibility when children present in unusual ways.

How should abused children be managed?

Treatment of child abuse includes treating the child's physical damage, protecting the child from further abuse, and, most difficult, treating the immediate emotional and mental trauma to the child and preventing long term emotional and mental damage.

If you suspect that a child has been abused:

- Ask immediately for a doctor's help.

If a doctor is not available, it is best to:

- Notify your senior staff
- Admit the child
- Treat the physical injuries
- Carefully observe the behaviour of the child and the guardians.

In cases of rape it is also necessary to:

- Test for HIV and other STIs
- Treat for sexually transmitted infections
- Prevent pregnancy occurring in older girls.

Sometimes the parents or guardians refuse to cooperate. It is then necessary to use the provisions of the Lukautim Pikinini (Child Welfare) Act, which allows for a Child Welfare Officer or Police Officer to act to protect the child.

After the immediate crisis of a non-accidental injury or sexual abuse is over, there remains the problem of how to protect the child from further injury. In making a decision, it is usually necessary to discuss the situation with the child's guardians (and particularly in Papua New Guinea with the head of the family). It may also be necessary to include other persons such as pastors, village councillors, and in the city areas, Welfare Officers. Sometimes it is necessary to involve the Police. In reaching a solution, the most important thing to consider is what will be best for the child. In Western society, abused children are sometimes removed from the parents and looked after by foster parents. Sometimes the person who has abused the child is put in prison.

These solutions are possible in Papua New Guinea but in many cases, it may be possible to solve the problem within the extended family system, although this should only be if it is in the best interests of the child, not to

protect the abuser. Sometimes the families of the abuser will pay compensation to the family of the abused child and will regard the problem as being sorted. But this does not necessarily protect the child from further abuse or bring the perpetrators to account. Part V of the Lukautim Pikinini Act Section 38 states that a health worker (and any other persons with professional responsibility for children) who “has reason to believe that a child is in need of protection” “shall immediately report the matter to the Office”. (Office for Child and Family Services). It further states that “a civil proceeding may be instituted against a professional failing to report”. All cases of child sexual abuse and cases of serious physical abuse are crimes against children and should be reported to the police and Child and Family Services Office.

When health workers are faced with an abused child they will have feelings not only of compassion for the child, but may also have feelings of anger against the abuser.

It is important to control these feelings of anger because they do not help the child and may interfere with making difficult decisions. Even though it is difficult to be compassionate to people who abuse children, it is important to recognise that some of them are in need of help themselves.

## OTHER SOCIAL ISSUES AFFECTING CHILDREN

Children’s health is strongly affected by their social and physical

environment. Other social conditions which adversely affect children in the 21<sup>st</sup> century include chronic unemployment, overcrowding and poor housing, poverty, drug and alcohol abuse, marital breakdown, and environmental hazards. These factors are called social determinants of health. They not only increase the risk of all forms of child abuse, but also increase the risk of disease or injury, and reduce care-seeking by parents for children who are unwell. Increasingly sickness and avoidable deaths in children will occur mostly within families on the fringes of society living in poor conditions.

The answers to these social problems are complex, and beyond the health sector, but health workers need to understand the influence of these factors on children and families.

Some social changes in the 21<sup>st</sup> century bring opportunities for better health. Use of mobile phones may increase care seeking by parents. The Internet provides a source of useful health information for parents, as long as they can be guided to sites that contain accurate information. Modern housing in many villages reduces some of the hazards of traditional housing, including indoor air pollution. So social change is not always bad if it is managed well, and for most people it can lead to better health.

# Chapter 36. Children in urban towns and cities

## Introduction

There have been many changes in PNG over the last 50 years. Some of these changes have resulted in improved health for PNG people, and others have brought major social and economic problems for many people and families, adversely affecting their health. The population has increased by a factor of 4- from about 2-3 million to 8-9 million. The number of people living in towns and cities has increased even faster. Whilst it is still true that the majority of the population live in rural areas, more than 200,000 children live in the towns and cities. Life in the towns and cities is in many ways very different from life in the rural village. In some ways - such as easier access to health services - life is better for children in the towns and cities, but in many way, it is much harder and there are many dangers and problems for children and their families in the towns and cities.

People migrate from the rural areas to the urban areas for different reasons, but mainly because they feel that life will be better, perhaps they will be able to get a job, and perhaps the children will get better education. The reality is often very different from these expectations. It is hard to find a job; it is even harder to find a place to live and hard to get enough food to feed the family. So, the children face many problems.

## Housing

In the towns and cities there is a huge difference between the housing occupied by the highly educated “elite” citizens and the villagers who have migrated to the city. The former have secure, spacious housing, good water supply and electricity, and flush toilets. Those at the opposite end of the social scale live in makeshift houses in overcrowded squatter settlements, with no direct access to water other than access to a communal tap [which may be some distance away) may have to share a pit toilet with many other families and have no electricity. In these settlements’ families are exposed to the effects of alcohol and drug abuse, domestic and sometimes ethnic violence. Hygiene is poor and faecal oral transmission of infections (diarrhoea, dysentery and typhoid), and transmission of respiratory infections due to overcrowding are routine.

Whilst all PNG families face pressure because of extended family expectations, those living in settlements are least able to deal with them. 15-20 people living in a one or two room shack with minimal income is a common situation.

## Nutrition

In many rural areas, the components of good nutrition are available from family gardens, which also produce enough for some income generation. Many families in urban areas have minimal or no access to land on which



to grow crops for consumption or income. Advertisements promote the purchase of “rubbish foods” and soft drinks, and mothers with minimal or no education spend hard earned income on these products instead of nutritious food. As a result, the prevalence of malnutrition underweight, stunting and wasting in urban area is high.

Since children from high socioeconomic circumstances will also seek care, health workers should be aware of over-nutrition. Children who are obese generally grow into obese adults with all the risks of developing heart disease, hypertension and diabetes. Parents of obese children should be informed of these dangers and advised on the principles of good nutrition.

### Employment for parents

Finding a job in the towns and cities is difficult, particularly if a person has no educational qualifications-and most migrants to the cities lack these. If jobs are available, they are likely to be poorly paid. Mothers may seek employment to assist with income for feeding the family, or may spend large amounts of time selling peanuts or bananas in the markets-but this means she may leave the children in the care of other family members - often younger sisters or older daughters- and the children are at risk of neglect.

### Access to health services

Access to health services, at least in terms of distance, should be easier in

the towns and cities than it is in rural areas. More facilities are available, but they are usually extremely busy, and patients have to wait for long periods of time to be seen. Even with the easier access, parents may not bring their children unless they are very ill, because they may be “too busy”, or may believe that illness is a custom problem rather than a health problem. Immunisation coverage should be high in urban areas, but parents may lack the knowledge about its importance and there are some areas of cities that are “no go” places for Health staff.

### Risks to the child

In rural areas risks to children are often environmental- such as snakes, wild animals, occasional poisonous plants, and fast flowing rivers. In the urban areas, environment dangers are present but there are many other “man-made” dangers. Road traffic accidents are common- often caused by poorly maintained vehicles, reckless driving, or intoxicated drivers. Electric cables, and wiring are part of the urban environment, and unsafe household appliances and sockets are a potential source of danger. Cleaning products and pesticides are more available in the urban setting, with risks of toxicity poisoning from ingestion.

### Child abuse

Child abuse is certainly not limited to urban areas, but it is likely to be more common than in the rural setting. Overcrowding, often with extended family members, breakdown of normal

cultural and family structures, drug and alcohol abuse are all likely contributing factors. Children may be left with “Babysitters” whilst the parents go to work.

### Features of healthy urban environments for children:

Well planned urban (and rural) environments can contribute to child health and development, but unsafe environments lead to transmission of infectious diseases, malnutrition, injuries, and psychological problems that can have devastating consequences. A healthy and safe environment for children needs things in the home and community, including:

- No over-crowding in housing
- Sewage and sanitation
- Hygienic waste disposal
- Clean water
- Healthy food, fresh fruits and vegetables
- Access to preventative health care (vaccines, growth monitoring), primary health care and referral level health services
- Public safety measures (e.g. speed limits on roads, seat-belt legislation, smoke detectors in homes)
- Access to schools and education so children can reach their full potential



Figure 5 - All children are different

- Parks and play-grounds, sporting ovals and sporting teams for children to join
- Trees and gardens
- Clean air without pollution
- Music
- Books
- Freedom from domestic violence and abuse of all kinds
- Freedom from bullying and peer violence
- Drug free environments

### Conclusion

Nurses and Health workers in urban setting will deal with children and families from a very wide range of

educational and social economic backgrounds. Every child, irrespective of background, has the right to the best available health care.

Understanding the child and family's social background and the environment in which they live is important in helping the health worker to provide kind, appropriate and comprehensive care. This will involve not only the immediate care for the child, but discussion of important issues such as immunisation for all the children in the family, nutritional education, discussion of the importance of family planning and antenatal care for mother, and a healthy and safe home environment.

## Chapter 37: Teaching parents and children

When parents have children in hospital it is a good time to teach them.

Parents want their child to be healthy. They can be taught individually (one by one) or collected together for group teaching. By watching their child's treatment in hospital parents can learn about disease and about cleanliness, good food and careful nursing. If a sick child recovers from an illness, which could have been prevented, you must teach her parents how to prevent her getting that illness again. Parents can learn important parenting skills while in hospital that will help them look after their child when they go home.

Important things to teach parents include:

- 1) Hand washing – emphasise to parents and children the importance of hand washing before eating, before food preparation, after going to the toilet, before touching a new baby or infant.
- 2) Infant feeding – teach parents that mother's breast milk is best for the first 6 months of life. After this, children need food in addition to breast milk so teach mothers to start giving babies soft mashed food from around 6 months of age, with a variety of foods with enough protein, calories and iron to make the child strong. Parents can learn about prevention of malnutrition, correct preparation and cleanliness of foods (see Chapter 3)
- 3) Diarrhoea – teach parents to give extra fluids if child has diarrhoea. Teach the importance of hand washing to prevent the spread of germs causing diarrhoea, and how to make up Oral Rehydration Solution (ORS). (See Chapter 9)
- 4) Parasites - malaria, hookworm, roundworm, and the importance of sleeping under insecticide treated bed-nets if the family live in a malaria area, receiving Albendazole every 6 months to treat worms, and wearing shoes to prevent worms getting into the skin.
- 5) Cleanliness - clean body, clean home, clean village and street
- 6) Environmental sanitation – teach them about the importance of clean water supplies to prevent illness in children, latrines, disposal of rubbish
- 7) Avoiding smoke exposure to the child, as this can cause pneumonia and chronic lung disease. Teach parents never to smoke in a child's presence, and not to expose children to smoke from cooking fires, indoor or outside.
- 8) Immunizations – teach the parents that immunisations will protect children from many diseases that can kill or damage their children, including measles, polio, meningitis pneumonia and tuberculosis.
- 9) Dental health
- 10) Family planning (see chapter 36)
- 11) Skin diseases – teach parents how to prevent skin sores, scabies, ulcers, head lice by cleaning of the skin, wearing shoes.
- 12) Prevention of accidents in the home, especially burns and

poisoning from household products. Prevention of road accidents with seat-belts and knowing how to walk safely on roads.

- 13) Regular attendance at community health clinics for growth checks and vaccines.

Be positive when you teach: never show a mother or a child as a bad example. Learn from those you are teaching by involving them in discussions as much as is practical. This not only increases your understanding of the issues being taught but talking with them is also more effective than just talking at them.

#### Visual aids

Posters, flip-charts, models may be helpful. But they are only useful if they are understood and enjoyed by the group, so need to be carefully explained.

- 1) Practical demonstrations are a good way to learn e.g. show the mothers how to cook locally available and acceptable foods on the type of fire they use for cooking in their homes. Then give the food to the children to eat.
- 2) Visual aids can be used to start questions and discussions.
- 3) Posters should be in a language that the people understand, e.g. Tok Pisin or Hiri Motu. They should be tested out beforehand. Often parents do not understand a poster that seems to be quite clear to the health worker.

- 4) Try to get only one idea understood at one time

Teach as many people as you can

- 1) Children love learning, and if they can learn important health messages when they are young, they will not forget them.
- 2) Parents and relatives of children in hospital.
- 3) Mothers at clinics.
- 4) Families when you visit their homes.
- 5) School teachers, village councillors and other community leaders.

**N.B.** Don't leave out the father or grandmother when teaching. Remember it is often the grandmother or the father who decides what the baby will eat and when the mother should take the child to the clinic.

All health workers should be health educators, so learn how to teach. Remember, it is much more effective to talk with people than to talk at them!

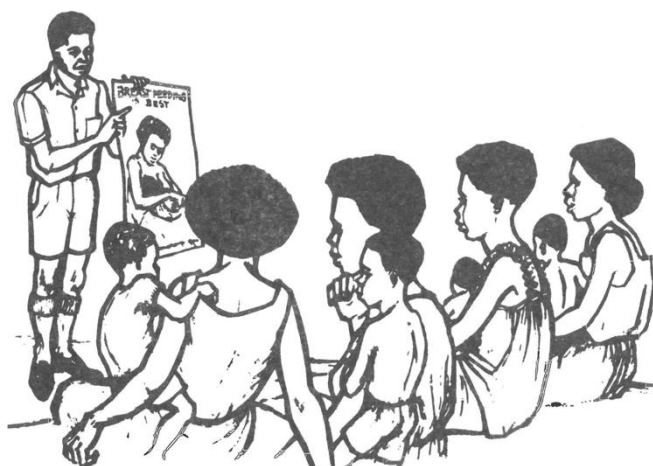


Figure 57 - All health workers should be health educators

## Chapter 38: Family planning and contraception

Family planning means that parents can decide how many children they want and when they want to have them. Family planning is very important for healthy mothers, healthy families and communities. Modern methods of family planning are safe and allow women to have more control over their lives. Contraception means avoiding conception (pregnancy).

Whilst many parents and health workers may not approve, they must accept the reality that many young people in their teenage years are involved in relationships that involve sex. These relationships can be healthier (and safer) if young people are knowledgeable about contraception and the prevention of sexually transmitted infections. New methods of contraception enable relationships to be safe and healthy. Without contraception too many girls have unplanned pregnancies and are taken out of school. It is much better for girls to have the knowledge of reliable contraception and be able to continue in their education. It is important for boys to have knowledge about contraception also, so they can take responsibility for not getting their partner pregnant. This is respectful of girls' health, education and future. Health workers should avoid being judgemental and should be willing to provide advice on contraception to

young people, or, if they feel unable to do so, should refer them to someone who can.

### TRADITIONAL (OLD) METHODS

In Papua New Guinea in the past a number of methods were used by mothers who did not want to become pregnant again. Often the method used was handed on by older village women. These methods are still used by some women. Some of these traditional methods work better than others in preventing further pregnancies. Sometimes the method used is dangerous to the health or life of the mother. A common traditional method was for the woman to drink a kind of tea made from a special plant.

In many places it was (and still is) the custom for the man not to have sexual intercourse with his wife while she is breast feeding. In these places mothers usually continued breast feeding their babies for two to three years. This taboo (rule) stops the husband from having sexual intercourse with his wife during these two to three years; however, in modern day PNG enforced prolonged abstinence of this kind can lead to the husband having sex with other partners. In this way children are spaced with several years between each child. There are also taboos on sexual intercourse at certain times e.g. before hunting, fishing, trading voyages, harvesting, pig feasts. Also when preparing for war, or in times of sickness.

It used to be necessary for parents to have many children because many would die in infancy. Parents needed to be sure that some of their children would live and become adults, so parents could be taken care of when they became old.

This was in the days when many babies and young children died. In some places in the past about half the babies born died before they had grown up to become adults.

## CHANGES

Many things are changing in Papua New Guinea. More health services are available and used. Children are vaccinated against deadly diseases, they go to school and are more educated, more parents work and earn an income, housing is better for some families, more is known about good nutrition, there are better roads so parents can reach health services, there is better communication with many people using mobile telephones, and more families live in towns.

As a result of these social changes and other changes in the health and medical system, more than 90% of the babies born today will live and grow up into adults.

There are many other ways in which these social changes affect families. Young people are moving to towns and leaving behind some of their customs. Those who remain in the villages are also forgetting some of the traditional customs. Many husbands no longer follow the rule about no sexual

intercourse with their wives while they are still breastfeeding. All these social changes mean health workers need to know about and provide information to young people and couples on family planning. The better the family planning the more children will survive – because better birth spacing prevents malnutrition, and families can provide better care, education, clothing and other things for a smaller number of children.

## REASONS FOR FAMILY PLANNING

- 1) **The family have enough children born already.** Some parents now have five or more children who all survived infancy. It is often difficult for these parents to find enough money to buy the food and clothing needed for their children. The children also need schooling which can be very expensive. When they leave school they need either jobs or land on which they can work. Parents who have a large number of children often cannot give their children these things that will help them in life. It is for this reason that many parents ask for help to stop having more babies. They know they have enough children.
- 2) **Spacing of children.** Some mothers keep having babies. Before the first baby has grown large enough to eat enough food by himself, the second baby is born. The mother now does not have time to look after the first baby well. Also, the second baby now drinks the breast milk which the first baby still needs. The first baby becomes poorly nourished



and unhappy. He easily catches infections. The poor mother works hard at gardening, collecting firewood, cooking and cleaning. Before the second baby has grown big enough the mother has become sick.

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She is always either pregnant or breastfeeding. Her body never has a chance to rest and recover. She does not have time to look after her children well. So they become malnourished, unhappy and sick. Her husband may get angry with her because she does not have time to work properly, or to spend time with him.

To avoid this trouble many parents now ask for help to space their children. This means the mother has enough time between each pregnancy to recover fully. Also, she is able to give each child the care he needs to grow properly. This means her children remain healthy and well nourished.

- 3) **Medical reasons.** Sometimes an illness in the mother makes it dangerous for her to have another baby.
- 4) **Economic reasons.** When a family has fewer children they can care for them better, provide more education, clothing and other material goods. The children are likely to improve their life, and become more prosperous than if they are in a large family which is poor.
- 5) **Society and national reasons.** Currently Papua New Guinea struggles to provide health, education, and later employment

for the children that are born. If there was more family planning there would be more prosperous families and the services would be more available for all children.

## IMPORTANCE OF FAMILY PLANNING

- 1) **The mother.** It helps the mother to stay healthy. Mothers who have had five or more pregnancies are more likely to have obstetric complications and to die during childbirth.
- 2) **The baby and child.** It helps the baby and young child to stay healthy. The older baby is likely to become malnourished if another baby is born before he is three years old.
- 3) **The family.** It helps the family to stay happy. The mother is not too tired. Her children are healthy. The father has enough money to look after his family well. The house is not overcrowded.
- 4) **The country.** Children have to be looked after. They need health services and schools. At present Papua New Guinea does not have enough money or trained staff to give health services to all the children who are born. Many schools are closed or poorly maintained, and children may not be able to go to school or may leave early. Many of these children are unable to find employment. So a country having too many people and not enough services creates many social problems.

## METHOD OF FAMILY PLANNING

Family planning methods can prevent pregnancies.

Another word that means the same is contraception. Any method that prevents pregnancy is called a contraceptive method. There are many different contraceptive methods. Those that nearly always work (i.e. those that prevent pregnancy) are called reliable methods. Those that often fail to prevent pregnancy are unreliable methods.

## RELIABLE METHODS

These methods are available through the Family Planning Clinics. They are free, but many clinics charge a visit fee- and this is up to the local health authority.

### INTRA-UTERINE CONTRACEPTIVE DEVICE (I.U.C.D.)

A small plastic coil with thread at the end.

The I.U.C.D. being supplied in the family planning services in PNG is called the Copper T380A. It is highly effective for up to 15 years after insertion. The I.U.C.D. is threaded through an introducer. It is then passed through the vagina and cervix (neck) of the uterus into the inside of the uterus. As long as the I.U.C.D. is in the uterus pregnancy is unlikely to occur. The I.U.C.D. can be easily removed if the mother wants to become pregnant again.

Special training is needed before it is safe for a medical worker to put (insert) an I.U.C.D. in. It only takes about five minutes to insert the I.U.C.D. There is a little discomfort during the insertion. Once the I.U.C.D. is in the uterus there is no pain. The woman can have sexual intercourse as often as she and her husband wish without becoming pregnant. The husband cannot feel the I.U.C.D. as it is right inside the uterus.

However, some woman should not have an I.U.C.D.

**Reasons for not having an I.U.C.D. are** (some of these contraindications are relative):

- 1) If the woman has never had a baby (a gynaecologist can fit an IUCD for a nullipara in special circumstances).
- 2) If the woman is already pregnant.
- 3) If the woman has or has had serious infection of the pelvic organs (PID)
- 4) If the woman has cancer of the pelvic organs.

The best times to insert an I.U.C.D. are:

- 1) Six weeks after the baby is born; or
- 2) At the end of a menstrual period or within a few days afterwards.
- 3) Immediately after the delivery of the placenta in the labour ward
- 4) When the uterus has been evacuated after a miscarriage

Side effects from the I.U.C.D.

Some women have mild side effects for the first 2-3 months. Others have no side effects. The commonest side effects are:

- More bleeding during the first few menstrual periods.
- Some small bleeding in between periods
- Slight pains for a short time after insertion.

Soon, the woman gets used to the I.U.C.D. She does not notice it at all. She can go on doing all her work. The I.U.C.D. does not make any difference.

Treatment of side effects:

- 1) For pain. Paracetamol or Aspirin tablets.
- 2) For heavy periods: Ferrous sulphate (iron) tablets, 2 tablets each day.

Why women like the I.U.C.D.

- 1) Once the I.U.C.D. is in, the woman does not have to remember to do or take anything.
- 2) The I.U.C.D. is supplied free.
- 3) The I.U.C.D. can be easily removed if the woman wants another baby.

Problems with I.U.C.D.s

- 1) Some women have side effects (bleeding or pains) at first.
- 2) Sometimes the I.U.C.D. comes out.

- 3) It is not usually a suitable method for women who have had no babies.

I.U.C.D.s are not suitable for all women. Careful examination of the woman is necessary before an I.U.C.D. is inserted. This is to make sure it will not cause any harm, and to make sure the woman is not pregnant.

Sometimes the I.U.C.D. is pushed out (expelled) by the uterus. Sometimes it has to be removed because of bleeding or pain. For these reasons, women who have had I.U.C.D.s inserted need to be carefully followed up. They should go to a clinic for a check-up after one month, then three months later, then every 12 months.

Although they are effective, I.U.C.D.s are not very popular in PNG, because many women do not like the idea of a "foreign body" being inserted into their womb. However, if women are counselled properly, many will accept an IUCD for long term contraception.

ORAL CONTRACEPTIVES (PILLS)

The woman takes a special tablet, or pill every day. Because they are purchased from different sources they are now referred to as the Combined Pill. These pills are a combination of oestrogen (they usually contain low dose (35mcg) of an oestrogen called ethinyl oestradiol) and progestogen female sex hormones. There are 28 tablets in the packet. 21 tablets contain the female sex hormones and 7 contain iron or sugar. It is easy for the woman to forget to take the tablets or to run out of them. The

tablets must be taken in the right order or the woman may become pregnant

**When to start oral contraceptives** If the woman is having menstrual periods each month - always start on the first few days of menstrual bleeding.

- 1) If the woman is not having menstrual periods (because she has recently had a baby or miscarriage), start taking the tablets that night, i.e. straight away.

Tell the woman:

- 1) Take one tablet every day. The arrows on the packet show in which order to take them.
- 2) Take the tablet at the same time each day.
- 3) Take the tablet with food in the evening. This helps prevent nausea.
- 4) Do not chew the tablet. Swallow it whole with water.
- 5) Begin a new packet of tablets the day after the old packet is finished
- 6) If she forgets to take a tablet each day she may become pregnant.

**Side effects of oral contraceptives.**

Usually there are no side effects. If side effects do occur, they are usually mild and stop after the first 2-3 months. They are like the symptoms of early pregnancy.

Common expected effects are:

- 1) Nausea (she feels she wants to vomit).
- 2) Sore breasts.
- 3) Gain in weight.
- 4) Less bleeding each month (or no menstrual period).
- 5) Bleeding in between periods if she misses out some of the hormone pills in a packet.

Rare but serious side effect is thrombosis (a blood clot in a vein). This is more common if a woman is a smoker or is overweight. Counsel any woman taking the pill not to smoke. Jaundice is very rare.



Figure 58 • Planned Families are happy families

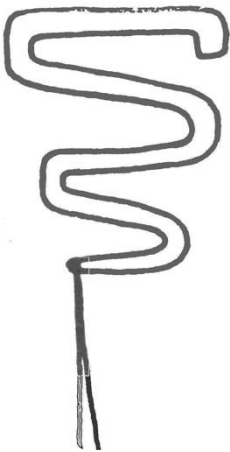


Figure 59 • Lippes Loop (I.U.C.D.)

#### Why women like oral contraceptives

- 1) They are safe. It is safer to take the tablets than to have a baby.
- 2) They always prevent pregnancy as long as the woman remembers to take them regularly.
- 3) If a woman wants to become pregnant she just stops taking the tablets after finishing a packet.
- 4) There is usually less menstrual bleeding.
- 5) There is nothing to remember to do just before having sexual intercourse.
- 6) Women who have never had a baby can use them.

#### Problems with oral contraceptives

- 1) The woman must remember to take them every day.
- 2) The tablets must be taken in the right order.
- 3) The woman must get new supplies of tablets every 3 months.
- 4) There may be side (expected) effects at first.
- 5) Women may produce less breast milk on the combined OCP. So give Microlut to mothers who are breastfeeding a baby under 12 months (see below).
- 6) The tablets must be started at the beginning of the menstrual cycle. If they are started at other times in the menstrual cycle, they will not prevent pregnancy straight away. A woman is not prevented from

pregnancy until she has been taking the tablets for two weeks.

**Microlut** (blue packet). This is another kind of oral contraceptive. It only has the progestogen female sex hormone. It is used by women who are breastfeeding a baby that is under 12 months of age. There are 28 tablets in the packet. All contain a low dose of the progestogen female sex hormone. These tablets do not interfere with the mother's breast milk supply. When the baby is 12 months old the woman who is breast feeding can change to the combined pill

The woman starts with the tablet labelled "Sun" (for Sunday) on the top row and then follows the arrows. But if she can read, she starts with the one labelled for that day of the week. When to start Microlut and what to tell the woman is the same as for the other oral contraceptives (see above).

**Side effects of Microlut.** Because Microlut does not have any oestrogen female sex hormone it does not have the side effects listed above under oral contraceptives. Microlut only has the progestogen female sex hormone. So it is very similar to the injectable contraceptive Depo-Provera (see below). Like Depo-Provera its main side effect is that it may cause irregular bleeding, or it may stop monthly menstruation (amenorrhoea).

## DEPO-PROVERA

An injection of this special long acting progestogen female sex hormone can be used as a contraceptive. Each injection prevents the woman becoming pregnant for three months. So the injections have to be repeated every 3 months. Depo-Provera does not decrease the mother's breast milk supply. In fact it may slightly increase it. So it can be given to women who are breastfeeding.

Side effects.

- 1) Some women may have bleeding for a long time.
- 2) Some women have no menstrual periods at all. This does not matter. It does not mean they are pregnant.
- 3) The injection lasts a long time. Women may be slow to become pregnant if they want to have another baby.

Why women like the injections.

- 1) The woman only has to remember to have the injection every 3 months.
- 2) It does not affect breastfeeding.
- 3) Many women think injections are good medicine.

Problems with Depo-Provera.

- .
- 1) It may cause irregular bleeding.
  - 2) It may stop monthly menstruation. But this is really an expected effect

rather than a side effect, and it should not be a problem if the woman is counselled properly.

- 3) Some women may be slow to get pregnant again after the last injection.

#### LONG-TERM REVERSIBLE CONTRACEPTIVE IMPLANTS

The newest form of depot contraception is an implant of levonorgestrel which provides reliable and effective contraception for up to five years. It is usually put under the skin of the upper arm. The implant can be removed at any time if a woman wants to have children. It is effective and acceptable to many women. It has a failure rate of less than 1%: this is the percentage of women in Papua New Guinea with a levonorgestrel implant who get pregnant. The only side effect is irregular bleeding. Implants are recommended for immediate postpartum insertion for women wanting contraception who may find it difficult to come back to the health facility in the following months.

There is no need to remove the Implant at the end of its 'life': i.e. at 4-5 years. The empty capsule can be left in the upper arm as a 'good memory' of successful family planning. Removing an empty implant is an unnecessary operation.

#### MECHANICAL CONTRACEPTIVES

These aim at preventing living sperms entering the uterus. The mechanical

contraceptive may be worn by either the man or the woman. It must be put on properly before sexual intercourse begins if it is to be a reliable method.

For the man-a rubber or plastic sheath (balloon) is placed over the penis. This sheath has several names, e.g. condom, sheath, prophylactic, rubber, French letter, and is sold in many shops and can be obtained free from family planning clinics.

For the woman-a rubber or plastic cap (also called diaphragm) is fitted inside the vagina. It blocks the entry of sperm to the uterus. The right size cap must be used. To find out the right size, the woman is examined by a doctor or other specially trained health worker.

#### Supply of Condoms.

Health workers can give men who are interested in using condoms a free sample. At the same time you must explain to the man how to use it properly. Tell the man he can buy further supplies of condoms himself, either at a pharmacy (chemist) or trade store, or obtain them free of charge from the Health facilities.

#### Why people like condoms.

- 1) A clinic visit is not necessary. Condoms are sold at pharmacies and trade stores or can be obtained free from Health facilities.
- 2) They prevent pregnancies straight away.
- 3) They cause no side effects.

- 4) They help prevent sexually transmitted disease and AIDS.

Problems with condoms.

- 1) The man must remember to put one on each time before sexual intercourse.
- 2) He must buy or obtain new supplies of condoms.
- 3) The condom is not as good in preventing pregnancy as the I.U.C.D. or oral contraceptives, Depo-Provera or implants.

## CHEMICAL CONTRACEPTIVES

A number of creams, pastes, jellies, tablets, or sprays that kill sperms can be bought at chemist shops. The woman can put one of these inside her vagina before sexual intercourse begins. Neither mechanical contraceptives nor chemical contraceptives are as reliable as I.U.C.D.s, oral contraceptives Depo-Provera or implants. But if used carefully, and especially if a mechanical plus a chemical method is used (e.g. condom on man plus jelly in woman), the method can be almost as reliable as an I.U.C.D.

## PERMANENT METHODS

Some parents who have many children are quite certain they do not want any more. The woman can have a small operation done by a doctor to stop her having more children. In this operation the tubes down which the ova pass to

the uterus are cut and tied. This is called *tubal ligation*.

This is also a good method for women who have an illness that makes it dangerous for them to have more children.

As tubal ligation is permanent, the woman and her husband must understand that the woman will not be able to become pregnant again, even if she wants to.

Sometimes an operation called *vasectomy* is done on the husband's sperm tubes (spermatic cords) instead of doing a tubal ligation on the woman. This will stop the man making his wife pregnant, but does not spoil sexual intercourse at all. It is an easier operation to do than tubal ligation.

There are no side effect of tubal ligation or vasectomy.

The person having the operation must sign a consent form before either tubal ligation or vasectomy is done. Some women in PNG want their husbands to co-sign the tubal ligation consent form with them.

## UNRELIABLE METHODS

### COITUS INTERRUPTUS

The man removes his penis from the woman's vagina before any fluid comes out of his penis. This method is not a safe one for preventing pregnancy. Often sperms enter the vagina before the man knows it.

### DOUCHES



The woman washes out her vagina with water or other solution after sexual intercourse. This also is not a safe method for preventing pregnancy. Not all the sperm are washed out of the vagina. This is a VERY unreliable method.

## RHYTHM METHOD

This is a method promoted by the Catholic Church. The ovary releases an egg each month (*ovulation*). Pregnancy is most likely to occur when sexual intercourse takes place around this time. The time around ovulation is therefore an unsafe time because pregnancy is likely to occur.

Pregnancy is *not* likely to occur if sexual intercourse takes place three or more days before or three or more days after ovulation.

These times when pregnancy is not likely to occur are called safe times. Women who use the rhythm method of contraception try to have sexual intercourse only during their safe time. However, it is usually not possible to know exactly when ovulation occurs.

This means the woman has to guess or calculate when ovulation will occur and so has to guess when her safe times will be. Often she guesses wrongly and pregnancy occurs. As an approximate rule, the first and last weeks of a woman's monthly cycle are safe times. The middle two weeks are unsafe times. But this is not always true. The day on which a woman begins her monthly period of bleeding

is counted as the first day of her monthly cycle.

Women who are able to keep a careful record over several months of the dates of the first day of their monthly cycles, or can take their temperatures regularly each morning, have a better chance of finding out when ovulation occurs. This helps them to know when their safe time is.

To be reliable the rhythm method must be correctly taught, correctly understood, and correctly practised by the woman and her husband. Usually, the method is not correctly understood and not correctly practised. The woman must be educated enough to easily understand numbers, and to be able to add and subtract. She must be able to keep a careful record of the dates of the first day of her monthly cycles. The husband must only have sexual intercourse during the safe times. Most husbands and wives do not manage the rhythm method correctly, so it is unreliable.

## OVULATION METHOD

This is another method promoted by the Catholic Church. In this method the woman finds the time of ovulation by noticing the feel of mucus from her vagina. On most days the woman feels quite dry around the opening of her vagina. On these days it is quite safe for the husband and wife to have sexual intercourse. For a few days before ovulation the woman will notice mucus from her vagina. The

mucus is clear and slippery like the white of an egg. If a woman has sexual intercourse during this time, she may become pregnant. So, if a woman feels wet or greasy in her vagina or sees mucus from her vagina she must not have sexual intercourse. The last day that the woman sees clear slippery mucus like the white of an egg is the day that ovulation occurs. She must wait three more days after this before having sexual intercourse. Three days after ovulation the egg cell will have died. The woman now cannot become pregnant. It is now safe for the woman to have sexual intercourse until she sees mucus again during the next monthly cycle.

**If a woman wants to become pregnant.** She has sexual intercourse during the time and for 2-3 days after she sees the clear slippery mucus from her vagina.

**The ovulation method of family planning is for both husband and wife.** The husband must agree to have sexual intercourse only during the safe days. Some husbands are not able to remember this, especially if they have been drinking alcohol.

Why some couples like the ovulation method.

- 1) No medicines are necessary.
- 2) The method is approved and promoted by the Catholic Church.

Problems with the ovulation method.

- 1) Some languages do not have words to describe clearly the different types of mucus.
- 2) Many women have a vaginal discharge which makes it difficult.
- 3) Some couples are unable to remember the rules. They have sexual intercourse on other days beside the safe days.
- 4) There may be physical and psychological disturbances between the husband and wife. This occurs if the husband wants to have sexual intercourse and his wife refuses because it is not a safe day.

## THINGS TO REMEMBER ABOUT FAMILY PLANNING

- 1) *The right to know.* All parents have the right to know that they can choose the number of children they want. And that they can space the arrival of their children.
- 2) *The right to decide.* All parents have the right to decide for themselves how many children they want and when they want them. It is wrong for a health worker to tell parents they must stop having children if the parents want to have another child. It is also wrong for anyone to tell parents they must continue to have children if they wish to stop.
- 3) *Family planning is for families.* Before any method is given both husband and wife should agree that they want it. Family planning is not usually given to a woman without her husband's agreement. Nor it is

usually given to a man without his wife's consent.

- 4) *Family planning is safe.* Most family planning methods do not stop a woman from having another baby if she later decides she wants one, e.g. with the I.U.C.D. or implant just remove the I.U.C.D. or the implant. This can be done easily and quickly. The only family planning methods that are permanent are tubal ligation and vasectomy. Written consent of is necessary (as for all operations) before these permanent methods are done.
- 5) *Family planning is part of the Health Programme.* Family planning helps the mother to stay healthy. It helps the children she already has to remain healthy and strong. It improves the health, education and chances in life of the children who are already born.

Family planning is not used just to reduce the number of children born. Sometimes a husband and wife want to have a baby, but the baby does not come. Family planning workers can often help these parents have the babies they want.

- 6) *Family planning and religion.* Some Catholics feel it is wrong to use any contraceptive method except the rhythm or ovulation methods. People's customs and religious beliefs must always be respected: however, PNG research shows that Catholic women use all methods of FP at the same rate as women from other Christian groups.

If a health workers decides it is wrong for them to give advice or help in family planning they do not have to do

so. But they should arrange for someone else to give family planning help to those who ask for it. Parents have a right to know that there are family planning methods available, so that they can use them if they want to. It is up to the parents to decide whether they wish to use family planning or not.

A health worker must never try to force parents either to agree to or to disagree to family planning. The parents must be free to make their own decisions.

Once the parents have decided what they want, it is the duty of the health worker to give the parents the advice or help they ask for. The health worker will either give this herself or arrange for someone else to give it.

# Chapter 39: Drug doses, fluids, and paediatric rules

## IMPORTANT NOTES

- 1) This chapter is to help you quickly find the doses of drugs for children.

You should not try to learn all these drug doses. You will soon get to know the doses of drugs that you often use. There is no need for you to remember the doses of drugs that you do not often use.

- 2) It is safer to look up the dose of a drug and not try to remember it. If you look the dose up, you will give the right dose. If you try to remember the dose you may remember it wrongly and give the wrong dose.
- 3) Always check the drug and the dose before you give it. This is especially important for injections. Some children have died because people got confused with the drugs or doses. If you don't know the dose - don't give the drug.
- 4) Many drug doses are worked out from the child's weight. Teach your staff to weigh every sick child as well as taking the temperature. This will save you a lot of time, and it will make sure that the child gets the right dose.
- 5) The drugs are listed here in alphabetical order. They are given the names used in the Medical Stores Catalogue. This name is written in capital letters. Many drugs have another name as well as

their Medical Stores Catalogue name. These other names are also shown here and are written in small letters.

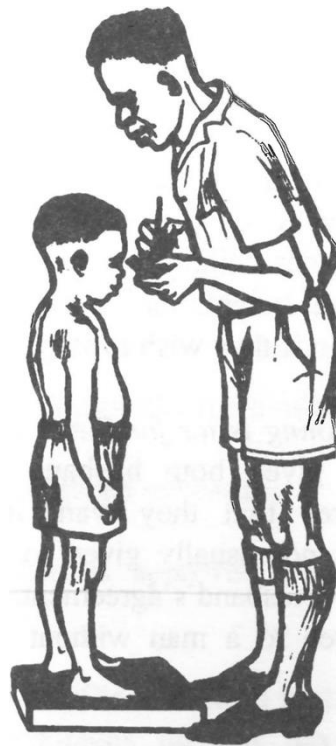


Figure 60 - Weigh child to work out drug dose.

- 6) The Medical Stores Catalogue item number is put in brackets after each drug. This will help you in ordering the drug from a Medical Store.
- 7) Most of the drugs listed here are Category A drugs and can be ordered from a Medical Store by H.E.O.s and trained nurses. Category B drugs must be ordered by a doctor. You can get these drugs from your nearest doctor, or Provincial Health Officer if you need them. If you order Category B drugs from a medical Stores, you must make sure that a doctor signs the order form.
- 8) Category D items are restricted to special indications only, e.g. Maloprim for prophylaxis of chloroquine-resistant malaria Digestelact or Nutramigen (lactose free milk) for malnourished

children with lactose intolerance.  
 Penicillin tablets for prophylaxis of  
 rheumatic fever. Benzathine  
 penicillin compound injection for  
 yaws.

You can get these items, if you need  
 them for these conditions, from your  
 nearest doctor or P.H.O.

#### 9) Drug dose abbreviations

Abbreviation	Unit
kg	Kilogram
g	Gram
mg	Milligram
mcg	Microgram
ml	Millilitre
cap.	Capsule
tab.	Tablet
amp.	Ampoule
b.d. or b.d.s	Twice a day

t.d. or t.d.s	Three times a day
q.i.d	Four times a day
p.r.n.	When necessary
stat or statim	Immediately
S.C.	Subcutaneously
I.M.	Intramuscularly
I.V.	Intravenously
U.	Units
Mega U	Million units

**Adbec.** See Vitamin Multiple Liquid

**ADRENALINE INJECTION 1: 1000, 1ml.**  
 amp. (Item No. 1010).

*Dose:* 0.01 ml/kg or 0.1 ml/10 kg. Give  
 S.C. or I.M.

*Used* for anaphylaxis and asthma.

#### **ALBENDAZOLE TABLETS**

200mg. (Item No. 1011).

1) No oedema: Single dose

2) Oedema present: Daily from 3 days

Dose:

Weight	Dose
Under 10kg	1 Tab
10kg and over	2 Tab

**N.B.** Albendazole tablets should be crushed up or chewed in order to be absorbed well. They should not be swallowed whole.

### AMINOPHYLLINE:

1) AMINOPHYLLINE AMP, 250 mg in 10 ml amp (Item No. 1022).

*I.V. Dose:* 0.2 ml/kg (5 mg/kg) every six hours. Do *not* give a dose more than 150 mg (6 ml) to a child. The correct amount of aminophylline is added to glucose saline in a burette. This is given *slowly* intravenously over one hour.

Weight	Dose
6 - 9 kg	37.5 mg (1 ½ ml)
10- 14 kg	50 mg (2ml )
15 - 19 kg	75 mg (3ml)
20 - 29 kg	100 mg (4ml)

30-39 kg	150 mg (6ml)
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Do not give aminophylline by I.M. I or rectally.

**Caution.** I. V. aminophylline is dangerous.

Weigh the child carefully and give the right dose *slowly*. Do *not* give IV aminophylline if the child has already had aminophylline in the last 4 hours.

Stop giving aminophylline if the child gets a headache or starts vomiting.

1) AMINOPHYLLINE ELIXIR, 25 mg m 5 ml (Item No. 1020).

Dose: 5 mg (1 ml)/kg 4 times a day.

Do *not* give a dose more than 20 ml (100 mg).

Weight	Dose
6 - 9 kg	6 ml (30 mg)
10 - 14 kg	10 ml (50 mg)
15 - 19 kg	15 ml (75 mg)

2) AMINOPHYLLINE TABLETS, 100 mg (Item No. 1025).

Dose: 5 mg/kg 4 times a day.

*Do not* give a dose more than 1 tab (100 mg).

Weight	Dose
6 - 9 kg	¼ tab (25 mg)
10 - 14 kg	½ tab (50 mg)
15 - 19 kg	¾ tab (75 mg)
20 kg and over	1 tab (100 mg)

Aminophylline is used for asthma and bronchitis.

AMOXYCILLIN Sometimes called Amoxyl:

- 1) AMOXYCILLIN SYRUP, 125 mg in 5 ml. (Item No. 1032).

*Dose:* 12.5 mg (112 ml)/kg given 3 times a day.

Weight	Dose
3 - 5 kg	50 mg (2 ml)
6 - 9 kg	125 mg (5 ml)
10 - 14 kg	175 mg (7 ml)
15 - 19 kg	250 mg (10 ml)

- 2) AMOXYCILLIN TABLETS, 250 mg. (Item No. 1031).

*Dose:* Given three times a day.

Weight	Dose
3 - 9 kg	½ tab
10 - 14 kg	¾ tab
15 - 19 kg	1 tab
20 - 39 kg	1 ½ tab
40 kg and over	<b>1)</b> tab

**N.B.** Amoxycillin Tablets 500 mg. (Item No. 1034. For STD only.

- 3) AMOXYCILLIN SUSPENSION

*Dose:* Same as syrup preparation 125mg in 5mls

- 4) AMOXYCILLIN 500mg +CLAVULANIC ACID 125 mg (AUGMENTIN) TABS (Item No. 1033).

*Used* for treatment of gonorrhoea.

*Dose:* One single dose given for gonorrhoea.

Weight	Dose
Under 10 kg	2 x 500 mg Amoxycillin Tablets

	(OR 4 x 250 mg Amoxycillin Tablets)  Plus ½ Augmentin Tablet (Amoxycillin & Clavulanic acid)  Plus ½ Probenecid Tablet
10 – 19 kg	3 x 500mg Amoxycillin Tablets (OR 6 x 250mg Amoxycillin Tablets)  Plus 1 Augmentin Tablet Plus 1 Probenecid Tablet
20 – 29 kg	4 x 500mg Amoxycillin Tablets (OR 8 x 250mg Amoxycillin Tablets)  Plus 1 ½ Augmentin Tablets  Plus 1 ½ Probenecid Tablets
30 kg and over	4 x 500mg Amoxycillin Tablets (OR 8 x 250 mg Amoxycillin Tablets)  Plus 2 Augmentin Tablets.  Plus 2 Probenecid Tablets

ASPIRIN TABLETS, 300mg. (Item No. 1052):

*Dose:* 15 mg/kg. Give up to 4 times a day.

*Do not* give more than 4 doses a day.

*Do not* use aspirin, in children under 10 years.

Weight	Dose
20 - 29 kg	300 mg (1 tab)
30 - 39 kg	450 mg (1 ½ tab)
40 - 49 kg	600 mg (2 tab)

*Used* for headache, pains and fever in children

10 years or older.

**N.B.** See page 156 for high dose of aspirin used in first 1-3 days treatment of rheumatic fever.

ATROPINE SULPHATE INJECTION, 0.6 mg in 1 ml amp. (Item No. 1059).

*Dose:* 0.02 mg/kg.

Weight	Dose
6 - 9 kg	0.15 mg ( ¼ ml)
10 - 19 kg	0. 3 mg ( ½ ml)
20 - 29 kg	0.45 mg ( ¾ ml)



30 kg and over	0.6 mg (1 ml)
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*Used before general anaesthetic (premedication).*

**N.B.** Make sure you use the ampoule containing 0.6 mg in 1 ml and not 1.2 mg in 1 ml **Bactrim**. See Conimoxazole.

**Benzathine penicillin.** See Penicillin, Benzathine Compound Injection.

**Benadryl.** See Diphenhydramine.

CHLORAL HYDRATE ELIXIR, 150 mg in 5 ml. (Item No. 1101).

*Dose:* 30 mg (1 ml)/kg. Given once or twice a day.

*Do not* give more than 600 mg (20 ml).

Weight	Dose
Under 6 kg	150 mg (5 ml)
6 - 9 kg	300 mg (10 ml)
10 - 14 kg	450 mg (15 ml)

15 kg and over	600 mg (20 ml)
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Used to help child sleep, and as sedation.

**N.B.** See page 53 for dose in newborn.

## CHLORAMPHENICOL

1) CHLORAMPHENICOL PAEDIATRIC ORAL SUSPENSION, 125 mg in 5 ml (Item No. 1106).

*Dose:* 25 mg (1 ml)/kg given every 6 hours.

*Do not* give a dose more than 500 mg (20 ml) to a child.

Weight	Dose
3 - 4kg	100 mg (4 ml)
5 - 6 kg	150 mg (6 ml)
7 - 9 kg	200 mg (8 ml)
10 - 14 kg	300 mg (12 ml)
15 - 19 kg	375 mg (15 ml)

2) CHLORAMPHENICOL CAPSULES, 250 mg. (Item No. 1104).

*Dose:* 25 mg/kg given every 6 hours.

*Do not* give a dose more than 500 mg (2 caps) to a child.

Weight	Dose
10- 19 kg	250 mg (1 cap)
20 kg and over	500 mg (2 cap)

### 3) CHLORAMPHENICOL SUCCINATE INJECTION, 1g vial. (Item No. 1107).

Add 4 ml water for injection to 1 g vial.

There is now 1 g (1000 mg) in 5 ml, and 200 mg in 1 ml.

*Dose:* 25 mg/kg given every 6 hours I.M. or I.V.

*Do not* give a dose more than 500 mg (2 ½ ml) to a child.

Weight	Dose
3 - 4kg	100 mg (½ ml)
5 - 6kg	150 mg (¾ ml)
7 - 9kg	200 mg (1 ml)
10 - 14 kg	300 mg (1 ½ ml)
15 - 19 kg	400 mg (2 ml)

20 - 29 kg	500 mg (2 ½ ml)
30 - 49 kg	600 mg (3 ml)

**N.B.** See page 54 for dose of I.M. chloramphenicol in the newborn.

**Caution.** Chloramphenicol can poison the bone marrow and cause aplastic anaemia (See page 104). So only use chloramphenicol for serious illnesses, e.g. severe pneumonia, meningitis, osteomyelitis, typhoid. Do not use chloramphenicol for colds, sore throats, ordinary pneumonias, and ordinary diarrhoeas.

## CHLOROQUINE

CHLOROQUINE TABLETS, 150 mg (Item No. 1124).

1) Dose for treatment of malaria. 10 mg/kg each day for 3 days.

Weight	Dose
Under 6 kg	37.5 mg (¼ tab)
6- 9 kg	75 mg (½ tab)
10- 19 kg	150 mg (1 tab)
20-29 kg	225 mg (1 ½ tab)
30-39 kg	300 mg (2 tab)

- 2) Dose for prophylaxis (prevention) of malaria. 5 mg/kg given on the same day each week.

Weight	Dose
6- 9 kg	37.5 mg (¼ tab)
10- 19 kg	75 mg (½ tab)
20-29 kg	150 mg (1 tab)
30-39 kg	225 mg (1 ½ tab)

## CHLORPROMAZINE

Also called Largactil.

- 1) CHLORPROMAZINE TABLETS, 25 mg (Item No. 1129)

Do *not* confuse with 100 mg tablets.

Check that the chlorpromazine tablets you use in children are 25 mg tablets.

- a) For sedation, e.g. rheumatic chorea.

Dose: 0.5 mg/kg given 3 times a day.

Weight	Dose
Under 20 kg	6.25 mg (¼ tab)

20-30 kg	12.5 mg (½ tab)
Over 30 kg	25 mg (1 tab)

- b) To increase lactation in mothers

Dose: 25 mg (1 tab) given to the mother 3 times a day for 5-7 days.

- 2) CHLORPROMAZINE INJECTION, 50 mg in 2 ml. (Item No. 1127).

Dose: 0.5mg/kg. I.M.

This is 0.1 ml (2.5 mg) per 5 kg. e.g. 20 kg child needs 0.1 x 4 = 0.4 ml (10 mg).

Under 10 kg	2.5 mg (0.1 ml).
10- 19 kg	6.25 mg (¼ ml).
20-29 kg	12.5 mg (½ ml).
30- 39 kg	18.75 mg (¾ ml).

Used for sedation.

**N.B.** Higher doses of chlorpromazine are given in tetanus. See page 57 for dose in newborn with tetanus, and page 149 for dose in child with tetanus.

CLOFAZIMINE CAPSULES, 50 mg. (Item No.1138)

Also called Lamprene.

Dose:

Weight	Dose
5 - 10 kg	1 cap each month under supervision, plus 1 cap every second day given at home.
11- 15 kg	2 caps each month under supervision, plus 1 cap every second day given at home.
16 - 20 kg	3 caps each month under supervision, plus 1 cap every day given at home.
Over 20 kg	6 caps each month under supervision, plus 1 cap every day given at home.

Used in multi bacillary leprosy.

COD LIVER OIL. (Item No. 1144).

Dose: 15 ml daily for one month.

Used in the treatment of protein-energy malnutrition to prevent vitamin A deficiency and to provide extra calories.

## COTRIMOXAZOLE

Often called Bactrim or Septrin.

### 1) COTRIMOXAZOLE SUSPENSION (Item No. 1151).

Contains 40 mg trimethoprim plus 200 mg sulphamethoxazole/5 ml.

Dose ½ ml/kg given twice a day.

Weight	Dose
3 - 5 kg	2 ½ ml
6 - 9 kg	5 ml
10 - 14 kg	7 ½ ml
15 - 19 kg	10 ml

### 2) COTRIMOXAZOLE TABLETS (Item No.1152)

Contains 80 mg trimethoprim plus 400 mg sulphamethoxazole in each tablet.

Dose:

Weight	Dose
6 - 14 kg	½ tab
15 - 19 kg	1 tab
20 - 29 kg	1 ½ tab
30 kg and over	2 tab

Used in urinary tract infection and chronic pneumonia.

**Crystalline Penicillin.** See Penicillin, Benzyl.

DAPSONE TABLETS, 50mg. (Item No. 1169).

Dose:

Weight	Dose
Under 20 kg	25 mg (1/2 tab) daily
20-29 kg	50 mg (1 tab) daily
30-49 kg	75 mg (1 ½ tab) daily
50 kg and over	100 mg (2 tab) daily

Used in leprosy.

## DIAZEPAM

Often called Valium.

1) DIAZEPAM INJECTION, 10 mg in 2 ml (Item No. 1177)

I.V. Dose: 0.25 mg (0.05 ml)/kg LV.

Do *not* give a dose more than 10 mg (2 ml) to a child.

Weight	Dose
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3- 5 kg	1.25 mg (¼ ml)
6 -14kg	2.5 mg (½ ml)
15- 19 kg	3.75 mg (¾ ml)
20-29 kg	5 mg (1 ml)
30 kg and over	10 mg (2 ml)

Rectal Dose (see page 139). Give 0.1 ml/kg.

But do *not* give a dose more than 10 mg (2 ml).

Weight	Dose
3 - 5 kg	1.25 mg ( ¼ ml)
6 - 9 kg	2.5 mg ( ½ ml)
10 - 14 kg	5 mg (1 ml)
15 - 19 kg	7.5 mg (1 ½ ml)
20 kg and over	10 mg (2 ml)

Used to stop convulsions. Given IV or rectally, but not I.M.

**N.B.** Higher doses used in the treatment of tetanus (see page 149).

2) DIAZEPAM TABLETS, 5 mg. (Item No. 1178, Category C).

*Used* in the treatment of tetanus (see page 149).

DIETHYLCARBAMAZINE TABLETS, 50mg. (Item No. 1180).

Often called Hetrazan or Banocide.

*Dose:* 2 mg/kg, 3 times a day, for 3 weeks.

Weight	Dose
Under 10 kg	12.5mg (¼ tab)
10 - 19 kg	25 mg (½ tab)
20 - 29 kg	50 mg (1 tab)
30 - 49 kg	75 mg (1 ½ tab)

*Used* to treat filariasis.

DIGOXIN

Often called Lanoxin

DIGOXIN PAEDIATRIC ELIXIR, 50 mcg/ml = 50 micrograms (0.05 mg)/ml. (Item No. 1181).

*Dose:* ½ ml (25 micrograms)/kg every 6 hours for 3 doses, by mouth. Then daily for not more than 3 days. If continued treatment is ordered by a

doctor, a smaller daily dose will be given.

Do *not* give a dose more than 5ml (250 mcg).

	Dose
3 - 5 kg	2 ml (100 mcg)
6 - 9 kg	3 ml (150 mcg)
10 - 14kg	5 ml (250 mcg)

1) DIGOXIN TABLETS, 0.25 mg. (Item No. 1184)

*Dose:* For child weighing 15 kg or more: 1 tab (0.25 mg) every 6 hours for 3 doses. Then daily for not more than 3 days. If continued treatment is ordered by a doctor, a smaller daily dose may be ordered for a child weighing less than 25 kg.

*Used* in heart failure.

**Dilantin.** See Phenytoin.

DIPHENHYDRAMINE ELIXIR, 10mg in 5ml (Item No. 1189)

Often called Benadryl

1 mg (½ ml)/kg. Can give up to 3 times if necessary.

Do *not* give a dose more than 20 mg (10 ml).

Weight	Dose
3 - 5 kg	4 mg (2 ml)
6 - 9 kg	8 mg (4 ml)
10 - 14kg	12 mg (6 ml)
15 - 19 kg	16 mg (8 ml)
20 - 29 kg	20 mg (10 ml)
30 kg and over	Use promethazine.

Used:

- For severe cough, especially at night.
- For sedation.
- For itch (wanting to scratch skin).
- For allergies.

ETHAMBUTOL TABLETS, 400 mg (Item No. 1206)

*Dose:* 15- 25 mg/kg during first 2 months of TB treatment

Weight	Dose
16-30 kg	400 mg (1 tab)
31-50 kg	600 mg (1 1/2 tab)
51 kg or more	800 mg (2 tab)

*Used:* As 4th drug in first 2 months of TB treatment in children aged 7 years or more who have AFB found in their sputum or gastric aspirate.

**Caution:** Vision can be damaged if too high a dose of ethambutol is given. If patient complains of blurred vision, stop the drug immediately. Do *not* use the drug in children who are unable to complain of blurred vision (younger than 7 years, comatose).

FANSIDAR TABLETS, Sulphadoxine 500 mg with Pyrimethamine 25 mg Tablets. (Item No. 1589)

Dose:

Weight	Dose
3 - 5 kg	¼ tab
6 - 9 kg	½ tab
10- 19 kg	1 tab
20 - 29kg	1 ½ tab
30 - 49 kg	2 tab

One (single) dose only is given on the first day of treatment with oral quinine.

*Used* with quinine in the treatment of chloroquine resistant malaria.

**N.B.** Do not use Fansidar by itself. Give it on the first day course of oral quinine.

FERROUS SULPHATE TABLETS, 200mg.  
(Item No. 1217).

*Dose:* Child weighing 30 kg and over: 1 tab (200 mg) twice a day for 3 months.

*Used* to treat anaemia.

**Flagyl.** See Metronidazole.

FOLIC ACID TABLETS, 5 mg (Item No. 1229).

*Dose:*

- 1) For protein-energy malnutrition: 1 tab daily for 1 month.
- 2) For anaemia: 1 tab each week for 3 months.

FRUSEMIDE INJECTION, 20 mg in 2 ml.  
(Item No. 1236).

Often called Lasix.

*Dose:* 1 mg/kg I.M. or I.V.

Do *not* give a dose more than 20 mg (2 ml).

Weight	Dose
3 - 5 kg	5 mg (½ ml)
6 - 9 kg	7.5 mg (¾ ml)
10 - 14 kg	10 mg (1 ml)
15 - 19 kg	15 mg (1 ½ ml)

20 kg and over	20 mg (2 ml)
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*Used* to treat heart failure, and when giving blood transfusion for anaemia.

**Imferon.** See Iron Dextran Injection.

**Infant Camoquin.** See Amodiaquine.

IPECACUANHA SYRUP. (Item No. 1310).

Also called Syrup of Ipecac.

*Dose:* 15 ml followed by a cup of water.

*Used* to make a child, who has swallowed a poison, to vomit.

**Caution.** Do *not* use if child:

- 1) Has swallowed kerosene.
- 2) Has swallowed an acid or alkali.
- 3) Is unconscious

**N.B.** Ipecacuanha Syrup must be kept in the refrigerator.

IRON DEXTRAN INJECTION

- 1) 2 ml amp. containing 100 mg iron (Item No. 1311).
- 2) 5 ml amp. containing 250 mg iron (Item No. 1312).

Usually called Imferon.

Given I.M. Each 1 ml contains 50 mg iron.



# Dose: IRON DEXTRAN INJECTION

Caution.

- 1) Do not give iron dextran injection to a child if he:
  - a) Is less than one month old; or
  - b) Has severe malnutrition; or
  - c) Has a fever above 38°C; or
  - d) Has a severe infection.

Give the iron injection when he has improved

- 2) Do not give total dose iron injection more than once a year.
- 3) If giving a blood transfusion to treat the anaemia, the doses of Imferon are smaller (see page 103).

**N.B. Bigger children (weighing over 10 kg) can be given total dose iron injection by intravenous drip (see page 102).** This is less painful than several IM injections.

Used to treat anaemia.

Weight	Day 1	Day 2	Day 3	Day 4	Total Dose
3 – 5 kg	3ml	-	-	-	3ml
6 – 9 kg	3ml	2ml	-	-	5ml
10 – 14 kg	4ml	3ml	-	-	7ml
15 – 19 kg	4ml	4ml	2ml	-	10ml
20 – 29 kg	4ml	4ml	4ml	3ml	15ml
30 kg or more	5ml	5ml	5ml	5ml	20ml

**IRON MIXTURE, INFANT.** (Item No. 1313). Contains Ferrous Fumarate 46.8mg/5ml

Dose:

Weight	Dose
3- 5 kg	5 drops
6- 9 kg	10 drops
10 - 14 kg	1 ml
15 - 29kg	2 ml
30 kg and over	Use ferrous sulphate

Given twice a day for 3 months.

*Used to treat anaemia.*

**Iron Tablets.** See Ferrous Sulphate.

**ISONIAZID TABLETS**, 100 mg. (Item No. 1315).

Often called INAH.

1) Dose for daily treatment ("A" or "C" regimen)

Weight	Dose
3 - 5 kg	50 mg (½ tab)
6 - 10 kg	100 mg (1 tab)
11 - 15 kg	150 mg (1 ½ tab)
16 - 20 kg	200 mg (2 tab)
21 kg and over	300 mg (3 tab)

Dose for twice-weekly treatment ("B" regimen)

Weight	Dose
3 - 5 kg	100 mg (1 tab)
6 - 10 kg	150 mg (1 ½ tab)
11 - 15 kg	250 mg (2 ½ tab)
16 -20 kg	300 mg (3 tab)
21 -30 kg	450 mg (4 ½ tab)*
31 -40kg	600 mg (6 tab)*
41 - 50 kg	750 mg (7 ½ tab)*
Over 50 kg	900 mg (9 tab)*

\*Give Pyridoxine 1 tab as well, when giving an INAH dose of more than 300mg.

KETAMINE HYDROCHLORIDE  
INJECTION, 500 mg in 10 ml. (Item No. 1351) *Category B, but available to HEOs).*

Usually called Ketalar. Contains 50 mg/ml.

*Dose:* 10 mg/kg, given I.M. So, give 0.2 ml/kg I.M.

Weight	Dose
3 - 5 kg	37.5 mg ( $\frac{3}{4}$ ml)
6 - 9 kg	75 mg (1 $\frac{1}{2}$ ml)
10 - 14 kg	125 mg (2 $\frac{1}{2}$ ml)
15 - 19 kg	175 mg (3 $\frac{1}{2}$ ml)
20 - 29 kg	250 mg (5 ml)
30 - 49 kg	375 mg (7 $\frac{1}{2}$ ml)

Used as general anaesthetic.

The reasons why an H.E.O. may need Ketamine are:

- Reduction of simple forearm fractures.
- Cleaning and dressing of bums.

- Manual removal of placenta.
- Dislocated shoulder.
- Suturing of large laceration in children.
- Incision and drainage of abscess in children.
- Finger amputation in a child.
- Removal of a foreign body.
- Cleaning and dressing multiple pig bites.

You must remember:

- 1) The child must not eat or drink for 4 hours before being given the Ketamine as it is an anaesthetic.
- 2) Permission for the operation must be given by the child's guardian, (mother or father).
- 3) Give atropine injection (see page 265) half an hour before giving Ketamine.
- 4) Make sure you have a sucker, oxygen and resuscitation bag ready near you.
- 5) Give the right dose of Ketamine according to the child's weight. So make sure the child has been weighed.
- 6) Give the injection of Ketamine I.M. and not LV.
- 7) Do not try to wake the child up afterwards. And do not let the child's family try to wake him up afterwards. The child must be left undisturbed to wake up himself when he is ready

Do not use Ketamine:

- For procedures around the mouth, throat or nose.
- For people who have a history of mental illness.
- For people who have a high blood pressure (above 140/90).
- For girls or women between 15 years – 50 years, as they may be pregnant.

**Konakion.** See Phytomenadione.

**Lanoxin.** See Digoxin.

**Largactil.** See Chlorpromazine.

**Lasix.** See Frusemide.

**MAGNESIUM HYDROXIDE MIXTURE**  
(Item No. 1368).

Also called Milk (Cream) of Magnesia.

Dose:

Weight	Dose
6 - 9 kg	2 ml
10 -14kg	5ml
15 -29 kg	10 ml

30 -49 kg	15 ml
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*Not* given more than once a day.

*Used* for constipation.

**MALOPRIM TABLETS:** Pyrimethamine 12.5 mg with Dapsone 100 mg Tablets. (Item No. 1538), Category D).

Dose:

Weight	Dose
Under 15 kg	Do not use
15 - 29 kg	½ tab
30 - 49 kg	¾ tab

Give once a week.

*Used* as prophylaxis for chloroquine resistant malaria.

**MORPHINE INJECTION**, 10 mg in 1 ml, and 15 mg in 1ml. (Item No. 2004).

Also called Morphia.

*Dose:* 0.2 mg/kg.

*Use the 10 mg in 1 ml amp.* The dose is 1 mg (0.1 ml) per 5 kg, given I.M.

Do *not* give a dose more than 10 mg (1 ml).

Weight	Dose
10 - 19 kg	2.5 mg ( $\frac{1}{4}$ ml)
20-29 kg	5 mg ( $\frac{1}{2}$ ml)
30 - 39 kg	7.5 mg ( $\frac{3}{4}$ ml)
40 - 49 kg	10 mg (1 ml)

Used for severe pain or shock.

**N.B.** Morphine is a "dangerous drug". It must be kept lock up, and details of its use recorded in a special Dangerous Drugs Register.

Caution.

- 1) Never use it for head injuries.
- 2) Never use it for asthma.

**NALOXONE INJECTION**, 0.02mg in 1ml (Item No. 1411).

Often called Narcan.

*Dose:*  $\frac{1}{4}$  ml/kg.

Weight	Dose
Under 2 kg	$\frac{1}{4}$ ml
2 - 2.9 kg	$\frac{1}{2}$ ml
3 - 3.4 kg	$\frac{3}{4}$ ml
3.5 kg and over	1 ml

The dose is given LV, I.M. Used to help newborn baby start breathing if his mother has been given an injection of pethidine or morphine less than 4 hours before the baby's birth.

**OIL VEGETABLE** (Item No. 1434).

Add 10 ml vegetable oil to each 250 ml of full cream milk. This makes milk oil formula (MOF).

*Used* in the treatment of severe malnutrition ([see page 37](#)).

**ORAL REHYDRATION SOLUTION, POWDER** (Item No. 1435).

Dissolve 1 packet (sachet) of the powder in 1 litre (1000 ml) of water.

*Used* for oral rehydration ([see page 72](#)).

**PARACETAMOL ELIXIR**, 120mg/5ml (Item No. 1452).

*Dose:* 12 mg/kg

Weight	Dose
Under 10 kg	2.5 ml
10 - 14 kg	5 ml
15- 19 kg	7.5 ml
20 - 29 kg	10 ml

Give up to 4 times a day. Do not give more than 4 times a day.

Used for fever and pains in young children.

PARALDEHYDE INJECTION, 5 ml amp.  
(Item No. 1455).

Dose: 0.2 ml/kg I.M. May be given every 6 hours if necessary. Do not give a dose more than 5 ml to a child.

Weight	Dose
3 - 5 kg	1 ml
6 - 9kg	1 ½ ml
10 - 14 kg	2 ½ ml
15 - 19 kg	3 ml
20 - 29 kg	4ml
30 kg and over	5 ml

**Caution.** Use a glass syringe to give paraldehyde injection.

Used:

- 1) To stop a convulsion.
- 2) For neonatal tetanus (see page 56).

N.B.

- 1) The dose may be repeated once, after 10 minutes, if the child does not stop convulsing.
- 2) The dose may be given by nasogastric tube. If given by nasogastric tube, the dose of paraldehyde must be mixed with at least 50 ml of water or milk.
- 3) See page 56 for dose in the newborn.

## PENICILLINS

PENICILLIN BENZATHINE  
COMPOUND INJECTION, 2 400 000 u.  
(Item No. 1464), Category D).

Dose: 50, 000 u/kg by deep IMI. (Max. 2400 000 u.) single dose. Mix 2 400 000 u with 8 ml water for injection to make 10 ml.

Weight	Dose
Under 5 kg	1 ml
5 - 10 kg	2 ml
11 - 15 kg	3 ml
16 - 20 kg	4ml
21 - 25 kg	5 ml
26 - 30 kg	6ml

*Used* in treatment of yaws, sexually transmitted diseases, and rheumatic fever prophylaxis.

PENICILLIN, BENZYL, 600mg (1 000 000u). (Item No. 1465).

Also called Crystalline penicillin.

Add 2 ml water for injection to the vial containing 1 000 000 u. benzyl penicillin.

Dose:

Weight	Dose
3 - 9 kg	½ ml (250 000 u or 150 mg)
10 - 19 kg	1ml (500 000 u or 300 mg)
20 - 29 kg	1 ½ ml (750 000 u or 450 mg)
30 kg and over	2ml (1 000 000 u or 600mg)

Give 1M or N every 6 hours.

PENICILLIN PHENOXYMETHYL TABLETS, 250 mg. (Item No. 1467, Category D).

Also called oral penicillin or penicillin V tabs.

*Used* for rheumatic fever prophylaxis (see page 156) in a dose of 1 tab each day.

**Pentavite.** See Vitamin Multiple Liquid.

PETHIDINE INJECTION, 50 mg in 1 ml. (Item No. 2012), 100 mg in 2 ml. (Item No. 2013).

*Dose:* 1 mg/kg. This is 0.1 ml/5 kg, given I.M.

Do *not* give a dose more than 50 mg (1 ml) to a child.

Weight	Dose
10 - 14 kg	12.5 mg (¼ ml)
15 - 29kg	25 mg (½ ml)
30 - 39 kg	37.5 mg (¾ ml)
40 kg and over	50 mg (1 ml)

*Dose* can be repeated, if necessary after 6 hours.

*Used* for severe pain or shock.

N.B.

- 1) **In very severe pain** you can double the dose of pethidine, and give 2 mg/kg (0.2 ml/5 kg) I.M.

Weight	Dose
6 - 9 kg	12.5 mg (¼ ml)
10 - 14 kg	25 mg (½ ml)
15 - 19 kg	37.5 mg (¾ ml)
20 - 29 kg	50 mg (1 ml)
30 - 39 kg	75 mg (1 ½ ml)
40 kg and over	100 mg (2 ml)

2) **Pethidine is a "Dangerous Drug"**. It must be kept locked up, and details of its use recorded in a special Dangerous Drugs Register.

Caution.

- 1) Never use it for head injuries.
- 2) Never use it for asthma.

#### IV PETHIDINE (General Lytic Cocktail).

N Pethidine can be used as an anaesthetic. When mixed with promethazine (Phenergan) and given I. V., diluted with sterile water, it is called General Lytic Cocktail.

Mix together in a 10 ml syringe:

- Pethidine injection 1ml (50mg), and Promethazine

- (Phenergan) injection 1ml (25 mg), and
- Water for injection 8 ml.

This will give you a total of 10 ml in the syringe.

Dose:

Weigh the child. You will *not* use more than 1 ml of the mixture for every 3 kg the child weighs.

e.g. If child weighs 12 kg you will *not* use more than 4 ml of the mixture.

e.g. If child weighs 12 kg, you may need 4 ml. So discard 6 ml from your syringe. This leaves you with 4 ml in the syringe. Now give the child 1 ml of the mixture IV every minute until he is just asleep.

N.B.

- 1) Do not give more than 1 ml for every 3 kg the child weighs.
- 2) Do not give a dose more than 10 ml (over 10 minutes).
- 3) Stop giving the injection as soon as the child goes to sleep.

**Phenergan.** See Promethazine.

#### PHENOBARBITONE

Often called phenobarb.

PHENOBARBITONE TABLETS, 30 mg.  
(Item No. 1475)



**N.B.** Make sure the phenobarbitone tablets you have are 30 mg tablets, and not another strength (e.g. 15 mg or 60 mg).

*Dose:* Stat (loading) dose of 15 mg/kg (maximum 300 mg), followed by 5 mg/kg (maximum 180 mg), once a day.

Weight	Dose
3 - 5 kg	60 mg (2 tab) stat, then 15 mg (½ tab) once a day.
6 - 9 kg	90 mg (3 tab) stat, then 30 mg (1 tab) once a day.
10 - 14 kg	150 mg (5 tab) stat, then 60 mg (2 tab) once a day.
15 - 19 kg	180 mg (6 tab) stat, then 90 mg (3 tab) once a day.
20 - 29 kg	210 mg (7 tab) stat, then 120 mg (4 tab) once a day.
30 - 49 kg	210 mg (7 tab) stat, then 150 mg (5 tab) once a day.

*Used to prevent fits (convulsions).*

**PHENOBARBITONE SODIUM INJECTION**, 200 mg in 1 ml. (Item No. 1477).

*Dose:* stat (loading) dose of 15 mg/kg (maximum 300 mg). Given I.M.

Weight	Dose
3 - 5 kg	50 mg (¼ ml)
6 - 9 kg	100mg (½ ml)
10 - 14 kg	150 mg (¾ ml)
15 kg and over	200 mg (1 ml)

**PHENYTOIN SODIUM CAPSULES OR TABLETS**, 30 mg. (Item No. 1482).

**Caution.** Do not use the 100 mg caps or tabs.

Often called Dilantin.

*Dose:* 6 mg/kg/day

Weight	Dose
3 - 5 kg	30 mg (1 cap)
6 - 14kg	60 mg (2 cap)
15 - 19 kg	90 mg (3 cap)
20 - 29 kg	120 mg (4 cap)

30 - 39 kg	150 mg (5 cap)
40 - 49 kg	180 mg (6 cap)

*Used* in the treatment of epilepsy.

**PHYTOMENADIONE INJECTION**, 1 mg in 1 ml. (Item No. 1488) or 1 mg in 0.5 ml.

Often called Vitamin K.

**Caution.** Do *not* confuse with phytomenadione

50 mg in 5 ml (10 mg/ml).

*Dose:* 1 mg (1 ml) I.M. given to all newborn babies.

*Used* to prevent haemorrhagic disease of the newborn.

*Storage:* Refrigerate and protect from light.

**PRIMAQUINE TABLETS**, 7.5mg. (Item No. 1510).

Caution. Check that the primaquine tablets you are using are 7.5 mg tablets.

1) Dose of primaquine to kill gametocytes:

Under 6 kg: Do not give

Weight	Dose
--------	------

6 - 9 kg	½ tab (3.75 mg)
10 - 19 kg	1 tab (7.5 mg)
20 - 29 kg	2 tab (15 mg)
30 - 39 kg	3 tab (22.5 mg)
40 - 49 kg	4 tab (30 mg)

This dose is given once (single dose).

2) Dose of primaquine to kill parasites hiding in the liver:

Weight	Dose
Under 10 kg	½ tab (3.75 mg)
10- 19 kg	1 tab (7.5 mg)
20-29 kg	½ tab (11.25 mg)
30-49 kg	Do not give

This dose is given once a day for 2 weeks in relapse of vivax malaria ([see page 94](#)).

**PROMETHAZINE**

Also called Phenergan.

**PROMETHAZINE INJECTION**, 2.5%, 25 mg in 1 ml or 50mg in 2 ml. (Item No. 1527)

Dose: 1 mg/kg LM or LV.

Do *not* give a dose more than 25 mg (1 ml) to a child.

Weight	Dose
6 - 9 kg	6.25 mg ( $\frac{1}{4}$ ml)
10 - 14 kg	12.5 mg ( $\frac{1}{2}$ ml)
15 - 19 kg	18.75 mg ( $\frac{3}{4}$ ml)
20 - 29 kg	25 mg (1 ml)
30 - 39 kg	37.5mg (1 $\frac{1}{2}$ ml)

Used:

- 1) For sedation.
- 2) To prevent reaction, when giving iron dextran (Imferon) by I.V. Drip or snake antivenom.
- 3) General Lytic Cocktail anaesthetic (see page 274).

PROMETHAZINE TABLETS, 25 mg.  
(Item No. 1528).

Weight	Dose
Under 30 kg	Use diphenhydramine (Benadryl)

30 kg and over	1 tab (25 mg)
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Given twice a day.

Used for sedation, itch and allergies.

PYRAZINAMIDE TABLETS, 500 mg.  
(Item No. 1533).

Dose: 25 mg/kg daily.

Weight	Dose
3 - 5 kg	125 mg ( $\frac{1}{4}$ tab)
6 - 10 kg	250 mg ( $\frac{1}{2}$ tab)
11 - 15 kg	375 mg ( $\frac{3}{4}$ tab)
16 - 20 kg	500 mg (1 tab)
21 - 30 kg	750 mg (1 $\frac{1}{2}$ tab)
31 - 45 kg	1000 mg (2 tab)
Over 45 kg	1500 mg (3 tab)

PYRIDOXINE TABLETS, 25 mg. (Item No. 1537)

Dose: 1 tab (25 mg) once a day.

Used in children if given isoniazid 300 mg or more.

Pyrimethamine with Dapsone,

See Maloprim.

## QUININE

### QUININE DIHYDROCHLORIDE INJECTION,

- a) 120 mg in 2 ml. (Item No. 1540).
- b) 600 mg in 10 ml. (Item No. 1541).

Quinine injection, therefore, contains 60 mg in 1 ml.

*Dose:* 10 mg/kg, given LM. twice a day until child improves (maximum 3 days).

Do *not* give a dose more than 6 ml to child.

Weight	Dose
3 - 3.9 kg	30 mg (½ ml)
4 - 5 kg	60 mg (1 ml)
6 - 9 kg	90 mg (1 ½ ml)
10 - 14 kg	120 mg (2 ml)
15 - 19 kg	180 mg (3 ml)
20 - 24kg	240 mg (4 ml)
25 - 29 kg	300 mg (5 ml)

30 - 39 kg	360 mg (6 ml)
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**N.B.** Give the IM injection deep into the muscle.

Used:

- 1) For chloroquine resistant malaria
  - a) Change to oral quinine when child improves.
  - b) At the start of oral treatment with quinine, give one (single) dose of Fansidar.
- 2) For cerebral malaria.
  - a) Change to full 3 days treatment course of oral quinine when child improves.
  - b) Give one dose of Fansidar at the start of oral treatment with quinine.

**QUININE TABLETS**, 300 mg. (Item No. 1542).

*Dose:* 10 mg/kg, given 3 times a day for 3 days.

Do *not* give a dose more than 600 mg (2 tab).

Weight	Dose
3 - 9 kg	75 mg (¼ tab)
10 - 19 kg	150 mg (½ tab)
20 - 29 kg	300 mg (1 tab)
30 - 49 kg	450 mg (1 ½ tab)

*Used to treat chloroquine resistant malaria.*

**N.B.** At the start of oral treatment with quinine, give one (single) dose of Fansidar.

## RIFAMPICIN

*Dose: 10 mg/kg*

RIFAMPICIN CAPSULES, 150mg (Item No 1547)

Weight	Dose
20 kg and under	Use Rifampicin Syrup
21 - 30 kg	300 mg (2 cap)
31 - 45 kg	450 mg (3 cap)
Over 45 kg	600 mg (4 cap)

RIFAMPICIN SYRUP, 100 mg/5ml.  
(Item No. 1548).

Weight	Dose
3 - 5 kg	50 mg (2 ½ ml)
6 - 10 kg	100 mg (5 ml)
11 - 15 kg	150 mg (7 ½ ml)
16 - 20 kg	200 mg (10 ml)

*Used in Tuberculosis and Leprosy.*

## SALBUTAMOL

Often called Ventolin.

SALBUTAMOL TABLETS, 4mg (Item No. 1551).

Weight	Dose
6 - 14 kg	1 mg (¼ tab)
15 - 29 kg	2 mg (½ tab)
30 kg and over	4 mg (1 tab)

Given 4 times a day.

SALBUTAMOL RESPIRATOR SOLUTION,  
0.5%. (Item No. 1552).

Weight	Dose
Under 9 kg	¼ ml solution in 1¾ ml sterile water or normal saline
9 kg and over	½ ml in 1½ ml sterile water or normal saline.

Given this through the face mask as a nebulised solution every 3-4 hours.

SALBUTAMOL AEROSOL (Item No. 1549)

*Dose:* 2 puffs every 2 hours. (Usually only children older than 7 years can manage this metered aerosol). Younger children can use the metered aerosol with a spacer.

**Caution.** Do not use with adrenaline.

*Used* to treat asthma.

**Septrin.** See Cotrimoxazole.

TINIDAZOLE TABLETS, 0.5g (500 mg)  
(Item No. 1612).

Often called Fasigyn

*Dose:* 50 mg/kg (maximum dose 2g), daily for 3 days.

Weight	Dose
3 - 5 kg	125 mg (¼ tab) daily
6 - 9 kg	250 mg (½ tab) daily
10 - 14kg	500 mg (1 tab) daily
15 - 19 kg	750 mg (1 ½ tabs) daily
20 - 29 kg	1g (2 tabs) daily
30 - 39 kg	1g (3 tabs) daily
40 kg and over	2 g (4 tabs) daily

*Used* to treat chronic diarrhoea (diarrhoea lasting more than 2 weeks), severe malnutrition, amoebiasis and large tropical ulcers.

**Valium,** See Diazepam.

**Ventolin,** See Salbutamol.

VITAMIN A CONCENTRATE  
CAPSULES, 200 000 u (UNICEF). (Item  
No. 1634).

Dose:

Cut capsule open, and squeeze out 3  
drops into the child's mouth.

This provides 100 000 u. Give daily for  
3 days.

*Used* to treat vitamin A deficiency.

**Caution.** Do not give more than 3 days  
treatment of vitamin A concentrate.  
Too much vitamin A is a poison.

*Storage:* Refrigerate.

**Vitamin K.** See Phytomenadione.

VITAMIN MULTIPLE LIQUID. (Item No.  
1637).

Often called Abdec or Pentavite.

*Dose:* 24 drops ((0.6ml) each day. Use  
the dropper supplied.

*Used* in children given milk mixtures,  
e.g. Full Cream Milk (Anchor, Farm  
Fresh, Sunshine), Sugar-Milk (Half  
strength milk), Milk Oil Formula (MOF),  
Lactose-free milk (Digestelact,  
Nutramigen).

*Storage:* Refrigerate and protect from  
light.

WATER FOR INJECTION, 10 ml. (Item  
No. 1639).

Used:

- 1) To dilute powder in vial for  
injections of chloramphenicol,  
aqueous procaine penicillin, benzyl  
penicillin and streptomycin.
- 2) To dilute pethidine and  
promethazine in General Lytic  
Cocktail.

## FLUIDS

### INTRAVENOUS FLUIDS

- 1) **NORMAL MAINTENANCE** – Use  
Hartmann's solution or Normal  
saline and glucose. Most children  
do not need their "full maintenance  
fluid", they will become  
oedematous (swollen). Best to  
start with 2/3 or half of their  
normal requirement. Reduce  
volume if they have puffy eyes,  
hands, or legs.

Add 6 ml (1.5 gram) Potassium  
Chloride to each litre flask of glucose  
saline.

Weight	Flow rate	Drops per minute using paediatric burette
3 - 5 kg	12 ml/hour	12
6 - 9 kg	20 ml/hour	20
10 - 14 kg	35 ml/hour	35

15 - 39 kg	50 ml/hour	50
40kg or more	70 ml/hour	70

## 2) DEHYDRATED OR BURNS

Weight	Dose
3 - 5 kg	100 ml fast. Then 25 ml/hour (7 drops/min)
6 - 9 kg	150 ml fast. Then 50 ml/hour (13 drops/min)
10 - 14 kg	250 ml fast. Then 75 ml/hour (20 drops/min)
15 - 19 kg	350 ml fast. Then 100 ml/hour (25 drops/min)
20 - 29 kg	500 ml fast. Then 100 ml/hour (25 drops/min)
30 - 39 kg	700 ml fast. Then 150 ml/hour (40 drops/min)
40 kg and over	1000 ml fast. Then 150 ml/hour (40 drops/min)

## ORAL OR NASOGASTRIC FLUIDS

- 1) **NORMAL MAINTENANCE** – Give every 3 hours, 8 times a day.

Weight	Dose
3 - 5 kg	120 ml
6 - 9 kg	240 ml
10 - 14 kg	300 ml
15 - 19 kg	350 ml
20 -29 kg	400 ml
30 - 49 kg	450 ml

- 2) **MENINGITIS, HEART FAILURE, COMA** - If patient is not drinking and you are unable to insert an I. V., give the following amounts of fluid by nasogastric tube 4 times a day.

Weight	Dose
3 - 5 kg	100 ml
6 - 9 kg	150 ml
10 - 14kg	200 ml
15 - 19 kg	250 ml
20 - 29 kg	300 ml
30 - 39 kg	350 ml



3) **ORAL REHYDRATION FOR DEHYDRATION** - Use Oral Rehydration Solution.

Weight	Dose
3 - 5 kg	100 ml fast. Then 50 ml every hour for the next 4 hours
6 - 9 kg	150 ml fast. Then 100 ml every hour for the next 4 hours
10- 14 kg	250 ml fast. Then 150 ml every hour for the next 4 hours
15- 19 kg	350 ml fast. Then 200 ml every hour for the next 4 hours
20 kg and over	500 ml fast. Then 300 ml every hour for the next 4 hours

Reassess the patient after 4 hours.

Stop giving oral rehydration solution immediately if the eyelids become puffy (swollen).

PAEDIATRIC RULES

- 1) **WEIGH**. Always weigh the child and record his weight. Plot the weight on the eight chart in the child's health record book, and look at his weight curve. Give the correct dose of medicine for the child's weight.
- 2) **IMMUNIZE**. Always check the child's health record book to see if the child is due for any immunizations. Give the immunizations that are due unless he has a fever above 38°C, or his illness is so severe that he needs admission to hospital or health centre. In this case immunize the child when he is better. There is no contraindication to giving measles vaccine.
- 3) **ADMIT** children to health centre or hospital who have any of the following:
  - Intercostal recession (rib indrawing)
  - Dehydration
  - Convulsion with fever
  - Fever and not sucking
  - Drowsiness or confusion
  - Continued abdominal pain and vomiting
  - Oedema (swelling)
  - Weight less than 60% line with weight curve flat or going down.
  - Sudden onset of paralysis
  - Swelling of limb or joint
  - Whooping cough in baby under 6 months old
  - Stridor (noisy breathing)
  - Snake bite
  - Poisoning

- Haematuria (blood in urine)
- A lot of fresh blood in the stools, or melena (black stools).
- History of unconsciousness after a head Injury.

#### 4) REFER TO A DOCTOR:

- Babies less than 4 weeks old with meningitis.
- Babies less than 4 weeks old with sepsis who are not improving after 2 days of treatment.
- Babies less than 4 weeks old with severe jaundice (yellow colour)
- Children with meningitis who are not improving after 3 days treatment
- Children with fever, tenderness, and swelling of a limb or a joint which does not improve after 2 days of treatment.
- Children with conjunctivitis that is not improving after 2 days of treatment.

## Chapter 40. Practical procedures

Figure 61 - Holding a child to examine his ear.



Ask an older child to cough out his sputum. You can make a young child cough by sucking out his pharynx.

### EAR EXAMINATION

Sit the child sideways on his mother's knees, with his head against her body. Ask the mother to put one of her arms around the child's body including his arms. Ask her to use her other arm and hand to hold the child's head firmly against her body (see fig. 61).

The child's head is now splinted by the mother. You can now examine his ears and his throat. Hold the auriscope between your thumb and index finger as if you are holding a pen. Rest your little finger on the child's cheek. With your other hand, pull the child's ear gently backwards. This straightens the meatus. Look through the speculum attached to the auriscope and see the ear drum (see fig 62).

### CHEST PHYSIOTHERAPY (POSTURAL DRAINAGE)

Children with pneumonia and bronchitis have sputum collecting in their lungs. Bacteria grow in the sputum and make the pneumonia worse.

Chest physiotherapy helps the child to cough up the sputum. It is easy to do, and you can teach the mother how to do it. Lie the child on his abdomen across the mother's knees. Slope the child downwards so that his head is lower than his chest. Gently smack his back 10 times. Squeeze in the bottom of his chest 5 times.

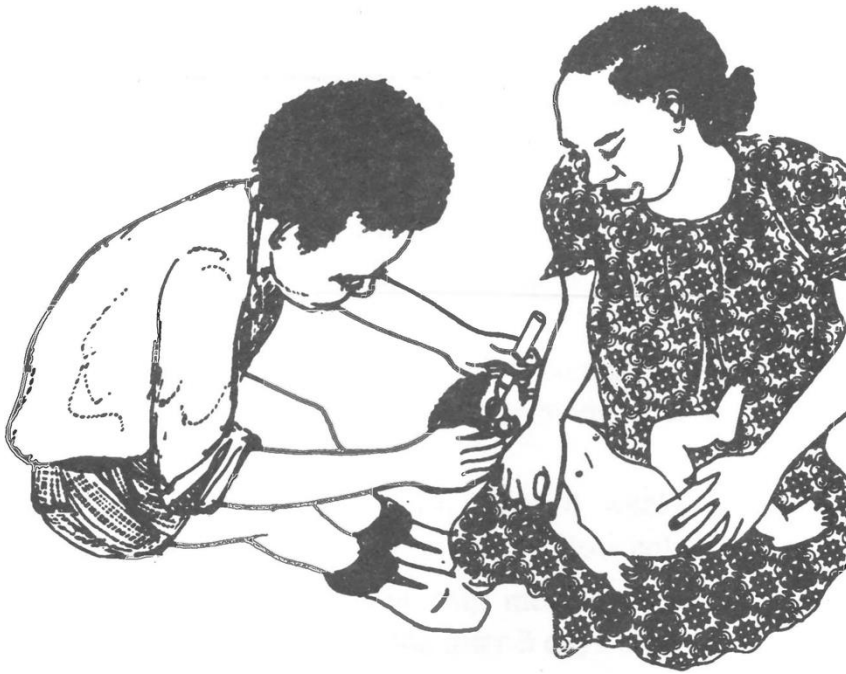


Figure 62- Using an auriscope.

Repeat this with more tissue spears until the ear is dry and no more pus comes out of the ear with the tissue spears.

## EARS - CLEANING WITH TISSUE (TOILET) PAPER

### 1) **Dry the ear with toilet tissue.**

Gently twist the corner of a piece of tissue to make a tissue spear. Break off and throw away the tip which is too small. Also, break off and throw away the other end which is too large. Ask the mother to hold the child's head steady while you pull the top of the ear upwards and backwards to make the ear canal straight.

Then gently push and twist the tissue spear into the ear canal until it stops (usually about an inch).

Leave the tissue spear in the ear for 2 minutes to absorb the pus, and then gently remove it.

- 2) **Put boric acid in alcohol eardrops into the ear.** Lie the child on the side of the mother's lap. Make the ear canal straight by pulling the ear upwards and backwards. Then put 1 or 2 drops of boric acid in alcohol eardrops into the ear canal. Press twice on the flap of skin in front of the ear canal to help push the eardrops down to the drum.

Supply one bottle of boric acid in alcohol eardrops to the mother to take home.

- 3) **Education of the mother.** Make sure that the mother knows how to use tissue paper to clean out the pus and that she knows how to put the ear drops into the child's ear.

Tell the mother to clean the ear 4 times a day with tissue spears and to put in 1 or 2 drops of the ear drops

each time after cleaning the pus out of the ear.

Reassure the mother that putting the tissue spear deep into the ear will not harm her child. This is the only way to get all the pus out of the ear.

Warn the mother that the eardrops may feel hot to the child and he may cry when they are put into the ear. But the drops are important to get rid of the ear discharge.

Tell the mother to avoid water getting into the ear.

If possible, the mother should come back each day for a few days to show you that she can clean the pus out with tissue spears and put the ear drops into the child's ear correctly.

Reasons why ear discharge does not improve:

- 1) Tissue spear made too fat and/or too short.
- 2) Tissue spear not put far enough into the ear.
- 3) Ear cleaning not done 4 times a day.
- 4) Cotton buds used instead of tissue paper.
- 5) Boric acid in alcohol ear drops not being used.
- 6) Osteomyelitis has already developed.

## REMOVAL OF FOREIGN BODY FROM EAR (EAR SYRINGE)

Sit the child on his mother's knee and ask her to hold him firmly. If he moves around too much wrap him in a sheet so that he cannot move his arms. Ask a helper to hold his head firmly.

Use a large syringe (e.g. 50 ml or larger) and fill it with warm water. Do not put a needle on the syringe. Hold the child's ear and pull it gently backwards. Put the end of the syringe into the meatus, pointing slightly upwards and forwards. Inject the water fast. Use a kidney dish to catch the water as it spills out of the ear. Then refill the syringe and inject more water. Do this several times until the foreign body comes out.

## HAEMOGLOBIN MEASUREMENT

### 1) Sahli Method

- a) Put a few drops of Hydrochloric Acid N/10 into the graduated tube.
- b) Clean and prick the patient's finger. Allow a large drop of blood to form on the finger. Let the blood run down into the pipette to the 20 cu. mm (20 microlitres) mark. There must be no bubbles in the column of blood. If a little too much blood goes into the pipette, quickly remove the excess by carefully applying cotton wool to the tip of the pipette.
- c) Blow the blood into the acid in the tube. Mix by sucking in and out of the pipette several times. Clean the pipette. (If a blood

slide is also required, take it now, before the finger prick stops bleeding).

- d) Dilute the acid-blood mixture with hydrochloric acid. Mix with glass rod or a stick applicator.
- e) Keep adding hydrochloric acid until the colour in the tube nearly matches the colour of the glass. Now add hydrochloric acid drop by drop, mixing and comparing the colours after each drop, until the colours match.
- f) The number at the level of the fluid is the haemoglobin reading.

## 2) Lovibond Method

- a) Add 10 ml of dilute ammonia solution to the tube.
- b) Prick the finger, wipe away the first drop, and then hold the finger so the drop of blood hangs down. Touch the end of the pipette against the drop. Keep the tip of the pipette slightly higher than the other end. Then the blood will run down into the pipette. Fill the pipette to 50 cu, mm (50 microlitres).

Wipe away blood from the outside of the pipette and then gently blow the blood into the tube containing the ammonia solution. Gently rinse the inside of the pipette by alternately sucking and blowing the ammonia solution up and down the pipette. (At this stage you can also do a blood slide from the blood remaining on the child's finger).

- c) Block the end of the tube and turn it upside down several times. This mixes the blood and the ammonia solution together.
- d) Place the tube in the haemoglobinometer and hold it up to a good light. Turn the dial until the colour of the glass window is the same as that of the blood solution.
- e) Record the reading.

**Note:** If the pipette blocks up clear it with a 10cm length of fine nylon thread (e.g. size 000).

## INTRAPERITONEAL DRIP

**Use 2.5% dextrose in ½ strength**

**Darrow's solution.** Do *not* use cold fluids. The fluid should be at body temperature. Place the bottle of fluid in a basin containing water hot enough for you to put your hand in. Leave it there for a few minutes to become warm.

How much to give.

If the child weighs less than 7 kg, give 250 ml.

If the child weighs more than 7 kg give 500 ml.

Method:

- 1) Feel to make sure the bladder is empty.
- 2) It will be empty if the child is dehydrated.

- 3) Feel for the spleen and liver. Make sure they're not near where you put the needle
- 4) Wash your hands.
- 5) Connect a giving set and needle to the bottle of fluid.
- 6) Wash the abdomen with soap and water, then paint with iodine.
- 7) With one hand lift a fold of skin in the midline of the abdomen just below the umbilicus and well clear of the spleen and liver. Push the needle of the giving set through the skin with your other hand. Keep the needle parallel to the abdomen, so that the point is under the skin. Open the clamp of the giving set. With the fluid running, change the direction of the needle so that it is at right angles to the abdomen. Then push the needles through the peritoneum. You will feel a "give" as the needle goes through the peritoneum, and the fluid will flow through the drip chamber.
- 8) The needle is held in position until the correct amount of fluid has run in (about 30 minutes).

Then remove the needle and put a small dressing over the needle hole.

After this, give the child fluid by mouth or by intragastric tube.

More fluid can be given by intraperitoneal drip after 4-6 hours if necessary

Do not give intraperitoneal drip if the abdomen is distended.

## LUMBAR PUNCTURE

Do a lumbar puncture on any child who:

- 1) Is unconscious: or
- 2) has recently fittted; or
- 3) Has a stiff neck; or
- 4) You suspect has meningitis.

Do not do a lumbar puncture if:

- 1) The child has had symptoms for more than one week;
- 2) There is an infection (e.g. skin sepsis) at or near the lumbar puncture site; or
- 3) The child has severe hypoxia or breathlessness; or
- 4) The child looks severely ill, and you think he may die if you do a lumbar puncture.

Treat these children for meningitis.

### Method

- 1) Sedate the child with chloral hydrate or paraldehyde.
- 2) Show your assistant how to hold the child properly. The child lies on his side with back and hips flexed so that the knees are bent up onto the abdomen. The child's back must be straight up and down, i.e. the knees must be above each other. The shoulders must be above each other. The assistant should hold the child with his right arm behind the child's neck and his left arm behind the child's knees.
- 3) Scrub your hands.
- 4) Clean the whole of the child's lower back and the tips of your fingers with iodine.



- 5) Find the L3-4 or L4-5 space, at or just above a line joining the iliac crests (see fig. 63).
- 6) Use a new disposable 21 or 22 gauge needle (or a scalp vein needle in small babies). *Do not touch the steel shaft of the needle with your fingers.* Check that the needle is not blocked.

Push the needle in through the skin in the line of the vertebral spines.

Keep the needle *exactly horizontal* and push it in slowly, aiming for the umbilicus. The CSF often comes out very slowly in small children. So unless you go slowly, the needle can be in the incorrect place without you knowing it.

- 7) When the CSF comes out, collect 1 ml into each of two bottles. If it flows very slowly rotate the needle a little.
- 8) Remove the needle. Lie the child on his front.

Clean off the iodine with spirits. Put a small dry swab with a piece of strapping over the puncture site.

Note:

- a) If you get a traumatic tap (blood), treat the child for meningitis.
- b) If you fail to get CSF after two tries, ask a more experienced person to help. If no one is available, treat for meningitis.

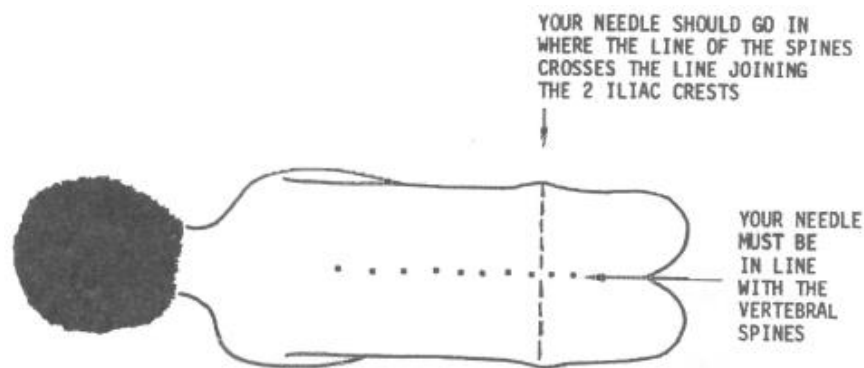


Figure 63 - Site for lumbar puncture.

## MANTOUX TESTING

The fluid used for Mantoux testing is called PPD. It is supplied in small bottles. It is mixed ready for use. It lasts six months from the date it is made (date of manufacture). The date is printed on the bottle. It should be kept in the refrigerator.

Method:

- 1) Draw up some PPD into a dry sterile tuberculin syringe with a large needle.
- 2) Replace the large needle with a short intradermal (26 gauge) needle.
- 3) The injection is given intra-dermally in the inner surface of the left forearm.
- 4) Hold the syringe flat against the arm, bevel of needle up. Prick the skin so that the needle tip goes between the layers of the skin. Inject 0.1 ml slowly. A small swelling appears if the injection has been given correctly (intra-dermally).
- 5) Read the reaction in 48-72 hours.



## MEDICINE ADMINISTRATION (GIVING MEDICINES) TO CHILDREN

A child's disease may get worse if he fails to swallow all the medicine ordered for him. Use the following procedure in giving medicines to children.

- 1) Try to get the child to co-operate and swallow the medicine by himself.
- 2) If the child refuses, get the mother to lie him across her lap, with his face upwards.
- 3) When he opens his mouth to cry, pour a small amount into his mouth. When he has swallowed this, give a little more.
- 4) If he will not open his mouth, pinch his nose shut. When he opens his mouth pour in a small amount of medicine.
- 5) Catch any medicine that dribbles down his cheek. Put it back in his mouth.
- 6) If he vomits it up, give him a second dose.

**N.B.** Small children have trouble swallowing tablets. So, crush the tablet up and mix it with a little water.

## NASOGASTRIC TUBE

Inserting a nasogastric tube.

A nasogastric tube may be required:

- 1) To give fluid to a child who cannot or will not swallow, e.g. a comatose

child, or a dehydrated child needing a nasogastric drip.

- 2) To aspirate fluid or gas from the stomach, e.g. a child with bowel obstruction, or to obtain a fasting gastric aspirate.

### Method

- 1) Select a tube which is long and wide enough. If you don't have a tube, use an old drip set.
- 2) Place the end of the tube on the child's lower sternum. Then lie the rest of the tube up his chest and neck to his ear, then to his nose. This tells you how far to push the tube. So, mark the tube with a small piece of strapping at this level.
- 3) Put a little surgical lubricant on the end of the tube. Then push it slowly into the child's nose. If he starts coughing a lot, it may have gone into his trachea, so remove the tube and start again.
- 4) When you have pushed the tube through the child's nose up to the mark on the tube, examine his throat with a torch and spatula. Make sure the tube has not coiled up and stuck in the child's throat.
- 5) Check that the bottom of the tube is in his stomach by:
  - a) Aspirating (sucking) the top of the tube with a syringe. If fluid comes, the bottom end is probably in the stomach. Test this fluid with litmus paper to make sure. Stomach fluid will turn blue litmus paper red (because of the acid in the stomach).

- b) Listen over the stomach with a stethoscope.
- 6) Inject about 3 ml of air from a syringe down the tube. If you can hear air coming out of the bottom end of the tube, the tube is in his stomach. If you think the end of the tube may not be in his stomach, take it out and try again. When you are sure it is in his stomach, strap the tube to his face.

## FASTING GASTRIC ASPIRATE

Young children swallow their sputum so examination of sputum is difficult. Gastric juice aspirated early in the morning will contain sputum swallowed during the night. This may show AFB.

Method:

- 1) Ask the mother not to feed the child after midnight. If the child cries, give him the correct dose of chloral hydrate to make him go back to sleep.
- 2) At 5 - 6 am, insert a nasogastric tube and aspirate the stomach contents. If the child has been fasting you will only get mucus. If you get milk, repeat the test the next night.

## NASOGASTRIC DRIP (see fig. 64)

A nasogastric drip is a useful way of rehydrating a child who has moderate dehydration and who refuses to drink. Because the fluid runs in over several

hours, the child does not usually vomit. It is easier to set up than an LV. drip.

Method:

- 1) Insert a nasogastric tube into the child's stomach.
- 2) Check to make sure the tube is in the child's stomach.
- 3) Strap the tube carefully to the child's face.
- 4) Splint the child's arms at the elbows so he cannot bend his arms and remove the tube.
- 5) Connect an I.V. giving set to a bottle of 2.5% dextrose in  $\frac{1}{2}$  strength Darrow's solution.
- 6) Connect the end of the giving set to the nasogastric tube.
- 7) Give the same amount of fluid fast, and then each hour, as you would for intravenous rehydration (see page 74).

**N.B.** The fluid used for nasogastric drip does not have to be sterile. You can use oral rehydration solution put in a clean old I.V. flask. Cut a window near the top of the old I. V. flask, so you can pour oral rehydration fluid into the flask.

## OXYGEN ADMINISTRATION

- 1) With an oxygen catheter, measure the distance between the child's nose and his ear. Insert the catheter through his nose for the full distance. When inserting the catheter, push it straight back through his nose. Do not push it up his nose. Strap the catheter to his top lip and his cheek. (If the

catheter goes too far, it enters the child's oesophagus and fills his stomach with oxygen. This is harmful to the baby).

- 2) Connect the oxygen to the oxygen catheter. In babies, run the oxygen at half a litre per minute. In older children give oxygen at 1 litre/minute.
- 3) Every 6 hours stop the oxygen and watch the child for 3 minutes. If the child remains quiet, and does not become restless or cyanosed, remove the oxygen catheter. If the child gets restless or cyanosed,

- 2) When putting the regulator into the oxygen cylinder, use your fingers to screw it in as far as possible. Then use the proper spanner (and not an adjustable spanner) to tighten the hexagonal (6 sided) nut.
- 3) Check that the connections of the humidifying bottle are tight and not leaking oxygen.
- 4) After use, oxygen must be turned off at the cylinder (using the "key wheel") to avoid leakage. Even a slow leak can empty a cylinder in a day.
- 5) Make sure that empty cylinders are

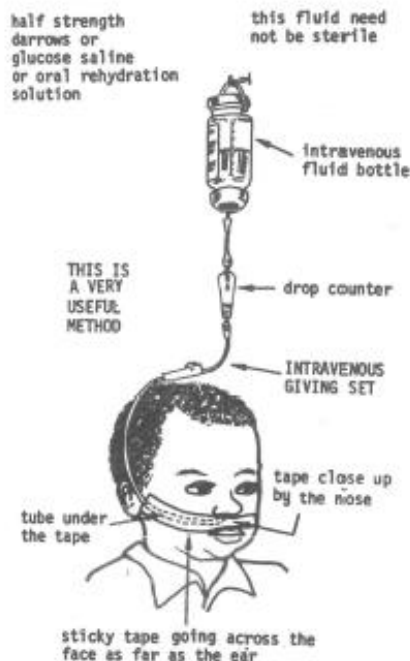


Figure 64 - Every health worker should be able to give a nasogastric drip.

restart the oxygen.

returned quickly to the medical store for refilling. Leaving empty oxygen cylinders around makes it difficult to provide new supplies of oxygen.

## OXYGEN CYLINDER CARE

- 1) Cylinders must be strapped onto a trolley or other support so that they cannot be knocked over.

## SKIN SMEARS FOR A.F.B. IN LEPROSY

Smears are taken from suspect skin lesions or nodules (lumps). The child should be examined in a good light.

The smear is taken from the edge, and not the centre of the lesion. The area is cleaned with spirits and allowed to dry. You should wear surgical gloves. The skin is pinched up into a fold between your thumb and index finger. A small cut, about 5 mm in length and 2 mm in depth, is made into the skin with a sterile scalpel. Still pinching up the skin, wipe the edges of the incision with a gauze swab to remove any blood or tissue fluid. The incision is then scraped with the sharp edge of the scalpel. The tissue juice obtained on the edge of the scalpel is used to make several smears on a glass slide. The incision should *not* be deep enough to need any dressing.

Break a match in two and place half at each end of the slide. Place another slide on top and hold the slides together with a rubber band. The smears must face inwards. Pack carefully and send to the nearest laboratory with a letter or request form. Make sure the slides are labelled with the patient's name. State on the request form exactly where each smear came from.

## SKIN BIOPSY FOR LEPROSY

A.F.B. may not be found in skin smears taken from tuberculoid leprosy. To

make sure of the diagnosis, a skin biopsy may be necessary. It is usual to remove a piece of skin, under local aesthesia, about 1.5 cm long and 0.5 cm wide, and deep enough to include some subcutaneous fat. The biopsy is taken at the edge of the lesion. This means that normal skin is included as well as some of the skin of the suspected lesion.

Close the biopsy wound with a few sutures. The piece of skin obtained by biopsy is placed in a screw-capped bottle containing 10% formalin.

It is sent to the pathology section, Port Moresby General Hospital, for staining and examination under the microscope.

## STOOL -TEST FOR SUGAR

Indications:

- 1) Diarrhoea in a malnourished child.
- 2) Watery diarrhoea that lasts more than 1 week.

Collection of liquid stool.

When a child has diarrhoea, the liquid part of the stool quickly runs into the nappy. The remaining stool cannot be used to test for sugar.

To collect liquid stool, first cut 10 cm off an old I.V. set. Heat one end of this plastic tube with a match for one second. This makes the plastic softer. Then lubricate this end and insert it 5 cm into the child's rectum. If liquid stool is present, it will run down the

tubing where it can be collected in a test tube.

Test using Clinitest Tablet.

- Put 5 drops of liquid stool in a test tube.
- Add 10 drops of water.
- Add 1 Clinitest tablet.
- Record the colour after 1 minute.

Test using Benedict's Solution.

- Put 5 ml of Benedict's solution in a test tube.
- Add 8 drops of liquid stool.
- Boil, and record the colour.

## Results

Blue or green colour is normal. The test is negative. Yellow, orange or red colour means that sugar (lactose) is present. The test is positive.

**N.B.** You *cannot* use Clinistix to test the stool for sugar. (Clinistix only tests for glucose, and *not* lactose).

## URINE TESTING

### Protein in Urine

Either of the following two test can be used.

- 1) Put 5 ml of urine in test tube. Boil the urine.

If the urine turns cloudy, add 2 drops of acetic acid. If the cloudiness disappears, there is no protein in the urine. If the cloudiness remains, there is protein in the urine. If protein is present, allow the test tube to stand.

When the protein clot has settled measure how much there is (e.g. 1/8 or ¼).

- 2) Dip the test area of an *Albustix* into fresh, well mixed urine. Tap the edge of the strip against the container to remove excess urine.

Compare the colour of the test area with the colour chart on the label of the bottle of *Albustix*.

Important. Do not touch the test area of the strip. Keep the bottle of *Albustix* in a cool place, but not in a refrigerator. Replace the cap quickly and tightly before performing the test.

### Sugar (Glucose) in urine

*Clinitest* tablet or Benedict's solution can be used in exactly the same way as testing the stool for sugar.

*Clinistix* can also be used for testing the urine for glucose. Follow the same instructions as those given above for *Albustix*. But wait for 30 seconds before reading the result.

Sugar is present in the urine in diabetes.

### Bile in urine

- 1) Shake test.

If urine is light yellow or colourless, bile is not present. If urine looks dark yellow or brown (like tea) bile may be present.

Put the dark yellow or brown urine into a test tube. Block the end of the tube and shake it strongly. Look at the

froth (bubbles). If the froth is yellow, bile is present. If the froth is white, bile is not present.

## 2) Combistix or Multistix

Some urine test papers test for protein, sugar, bile, blood and other things on the same strip of paper.

## 3) Iodine Test

- a) Pour a little iodine into a test tube.
- b) Dilute the iodine with water until it looks the same colour as the patient's urine.
- c) Very carefully pour a little of the diluted iodine slowly on top of some of the patient's urine in a test tube.
- d) If bile is present, a green ring will form where the diluted iodine meets the urine.

## Blood in urine

Put some urine into a test tube. If it looks quite clear, blood is probably not present. If it looks a bit cloudy, add 2-3 drops of dilute acetic acid. If the urine clears, blood is probably not present.

If the cloudiness remains, allow it to stand for 1 hour. If a red sediment forms at the bottom of the tube, blood (red blood cells) is present.

*Combistix* or *Multistix*, if available, can be used to test for blood in the urine.

Blood in the urine occurs in acute nephritis and sometimes in malaria.

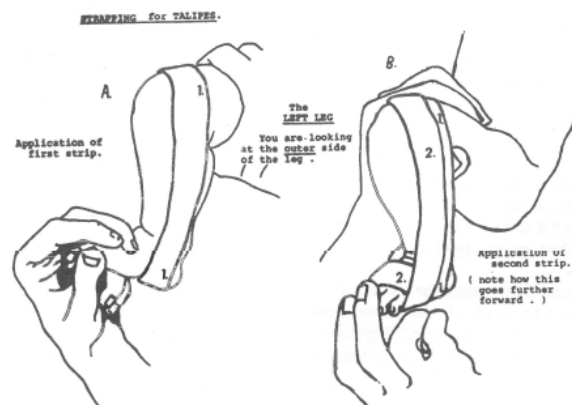
## TALIPES CORRECTION (STRAPPING OF TALIPES)

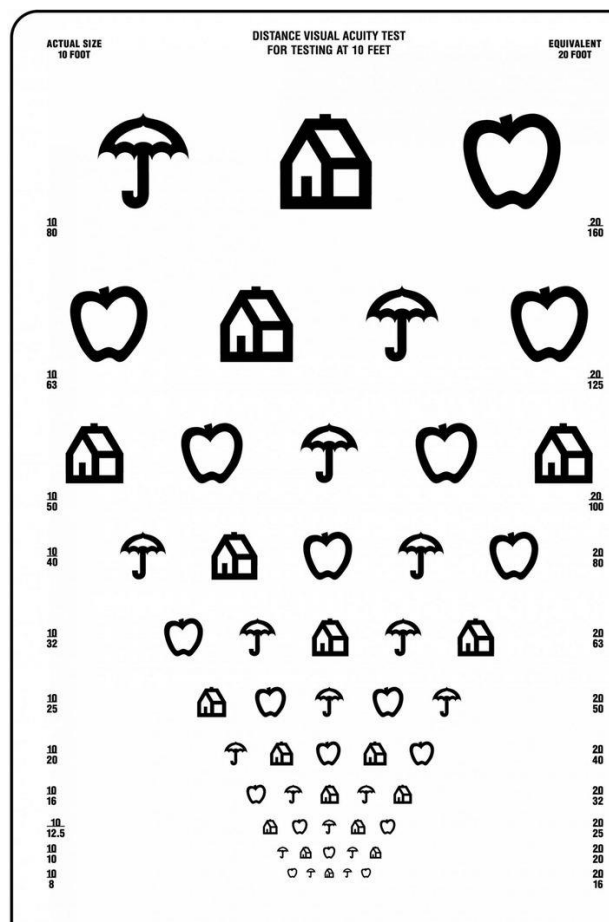
Babies born with talipes (club foot) should have this corrected as soon as possible.

- 1) Paint the leg with benzoin compound tincture
- 2) Put small pieces of gauze over the bony prominence of the foot, ankle and knee.
- 3) Put the first piece of strapping under the heel, up the outer side of the leg, and over the knee (see fig. 65 a).
- 4) Put the second piece of strapping around the front of the foot, up the outer side of the leg (more forward than the first strapping), and over the knee (see fig. 65 b).
- 5) Put a piece of strapping loosely around the middle of the leg.

**N.B.** Keep the leg bent while putting on the strapping. Then each time the baby kicks his leg, the talipes will be corrected.

Show the mother how to gently straighten the foot (correct the talipes) with her hand. Encourage her to do this many times a day. Put new strapping on twice a week. Check each time that the mother is gently straightening the foot herself many times a day. Send the baby to a doctor if the talipes is not corrected by 4 months, or if the Achilles tendon is short and tight.





Vision charts for children

