



**Federal Democratic Republic of Ethiopia
Ministry of Health**

Communicable Diseases

Part 2 Tuberculosis and leprosy

Blended Learning Module for
the Health Extension Programme



HEAT

Health Education and Training
HEAT in Africa

Acknowledgements

Communicable Diseases is the largest of the 13 Blended Learning Modules for the Ethiopian Health Extension Programme. Together with the practical skills training sessions that accompany each of the supported self-study texts, this programme will upgrade the Health Extension Workers who complete the curriculum to Health Extension Practitioners at Level-IV of the Ethiopian Occupational Standards. The upgrading programme is sponsored by the Ethiopian Federal Ministry of Health (FMOH) and the Regional Health Bureaus (RHBs). The FMOH gratefully acknowledges the receipt of funding for this programme from the Ethiopian Office of UNICEF (the United Nations Children’s Emergency Fund), The Open University UK, the Alan and Nesta Ferguson Foundation Trust UK, and AMREF (the African Medical and Research Foundation). We are also thankful for the support of the Ethiopian Offices of Jhpiego and the World Health Organization (WHO) for freely enabling their experts to participate in the development of this Module.

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We acknowledge the vital contributions of the Programme Coordinators within Ethiopia:

Ato Mohammed Hussein Abeseko, UNICEF Ethiopia and the Federal Ministry of Health

Ato Tedla Mulatu, AMREF Ethiopia

The cover design for *Communicable Diseases* is by Chris Hough, Learning and Teaching Solutions, The Open University UK. The cover photographs are reproduced with the permission of UNICEF Ethiopia, with acknowledgement to Indrias Getachew.

The opinions expressed in this Module are those of the authors and do not necessarily reflect the views of any of the donor organisations whose generous support made the production of *Communicable Diseases* possible.

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Study Session 13 Introduction, Transmission and Tuberculosis Case Finding

Introduction

Tuberculosis (TB) is one of the major common diseases in Ethiopia and you are very likely to have come across this disease in your daily work as a health worker. In this study session, you will learn about the cause of TB, how important it is as a public health problem in the world, in Africa and in Ethiopia. You will also come to understand how TB is transmitted (spread) in the community. This study session will also help you to understand the approach adopted by the World Health Organization (WHO) to tackle the problem of TB worldwide.

You will become aware of what you and other health workers can do, in line with the global plan, to reduce and eliminate the problem of TB in your community. You will also learn how to identify a suspected case of TB and how to confirm your suspicions by reaching a diagnosis. Early diagnosis and prompt treatment of TB patients is essential if you are to help reduce the sufferings of patients and stop the spread of TB in your community.

Learning Outcomes for Study Session 13

When you have studied this session, you should be able to:

- 13.1 Define and use correctly all of the key words printed in **bold**. (SAQs 13.1, 13.2, 13.4 and 13.7)
- 13.2 Describe the burden of TB in the world, Africa and Ethiopia. (SAQs 13.2 and 13.3)
- 13.3 Describe the global approach to fight tuberculosis, known as the Global Stop TB Strategy. (SAQ 13.4)
- 13.4 Describe the mode of transmission of tuberculosis and identify the groups most at risk of TB infection. (SAQs 13.1 and 13.5)
- 13.5 Detect and confirm a case of TB based on clinical signs and screening of sputum specimens. (SAQs 13.6 and 13.7)

13.1 What is TB?

Tuberculosis is a chronic infectious disease caused by *Mycobacterium tuberculosis*; another name for these bacteria is **TB bacteria** or *tubercle bacilli*. TB usually affects the lungs (80% of TB cases are of this type), hence the name **pulmonary TB (PTB)**. When other organs of the body are affected, such as the bones, joints, lymph-nodes, gastro-intestinal tract, meninges (coverings of the brain), or the reproductive system, kidneys and bladder (also known as the genito-urinary tract), the disease is called **extra-pulmonary TB** (or **EPTB**).

'Pulmonary' is the term given to anything affecting the lungs. 'Extra-pulmonary' means *outside* the lungs.

- You have probably come across people who suffer from TB. Do you know what the most common symptoms are?
- If you have direct experience of TB patients, you will probably know the symptoms are: persistent cough, weight loss, chest pain, tiredness, difficulty in breathing, sometimes spitting up blood, and general symptoms like sweating and fever.

13.2 Global and regional burden of TB disease

TB is a major public health problem throughout the world. According to the World Health Organization's (WHO) Global Report 2009, one-third of the world's population is estimated to be infected with TB bacteria and at risk of developing the active form of the disease. In 2009, the annual incidence of TB (the number of new cases) across the world was about nine million people. The annual number of deaths due to TB was 1.7 million, including 195,000 patients infected with HIV. In developing countries, TB comprises 25% of all avoidable adult deaths. The disease affects both sexes equally and most TB cases are found among the age group 15–54 years. Since this group constitutes the majority of the working population, their deaths can be a major blow to the economy of any country.

Thirty percent (30%) of the estimated total TB cases in the world in 2008 occurred in Africa. Among African countries, South Africa has the highest estimated number of cases (0.38–0.57 million), followed by Nigeria (0.37–0.55 million), and Ethiopia is third with 0.24–0.36 million. Throughout the world, almost 30,000 cases of **multidrug resistant-TB (MDR-TB)**, a form of TB that does not respond to the standard treatments using the drugs most commonly used against TB, were reported in 2008.

The main reasons for the increasing burden of TB globally include:

- Poverty.
- Neglect of the disease (inadequate case finding, diagnosis and cure).
- Collapse of the health system in countries experiencing severe economic crisis or civil unrest.
- Effect of the HIV pandemic.

TB is a disease of poverty because most cases occur among poor peoples of the world, often living in very poor conditions and hard-to-reach communities. Because of their circumstances, poor people do not have easy access to health care services, including diagnosis and treatment for TB. This is why your role as a Health Extension Practitioner is crucial, because you can bring TB diagnosis and treatment within reach of the rural community dwellers.

13.2.1 Tuberculosis burden in Ethiopia

According to the Ethiopian Federal Ministry of Health's hospital data, tuberculosis is the leading cause of morbidity (sickness), the third cause of hospital admission, and the second cause of death in Ethiopia, after malaria.

Ethiopia ranks seventh among the 22 countries with high TB burden, and third only to South Africa and Nigeria in Africa, with an estimated incidence of all forms of TB at 378/100,000 in 2009. This means that among every 100,000 Ethiopians, 378 new cases of TB were estimated to have occurred in 2009. The estimated incidence of **smear-positive** (a form of TB in which TB bacteria are seen when a sputum smear is stained and examined under the

Sputum is jelly-like mucus coughed up from the lungs. TB bacilli can be seen in sputum smeared thinly onto a glass microscope slide and stained with special dye.

microscope) is 163 per 100,000 population. If the population of Ethiopia is assumed to be 80,000,000, then 302,400 new cases of all forms of TB and 130,400 new smear-positive TB cases were expected to have occurred in the country in 2009. However, of the estimated figures, only 145,924 (48%) of all forms of TB cases and 44,593 (34%) of estimated new smear-positive TB cases were actually detected. This suggests that the number of TB cases detected in Ethiopia in 2009 is far below the expected numbers.

The **global target for TB control** is to detect at least 70% of the smear-positive cases and cure at least 85% of the detected cases. If we do not detect TB cases as they occur in the communities, it means that people who are sick with active TB will continue to spread the disease among the healthy population and many people will continue to suffer and/or die in our communities.

The HIV epidemic (which you will learn more about in *Communicable Diseases*, Part 3) has made the TB situation significantly worse by accelerating the progression of TB infection to active TB disease, thus increasing the number of new TB cases. Another challenge to TB control in Ethiopia is the emergence of MDR-TB, with 5,979 estimated cases in 2007.

For all forms of TB the expected cases calculation is 80,000,000 divided by 100,000 = 800, then $800 \times 378 = 302,400$ cases. For smear-positive cases it is 80,000,000 divided by 100,000 = 800, then $800 \times 163 = 130,400$ cases.

As a Health Extension Practitioner, you have an important role to play in the community to prevent and control TB.

13.3 Global strategy for the prevention and control of TB

In 1994, WHO launched their global strategy for the prevention and control of TB. The key feature of the strategy remains the **Directly Observed Treatment, Short-course (DOTS)**, as the best approach to TB. DOTS has five key components:

- 1 Sustained government political and financial commitment to TB control
- 2 Access to quality-assured laboratories for the confirmation of persons suspected of having TB
- 3 Uninterrupted supply of quality-assured drugs to treat TB
- 4 Standardized treatment and care for all TB cases, including Directly Observed Treatment Short-course (DOTS)
- 5 Setting up of a recording and reporting system through which the progress of patients and the overall performance of the TB control programme can be assessed. Box 13.1 outlines the records and forms that will be used to monitor the progress of your patients and how effectively TB is being controlled in your area.

Box 13.1 Record keeping and the TB patient

To help TB patients, you will need to know about different forms that need to be completed. For example, a *TB lab register* is used to record information on all patients investigated for TB; a *sputum request form* needs to be sent with the sputum samples that are sent for investigation. A *TB unit register* has to be completed for all patients where TB is detected, where the details of their treatment are recorded; there is also a *TB referral/transfer form*. Find out from where you work what these different forms look like. Keeping them up-to-date is essential for checking the progress of patients and seeing how effective the control of TB in your area is proving.

Let us focus now on those components of the DOTS strategy that are carried out at the health facility and community levels. As you've just read, one of the most important components of the global strategy is the Directly Observed Treatment, Short-course, which means that a health worker or a treatment supporter (such an individual could be a family member, a religious or community leader) must support and watch the patient taking each dose of his/her treatment. DOTS is important to:

- Ensure that patients take the correct treatment regularly
- Detect when a patient misses a dose, find out why, and solve the problem
- Monitor and solve any problem that the patient may experience during treatment.

13.3.1 The Global STOP TB Strategy

The **Global STOP TB Strategy** was launched by WHO in 2006 to improve the achievements of the DOTS strategy (Figure 13.1). It comprises the following elements:

- 1 Improve and scale-up DOTS so as to reach all patients, especially the poor.
- 2 Address the problems of TB/HIV, drug resistant TB and other challenges.
- 3 Contribute to health system strengthening by collaborating with other health programmes and general services, for example, in mobilizing the necessary resources to make the health system work.
- 4 Involve all public and private care-providers to increase case finding and ensure adherence to the International Standards for TB Care.
- 5 Engage people with TB and affected communities to demand, and contribute to, effective care. This will involve scaling-up of TB control at community level by creating community awareness and mobilizing local authorities and community members for action.
- 6 Enable and promote research for the development of new drugs, diagnostic tools and vaccines.

The things that you can do in line with the Global STOP TB Strategy to reduce the problem of TB in your community, include educating the community members about TB, identifying community members with TB symptoms, making sure people know their HIV status, encouraging community members, active and ex-TB patients to participate in TB control activities, and finally persuading private health practitioners, including traditional healers to participate in TB control activities.

13.4 How is TB transmitted?

When an adult with infectious TB coughs, sneezes, sings or talks, the TB bacteria may be expelled into the air in the form of small particles called *droplet nuclei*, which cannot be seen except through a microscope. Transmission occurs when a person in close contact inhales (breathes in) the droplet nuclei.

Figure 13.2 shows an infectious TB patient expelling a large amount of droplet nuclei after coughing, and those nuclei being inhaled by a nearby person. If an infectious adult spits indiscriminately, the sputum containing bacteria dries and wind can carry the droplet nuclei into the air, so anyone can inhale them.



Figure 13.1 The STOP TB logo used by the WHO (Photo: courtesy of SEARO, WHO).

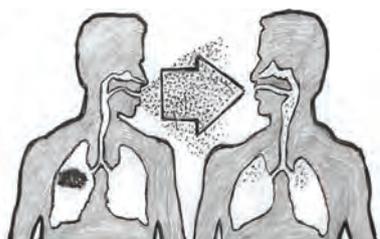


Figure 13.2 TB bacteria released during coughing, sneezing and talking can infect a contact person.

In addition, consumption of raw milk containing *Mycobacterium bovi* (TB bacteria found in domestic animals such as cows, goats and lambs) may also cause TB in humans, though nowadays it is much less frequent because of boiling milk or pasteurization (the processing of removing germs from milk).

The contact person does not usually develop active TB immediately. In some cases, the person's immunity is able to remove the bacteria and he/she does not develop TB infection. In other cases, the person develops an immune response that controls the bacteria by 'walling it off' inside the body. This causes the bacteria to become inactive. The person does not develop active TB or become ill at the time, but is said to have **latent tuberculosis infection (LTBI)**. Up to one-third of the world's population is thought to be infected with latent TB.

If the immunity of a person with LTBI is weakened, the body is no longer able to contain the TB bacteria, which then grow rapidly and the person becomes sick with symptoms and signs of TB. The person is then said to have **active TB**. This process of progression from LTBI to active TB is called **reactivation**. The greatest risk for developing active TB is within the first two years following the initial infection.

A person with latent TB infection is well and cannot spread infection to others, whereas a person with active TB is sick and can transmit the disease.

13.4.1 Who is at risk from tuberculosis?

In a country like Ethiopia, with a very high number of TB cases, certain factors increase a person's risk of developing active TB, either on first exposure or when a latent TB infection overcomes the body's immunity to become active. These risk factors include:

- Poverty, causing poor living conditions and diet
- Prolonged close contact with someone with active TB
- Extreme age (the very young or old age groups), when the effectiveness of the immunity is lowered
- Malnutrition, which prevents the immune system from working properly
- Inaccessible health care, making it harder to diagnose and treat TB
- Living or working in a place or facilities such as a prison or a refugee camp, where there is overcrowding, poor ventilation, or unsanitary conditions
- Healthcare workers such as yourself, with increased chances of exposure to TB
- Lowered immunity factors, like HIV/AIDS or diabetes, drug treatments for cancer, and certain arthritis medications, will decrease the ability of the body's defence mechanisms to keep the TB in check; this increases the chances of active TB developing.

13.4.2 Natural history of tuberculosis

Look at Figure 13.3 (on the next page) which illustrates the different outcomes of a person exposed to TB infection. You can see that exposure to TB does not lead to infection of the contact in 70–90% of cases. For those 10–30% of individuals that do become infected with *M. tuberculosis*, in about 90% of them, the body's immunity either kills the bacteria, or perhaps more often, keeps them suppressed (inactive), causing LTBI. (In HIV infected persons, TB infection progresses to disease more rapidly due to the weakening of their immunity.) In healthy individuals, only about 10% of infected persons develop active disease and become ill.

Without treatment, 50% of patients with pulmonary TB will die within five years, but most deaths are within two years; 25% will remain sick with chronic, infectious TB which can be spread to the community. Another 25% will spontaneously recover and be healthy, due to their strong immune defences, but they could become sick again at any time if the TB bacteria are latent.

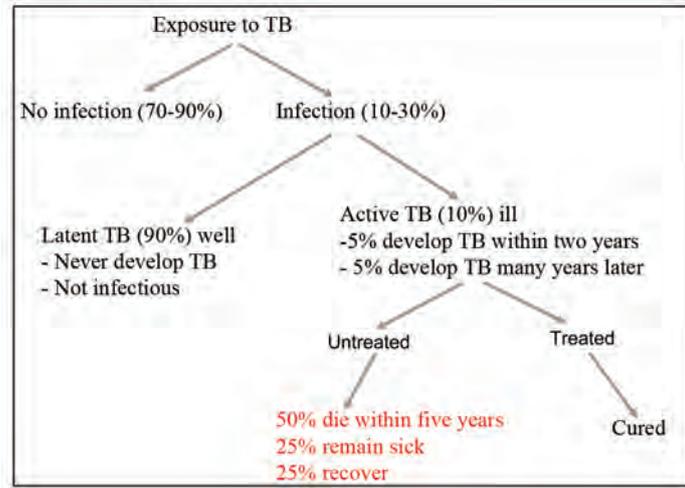


Figure 13.3 Natural history of tuberculosis after exposure to an infectious person.

13.4.3 What is the difference between TB infection and TB disease?

As you've just learnt, in a TB *infection*, an individual has no signs and symptoms of TB disease, whereas in pulmonary TB *disease*, signs and symptoms are evident. There are other differences between TB infections and pulmonary TB disease and these are summarised in Table 13.1.

Table 13.1 The distinction between TB infection and pulmonary TB disease.

Descriptions	TB infection	TB disease (in the lungs)
<i>M. tuberculosis</i> in the body	Yes	Yes
Symptoms	No	Yes
Chest X-ray	Normal	Abnormal
Sputum smears	Negative	Usually positive
Culture	Negative	Positive
Infectious to others?	No	Yes
A case of TB	No	Yes

TB bacteria isolated from the patient are grown in a **culture** medium in the laboratory, so they can be identified.

13.5 Case finding

Now it's important you learn about how to identify a person with suspected TB and confirm a TB case in the community and at a health facility.

Detection of the most infectious cases of tuberculosis (sputum smear-positive pulmonary cases) is a critical step in the control of TB in the community where you are working. The process of determining a TB case is known as **case finding**. The objective of case finding is to identify the source of infection in the community, that is, individuals who are discharging large numbers of TB bacteria, so that they can receive prompt treatment, which in

turn will cut the chain of transmission (stop the spread) and therefore lower the prevalence and mortality of TB.

The identification of people with suspected TB (or **TB suspects**) is the first step in case finding. The second step involves the laboratory investigation of the TB suspect's sputum samples to confirm those who have active TB. This process is called **TB screening**. When selecting people for TB screening you should always be aware that certain individuals are at high risk of becoming infected and developing tuberculosis, in particular, contacts of those who are in prison, drug abusers, diabetic patients and People Living with HIV (PLHIV). You should educate the general public about the need for these high risk groups to be screened for TB regularly to reduce the burden of TB in the community. It is your responsibility to identify people in such groups at all times and to regularly refer them for sputum examination. It is also important to ask all household contacts of smear-positive TB patients whether they have been coughing and for how long they have been doing so. All children under the age of five years, anyone who is HIV-positive and any TB suspects among them in the family, or in prison should also be screened for TB.

13.5.1 How to identify a person with suspected TB

First, remember that you need to inform the general public about the signs and symptoms of TB and to tell them about where TB screening can be done.

How to suspect pulmonary TB

You can identify a TB suspect with pulmonary TB by asking two simple questions:

- Do you have a persistent cough?
- How long have you had the cough?

You may also come in contact with persons who have extra-pulmonary TB, in which case you can use Table 13.2 as a guide on how to proceed. What is important for you to appreciate is that while a patient with EPTB is likely to have general symptoms such as weight loss, fever, night sweats, their specific symptoms will depend on which organ has been affected by the TB bacteria.

Table 13.2 Identifying a person with extra-pulmonary TB (EPTB)

Organ affected	Symptoms
Vertebral spine	Back pain, swelling on spine
Bone	Long-lasting bone infection
Joints	Painful joint swelling, usually affecting one joint
Kidney and urinary tract	Painful urination, blood in urine, frequent urination, lower back pain
Upper respiratory tract (larynx)	Hoarseness of voice, pain on swallowing
Pleural membrane of lungs	Chest pain, difficulty in breathing, fever
Meninges of the brain (meningitis)	Headache, fever, neck stiffness, vomiting, irritability, convulsions
Lymph node	Swelling of the node, draining pus. Long-lasting ulcer despite antibiotic treatment, draining pus



Remember that any person with a persistent cough of two or more weeks is a TB suspect and should be screened for TB.

Any person suspected of extra pulmonary TB should be referred to a medical doctor or clinician for diagnosis. If the patient is also coughing, sputum must be examined.

How to suspect TB in children

What about diagnosis of TB in children? This is often quite difficult because sputum is not so easy to obtain. What is more, the symptoms are not as clear cut as in adults. They include:

- Low grade fever not responding to malaria treatment
- Night sweats
- Persistent cough for three weeks or more
- Loss of weight, loss of appetite
- Failure to thrive
- Lymph node swellings
- Joint or bone swellings
- Deformity of the spine
- Listlessness
- Neck stiffness, headache, vomiting (TB meningitis).

Diagnosis in children rests largely on the results of clinical history, family contact history, X-ray examination and tuberculin test. A medical officer experienced in TB should make the decision whether to treat or not to treat.

13.5.2 Case finding through confirmation of a TB suspect by sputum examination

The purpose of sputum examination is to determine whether TB bacteria are present. You will need to collect three sputum samples (also called specimens) from each person with suspected TB for this purpose, as follows:

- First, explain to the TB suspect the reason for sputum examination and ask for his/her cooperation
- Then explain that examining sputum under a microscope is the best way to determine the presence of TB bacteria in the lungs
- Collect three sputum specimens from the TB suspect and write his or her name on the specimen containers (a small plastic bottle with a lid to prevent the spilling of the specimen while being transported to the laboratory).

How to collect sputum samples

You need three sputum containers on which the name of the suspect is to be written. Do not write the person's name on the lid as this can cause confusion in the laboratory. Before you begin, explain to the person what collecting a specimen involves, and where possible guide him/her through the process. Begin by giving the person the container, then:

- Ask the person to open the lid and, holding the container like a glass of water, to take a deep breath and then cough out sputum (not saliva) into the container, without allowing sputum to spill on the edge or side of the container.
- Ask the person to put the lid on the container tightly.
- This first sample is collected 'on the spot'. Keep the specimen in a safe place away from children, heat or sunlight. Heat or sunlight can kill the TB bacteria in the specimens (Figure 13.4).
- Give the person another labelled container to take home and collect a specimen immediately after waking up the next morning.



Any child suspected of having TB should be referred to a Medical Officer/Clinician for diagnosis. The tuberculin test is a skin test to see if there is a reaction to extracts of TB bacteria.

- Explain to the person that before collecting this second specimen, he or she should rinse their mouth with water so that food or any other particles do not contaminate the specimen. This second specimen is the ‘early morning specimen’. It is important to tell TB suspects to bring this second specimen with them when they come back to you the following day.
- When the person comes back with their ‘early morning’ specimen the following day, take the third specimen ‘on the spot’.



Figure 13.4 A woman hands over her sputum sample to a health worker (Photo: courtesy of the Lung Health Image Library, World Lung Foundation).

Box 13.2 summarises the key action points involved in collecting sputum for TB case finding.

Box 13.2 Important points to remember about sputum collection

- Use three containers labelled with the person’s name; do not write the name on the lids.
- Collect specimens in an open area or a well ventilated room
- Check that the lid is tightly closed after the specimen is collected
- Wash your hands with soap and water after handling the container
- Ensure that three specimens are collected and kept safely before sending them to the laboratory
- Send the specimens with a request form to the nearest laboratory for examination.
- Tell the TB suspect when to come back for the laboratory result
- If the sputum is positive and the person does not come back to hear the result, then trace him or her as soon as possible, and explain the outcome and refer them for treatment. Treatment needs to be started immediately to prevent the spread of TB.

Summary of Study Session 13

- 1 Tuberculosis (TB) is a chronic disease caused by *Mycobacterium tuberculosis*, also known as TB bacteria.
- 2 Pulmonary TB affecting the lungs is the commonest type of TB; extra-pulmonary TB arises when TB affects other organs of the body.
- 3 TB is a major health problem in Ethiopia and around the world. The Global STOP TB strategy, including DOTS (directly observed treatment, short-course) is designed to reduce the level of TB infections and transmission.
- 4 Transmission of TB occurs mainly by inhalation of infectious droplets produced when an untreated person with TB coughs, sneezes, sings or talks.
- 5 Identification of the most infectious cases of tuberculosis (sputum smear-positive pulmonary TB cases) by screening sputum smears is crucial to TB control.
- 6 Three sputum specimens are sent in labelled containers to the laboratory for sputum examination. Tell the TB suspect when to come back for the result.
- 7 If a person who is smear-positive fails to come back for the report, locate and inform him or her about their TB status as soon as possible. Treatment needs to be started immediately to prevent the spread of TB.

Self-Assessment Questions (SAQs) for Study Session 13

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 13.1 (tests Learning Outcome 13.1)

In lay person's language, how would you describe TB and its symptoms to a person who comes to your Health Post? Explain why it is important to follow the treatment exactly.

SAQ 13.2 (tests Learning Outcomes 13.1 and 13.2)

What are the global targets for TB case finding and treatment?

SAQ 13.3 (tests Learning Outcome 13.2)

If the population of a *woreda* in Tigray is 200,000 people, what is the estimated number of new smear-positive TB cases? (Remember in Ethiopia as a whole, the estimated number of new smear-positive TB cases is 163/100,000 annually.)

SAQ 13.4 (tests Learning Outcomes 13.1 and 13.3)

What are the components of the Global STOP TB Strategy?

SAQ 13.5 (tests Learning Outcome 13.4)

How is TB spread?

SAQ 13.6 (tests Learning Outcome 13.5)

How does a health worker identify TB suspects from among all the persons in the community, or those visiting a health facility?

SAQ 13.7 (tests Learning Outcomes 13.1 and 13.5)

A person with smear-positive pulmonary TB lives with family members in your community. Whom among the family members are you going to screen for TB by sending sputum specimens to the laboratory?

Study Session 14 Diagnosis and Treatment of Tuberculosis

Introduction

In this study session you will learn about methods for diagnosis of tuberculosis, be introduced to different categories of patient with TB and also learn about treatment of tuberculosis with drugs, including the major side-effects of these medications. Even though you are not the person with responsibility for diagnosing and prescribing anti-TB drugs, having this information will enable you to swiftly identify and refer people suspected of having TB and ensure there is follow-up for confirmed cases. You will also learn more about the main method of diagnosis of TB, which is sputum examination under a microscope, and other supportive measures like chest X-ray, which is likely to help diagnosis of individuals who are smear-negative.

Your role is to make sure that every person diagnosed with TB takes the recommended drugs, in the right combinations and at the right time, for the appropriate duration. The best way to achieve this is for you to watch each patient swallow the drugs. This is called Directly Observed Treatment, Short Course (DOTS) and was introduced in Study Session 13. Directly observed treatment can take place at a hospital, health centre or health post, the patient's workplace or home. If drugs are taken incorrectly or irregularly, the patient will not be cured and drug resistance may arise. To a large extent, the success of TB treatment by drugs depends on your effectiveness in overseeing the patient's adherence to the treatment.

Learning Outcomes for Study Session 14

When you have studied this session, you should be able to:

- 14.1 Define and use correctly all of the key words printed in **bold**. (SAQs 14.1, 14.2 and 14.3)
- 14.2 Describe methods used to diagnose tuberculosis and the different types of case definitions. (SAQ 14.2)
- 14.3 Describe different treatment categories used to treat tuberculosis. (SAQs 14.2 and, 14.3)
- 14.4 Describe the main drugs used to treat tuberculosis and the processes that help you ensure patients are following the correct treatment schedules. (SAQ 14.3)
- 14.5 Describe the potential side-effects associated with the drugs used to treat tuberculosis and explain how such side effects are managed. (SAQ 14.4)

14.1 Diagnostic methods

In Study Session 13 you learnt about the clinical symptoms of TB. They are a cough for two or more weeks, spitting up blood in the sputum, weight loss, fever or night sweats for three or more weeks, fatigue, and loss of appetite, chest pains or difficulty breathing.

Sputum is a secretion coughed up from the lungs and expectorated (expelled) through the mouth.

Remember, taking a history from the person you suspect of having TB will allow you to determine if they need to be referred for a sputum examination.

A **low grade fever** is defined as a slight increase in body temperature that does not exceed 38.5°C.



Persons with one or more of these symptoms should be investigated for extra-pulmonary TB and referred urgently to a health facility.

- If a person comes to you complaining of a persistent cough that has lasted for over two weeks and they are also producing whitish sputum, what should you do?
- This person is showing symptoms that are consistent with an active TB infection. You should obtain sputum samples from this individual to send for sputum examination to confirm the diagnosis.

If you ask the right questions and make the right observations, you will be able to identify those individuals who you suspect of having TB. What to look for depends on the type of TB involved. The key symptoms of both forms of TB are summarised in Box 14.1.

Box 14.1 Key symptoms of both forms of TB

Active Pulmonary TB disease (PTB)

Pulmonary TB has several manifestations. The most common and obvious one is a persistent cough that lasts for two weeks or more which is usually accompanied with the production of whitish sputum.

Other key symptoms are spitting of blood, weight loss, low grade fever, loss of appetite, night sweating, chest pain and shortness of breath or difficulty in breathing. Any person with persistent cough of two or more weeks (with or without any of these other symptoms) should be suspected of having TB and you should refer them for a sputum examination.

Extra-Pulmonary TB disease (EPTB)

The symptoms of EPTB will vary depending on the organ affected (this was summarised in the previous Study Session in Table 13.2), but they can include: back pain, swelling on the spine, long-lasting bone infection, painful joint swelling (usually affecting one joint), painful urination, blood in urine, frequent urination, hoarseness of voice, pain on swallowing, headache, fever, neck stiffness, vomiting, irritability, convulsions, swelling of the lymph node with draining pus and long-lasting ulcers resistant to antibiotic treatment.

We will now describe in more detail different methods used to diagnose tuberculosis and other procedures that are used to diagnose extra-pulmonary tuberculosis (EPTB). Diagnosis of tuberculosis is made at health centres and hospitals, but you will make a vital contribution by identifying those individuals who may be infected with TB and referring them for investigation. Part of your role is to provide information and counsel those who are about to undergo diagnostic investigation and treatment.

14.1.1 Microscopic examination of sputum smears

Sputum microscopy is the most efficient way of identifying a tuberculosis infection. It is the primary tool used for diagnosing TB and for monitoring the progress of treatment until the patient is cured. You are expected to oversee the collection of sputum samples during initial diagnosis, and at various times during drug treatment to monitor the effectiveness of the treatment.

You will recall from Study Session 13 that three sputum samples will be collected over two consecutive days, and that one of the sputum samples is collected in the morning. The samples are sent to a laboratory and Figure 14.1 illustrates a health professional examining a sputum smear using a microscope. The smear is treated with chemicals that reveal the presence of TB bacteria and these can be seen using a microscope (they cannot be seen with the naked eye). The examined specimens are classified as being either **smear-positive** pulmonary TB or **smear-negative**. However, you should know that a smear-negative result could either mean the patient has TB but it is not showing in the sputum, or that the person does not have TB.

An example of a positive smear, seen under a microscope, is shown in Figure 14.2. The smear has been stained with chemicals to reveal the presence of TB bacteria (they appear as purple rod-shaped bacteria).



Figure 14.1 A health professional is examining a sputum smear under a microscope.

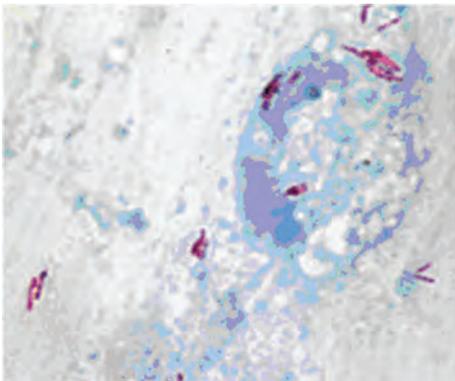


Figure 14.2 The photograph shows you what the health professional sees under the microscope and is an example of a smear-positive sputum specimen. (Photo courtesy of the WHO; *The Natural History of Pulmonary Tuberculosis, Facilitator Guide*, 2001).

A diagnosis of TB is made if at least two out of the three sputum smears are positive for TB bacteria. TB is also confirmed if one sputum specimen is positive for bacteria, and there is also evidence of abnormalities in a chest X-ray. Finally, in people living with HIV (or in the presence of a strong clinical suspicion of HIV infection), only one positive smear result is necessary to make a diagnosis of smear-positive pulmonary TB.

14.1.2 Chest X-ray

Chest X-ray is another tool used in diagnosing TB. It is particularly important when diagnosing TB in individuals who are smear-negative for the TB bacteria or who are unable to produce sputum. It is also an important diagnostic tool for those persons who may have extra-pulmonary tuberculosis; such individuals may not be able to produce sputum and should be referred to the doctor/clinician for a chest X-ray. It is also possible to have EPTB and a normal chest X-ray.

A chest X-ray can only be ordered by a doctor or a clinician.

- What distinguishes EPTB from PTB?
- In EPTB the active infection occurs in an organ other than the lungs (see Study Session 13, Table 13.2 for a list of organs that can be affected and the symptoms associated with EPTB infection).
- Why do you think a chest X-ray is useful in diagnosing TB?
- If you recall from Study Session 13, TB enters the body via inhalation of droplet nuclei contaminated with TB bacteria. Because they enter the body via the lungs they produce changes in the lungs that can be seen on a chest X-ray.

14.1.3 TB culture from sputum

Culturing of TB bacteria from a sputum sample in the laboratory is very expensive and takes several weeks to produce a result; however it is a very sensitive and highly specific tool. It plays a key role in identifying the type of drug-resistant TB found in a patient, such as those patients who are not responding to treatment as well as expected. Culture with Drug Sensitivity Testing (DST will be covered in Study Session 16) takes even longer; but provides crucial information about which antibiotics will kill the bacteria isolated from the patient. You should send patients for TB culture and DST if they are suspected of drug-resistance.

14.1.4 Biopsy

Biopsy is an important tool used to diagnose extra-pulmonary TB. It is the removal and examination of tissues from the living body to determine the existence or cause of a disease. It involves the microscopic examination of a small specimen of tissue extracted from the patient's body. It is particularly useful for diagnosing extra-pulmonary TB in the lymph nodes and joints, as well as other affected organs. It can also be used to confirm pulmonary TB by sampling lung tissue in smear-negative suspects. Again, only doctors and clinicians are allowed to request this type of examination to diagnose TB.

14.2 Treatment of tuberculosis

The main objectives of anti-TB treatments include: to cure TB patients (by rapidly eliminating most of the bacteria), to prevent death or organ damage from active TB, to prevent relapse of TB (by eliminating the inactive bacteria), to prevent the development of drug resistance (by using a combination of drugs) and importantly to decrease TB transmission to others.

14.2.1 Classifications of TB and treatment categories

Classifications of TB cases are based on the following factors and you will see these terms used when cases are confirmed:

- organ involved: pulmonary or extra-pulmonary
- sputum result: smear-positive or smear-negative
- history of TB treatment: new or previously treated or relapsed
- severity of the disease: severe or not severe (covered later in this study session).

A **culture** involves growing the bacteria in the laboratory; this test can only be ordered by a doctor or a clinician.

14.2.2 Definition of types of TB cases

You are already aware that a ‘case of TB’ is an individual in whom tuberculosis has been confirmed by microscopic examination, or diagnosed by a clinician or medical doctor.

However, there are several different types of TB cases (in other words different **case definitions**) and these are based on the smear result, history of previous treatment and severity of disease. These different case definitions are listed in Table 14.1, from which you’ll also see that if a patient does not fall into any of the main types, they are registered as ‘other’.

Knowing these different case definitions will help in your recording and reporting of cases, as well as giving you important information about the infectiousness of the patient, the risk of drug resistance, and where there is a need for follow-up of patients.

Table 14.1 Case definitions of TB patients

Type of patient	Case definition
New	A patient who has never had treatment for TB, or has been on anti-TB treatment for less than four weeks.
Relapse	A patient who has been declared cured or treatment completed for any form of TB in the past, but who reports back to the health service and is found to be sputum smear-positive or culture positive.
Treatment after previous treatment failure	A patient who, while on treatment remained sputum smear-positive or became sputum smear-positive at the end of the five months or more, after commencing treatment.
Treatment after default (did not complete previous treatment)	A patient who had previously been recorded as defaulted from treatment and returns to the health service with smear-positive sputum.
Transfer in	A patient who is transferred from another district to continue treatment.
Other	A patient who does not fit into any of the above categories.
Chronic case	A patient who is still sputum smear-positive at the completion of a re-treatment regimen.

14.3 Patient categories and treatment regimens

In order to establish treatment priorities, the WHO recommends that TB patients should be classified into four categories, as shown in Table 14.2. Patients are started on anti-TB drugs according to their category.

Table 14.2 Treatment category by type of patient.

Treatment category	Type of patient
I	Sputum smear-positive; new Sputum smear-negative; seriously ill, new EPTB; seriously ill, new Others (e.g. TB with HIV infection)
II	Sputum smear-positive; relapse Sputum smear-positive; failure Sputum smear-positive; return after default PTB patients who become smear-positive after two months of treatment (case definition = other) Return after default from re-treatment Relapses after re-treatment
III	Sputum smear-negative, not seriously ill, new EPTB, not seriously ill, new
IV	Chronic and drug resistant-TB cases (still sputum positive after supervised re-treatment)

Always keep in mind that patients with severe forms of EPTB may come to you with the types of symptom mentioned in Study Session 13, Table 13.2 — perhaps with TB affecting the lining of the brain (**TB meningitis**) or the kidney (**renal TB**) or the spine (**spinal TB**). You must refer such patients to the hospital for proper management because they need additional medication and/or special care. **Disseminated TB** is often used to describe TB involving two or more organs or tissues of the body and it is considered as one of the severe forms of TB.

14.3.1 Treatment regimens for different TB categories

If you are already a health worker, you will be familiar with the types of anti-TB drugs used in Ethiopia. However, we will teach the regimens here in detail because they may have been updated since you learned about them. The first line anti-TB drugs used are (drug abbreviation in brackets):

rifampicin (R), ethambutol (E), isoniazid (H), pyrazinamide (Z) and streptomycin (S).

These drugs are provided in combination. For instance R, H, Z and E are combined in one preparation in the proportions (RHZE 150/75/400/275 mg). Similarly, two drugs can be combined in one preparation, for example R and H are combined (RH 150/75 mg), and so are E and H (EH 400/150 mg). Some drugs are available as single drug preparations; such as ethambutol 400 mg, isoniazid 150 mg and 300 mg, and streptomycin sulphate vials (1 g). Streptomycin is administered by injection while the other drugs are taken orally. All the drugs should be taken by patients together as a single, daily dose, preferably on an empty stomach to improve drug absorption.



You should refer patients with the following symptoms urgently to hospital for proper management:

- Coughing up blood
- Increasing breathlessness
- Suddenly increasing chest pain
- Progressively deteriorating general condition.

A **regimen** is a defined course of drug treatment.

Vials are small glass bottles of liquid injectable medications (or vaccines).

14.3.2 Phases of chemotherapy

The **chemotherapy** (drug treatment) of tuberculosis has two phases, known as the intensive and the continuation phases.

Intensive phase

The **intensive phase** consists of four or more drugs for the first eight weeks for new cases, and 12 weeks for re-treatment cases. It makes the patient non-infectious by rapidly reducing the load of bacteria in the sputum, usually within two to three weeks (except in cases of drug resistance). During the intensive phase, the drugs must be collected daily by the patient and must be swallowed under the direct observation (DOTS) of you or another health worker or a treatment supporter.

Continuation phase

The **continuation phase** immediately follows the intensive phase and is important to ensure completion of treatment and a cure; it is essential to avoid relapse after completion of treatment. This phase requires at least two drugs, to be taken for four or six months in the case of Category I and Category III patients, or for five months for Category II patients. During the continuation phase, you should encourage the patient to go and collect the drugs every month — perhaps you can accompany the patient to collect the drugs — and then follow-up to ensure that the patient is taking their medication properly.

14.3.3 Treatment regimens

According to WHO recommendations and the national guidelines that apply in Ethiopia, the following treatment regimens should be used:

- Category I and III patients are treated in the intensive phase with combinations of four ‘first-line’ drugs: isoniazid, rifampicin, pyrazinamide and ethambutol for two months, which can be summarized as 2 (HRZE). In the continuation phase, they receive either a combination of isoniazid and rifampicin for four months 4 (HR), or a combination of isoniazid and ethambutol for six months 6 (HE).
- For Category I patients with a smear-positive sputum result after two months of intensive treatment, extend the intensive phase for an additional one month. Then follow the continuation phase as above. If a patient is still smear-positive after five months of treatment, then they need to be categorised as ‘treatment failure’ and restart treatment (Category II).
- Category II patients are treated with five drugs for the initial two months of the intensive phase: a combination of isoniazid, rifampicin, pyrazinamide and ethambutol 2 (HRZE), plus streptomycin (S); then continue with four drugs, excluding streptomycin, for an additional one month; then followed by five months of the continuation phase with isoniazid, rifampicin 5 (HR), and ethambutol (E).
- Category IV patients are treated with ‘second-line’ anti-TB drugs, which you do not need to know the details of.

Note that the number before the bracket refers to the number of months the drug is taken.

These different treatment regimens are summarised in Table 14.3.

Table 14.3 Recommended treatment regimens for each treatment category.

Treatment category	TB treatment regimen	
	Intensive phase (daily or three times every week)	Continuation phase (daily or three times every week)
I	2 (HRZE)	4 (HR) or 6 (HE)
II	2 (HRZES) followed by 1 (HRZE)	5 (HRE)
III	2 (HRZE)	4 (HR) or 6 (HE)
IV	Second-line drugs	Second-line drugs

The number in front of each drug combination indicates the number of months the drugs are taken. For example, 2 (HRZE) means that this combination is taken for two months.

Knowing this information will enable you to understand the type of drug regimen prescribed by the doctor or clinician for different patient categories. This will help you ensure that the drug treatment is being followed correctly.

Tables 14.4 and 14.5 show the amounts of the different drugs to be administered to patients — in particular the number of tablets they take at any one time. The number of tablets depends upon the body weight of the patient. You are not expected to know the precise dosage of each drug — for example how many milligrams of isoniazid is taken when the patient takes their tablets — but it is *very important for you to know the number of tablets a particular patient should be taking*. So it is important to check the weight of your patients periodically and refer them to a clinician for an adjustment of drug dose if there is change in their body weight during treatment.

Table 14.4 Drug dosage of Category I and III regimens: (2 HRZE) followed by (6 HE).

Regimen	Intensive phase (2 months)		Continuation phase (6 months)	
	2 (HRZE) daily		6 (HE) daily	
	H 75 mg + R 150 mg + Z 400 mg + E 275 mg tablets		H 150 mg + E 400 mg tablets	
Patient's weight	Number of tablets			
20–29 kg	1½		1	
30–39 kg	2		1½	
40–54 kg	3		2	
55–70 kg	4		3	
Over 70 kg	5		3	

Table 14.4 shows the 2 (HRZE) and 6 (HE) drug regimen for categories I and III. The Ethiopian Federal Ministry of Health have now approved a move to the adoption of 4 (HR) in the continuation phase in such cases, which means four months of isoniazid and rifampicin. It may be some time before 4 (HR) becomes the standard in such cases, so in Table 14.3 both 6 (HE) and 4 (HR) are shown.

Table 14.5 Dosage for Category II regimen: 2 (HRZES), then 1 (HRZE), then 5 (HRE)

Regimen	Intensive phase (3 months)		Continuation phase (5 months)
	2 (HRZES) then 1(HRZE) daily		5 (HRE) (three times per week)
	H 75 mg + R 150 mg + Z 400 mg + E 275 mg tablets	S (vials) 1 g intramuscular	H 75 mg + R 150 mg + E 400 mg tablets
Patient's weight (kg)	Number of tablets (or vials)		
20–29 kg	1½	½	1½ + 1
30–39 kg	2	½	2 + 1½
40–54 kg	3	¾	3 + 2
55–70 kg	4	1	4 + 3
Over 70 kg	5	1	5 + 3

- What is the regimen prescribed for the Category II relapsed TB patient?
- The drug regimen used for Category II is 2 (HRZES), then 1 (HRZE), then 5 (HRE). Because the intensive phase is three months, but streptomycin is used for only two months (56 doses), it is helpful to write a reminder on the card about when to stop streptomycin.

14.3.4 Anti-TB drug treatment in special situations

Pregnancy

Be sure to ask women patients whether they are pregnant. Most anti-TB drugs are safe for use in pregnancy, with the *exception* of streptomycin, because this can cause permanent deafness in the baby. Pregnant women who have TB must be treated, so ethambutol is used instead of streptomycin. Refer pregnant TB patients to a clinician who can prescribe the appropriate anti-TB drug regimen.

Anti-TB drug treatment for people with HIV on antiretroviral drugs will be discussed in Study Session 16.

Oral contraception

Rifampicin interacts with oral contraceptive medications with a risk of decreased protection against pregnancy. A woman who takes the oral contraceptive pill (which you'll probably know is medication used for preventing pregnancy) may choose between two options while receiving treatment with rifampicin, following consultation with a clinician. She could either take an oral contraceptive pill containing a higher dose of oestrogen (50 µg), or she could use another form of contraception. You should be in a position to give advice on the options for women in this situation; the Module on *Family Planning* will give you more guidance on topics such as this.

Breastfeeding

A breastfeeding woman who has TB can be treated with the regimen appropriate for her disease classification and previous treatment. The mother and baby should stay together and the baby should continue to breastfeed in the normal way.

The benefits of breastfeeding to the baby are greater than the risk of getting TB from the mother, or diarrhoeal diseases when the baby is fed with animal or formula milk using a feeding bottle. However, you need to advise the mother to take her child for screening for TB to a higher health facility. If the baby is not infected with TB, he or she will be provided with isoniazide preventive therapy. It is also important that the mother cover her mouth during coughing or sneezing, to prevent TB transmission to the baby.

14.3.5 Treatment of TB patients under Directly Observed Treatment (DOTS)

WHO recommends that directly observed treatment continue through the continuation phase if the regimen includes rifampicin.

As you appreciate from Study Session 13, DOTS is essential during the intensive phase of treatment (the first two to three months); it will also be needed during the continuation phase for patients with previous treatment failure who are being re-treated. Directly observed treatment ensures that the drugs are taken in the right combinations and on schedule, and that the patient continues treatment until all the doses have been taken. The health facility is the recommended place for treatment because of the ease of supervision. However, some patients live far away or do not find it convenient to come to a health facility, in which case you need to directly observe treatment at a place and time more convenient for them.



Figure 14.3 Patient under DOTS therapy. (Photo: Lung Health Image Library, World Lung Foundation)

14.4 Side-effects of anti-TB drugs and their management

14.4.1 Types and severity of side-effect

Side-effects are unwanted symptoms, discomfort or more serious adverse (harmful) consequences of drug treatment. Serious side-effects are rare in patients taking anti-TB drugs. A minority of TB patients treated with Category I or Category II regimens experience adverse side-effects categorised as:

- major adverse side-effects giving rise to serious health concerns that require the stopping of anti-TB treatment
- minor side-effects causing relatively little discomfort and often responding to simple treatment of the symptoms; they may occasionally persist for the whole period of anti-TB treatment.

Possible side-effects of the anti-TB drugs and their management are listed in Table 14.6.

Table 14.6 Symptom-based approach to management of anti-TB drug side-effects

Side-effects		Drugs	Management
(a) Minor (continue anti-TB drugs)	Decreased appetite, nausea, abdominal pain	rifampicin pyrazinamide	Give tablets with small meals or last thing at night
	Joint pains	pyrazinamide	Aspirin
	Burning sensation in the feet	isoniazid	Pyridoxine 100 mg daily
	Orange/red urine	rifampicin	Reassurance; symptom is harmless
	Itching, skin rash	streptomycin; rifampicin or isoniazid	Refer to higher health facility where TB treatment is available
(b) Major (stop the drug(s) responsible)	Deafness	streptomycin	Refer to higher health facility where TB treatment is available
	Dizziness (vertigo, imbalance and loss of balance)	streptomycin	Refer to higher health facility where TB treatment is available
	Yellowish discoloration of the eye (hepatitis)	most anti-TB drugs	Refer to higher health facility where TB treatment is available
	Vomiting and confusion	most anti-TB drugs	Refer to higher health facility where TB treatment is available
	Visual impairment	ethambutol	Refer to higher health facility where TB treatment is available
	Shock, skin rash and decreased urine output	rifampicin	Refer to higher health facility where TB treatment is available

In the next study session we turn to the subject of following-up patients and tracing patients who are not taking their medication.

Summary of Study Session 14

In Study Session 14, you have learned that:

- 1 Sputum examination should be done for all persons suspected of TB who are able to produce sputum; other diagnostic methods (chest X-ray, TB culture) support sputum examination but cannot replace it as the primary tool used for TB diagnosis.
- 2 Treatment for TB consists of the intensive phase (two to three months) followed by the continuation phase (four to six months). Treatment involves a combination of drugs.
- 3 If anti-TB drugs are taken incorrectly or irregularly, the patient will not be cured and drug-resistance may develop.
- 4 Health workers have to take an active role in ensuring that every TB patient takes the recommended drugs, in the right combinations, on the correct schedule, for the appropriate periods of time.

-
- 5 Anti-TB drugs are given under DOTS for the first two months for Category I and III patients, and for the whole course for re-treatment cases.
 - 6 If a patient has major side-effects related to the anti-TB drugs, refer the patient to a clinician or hospital. If the patient has minor side-effects, reassure the patient and give advice on how to relieve the symptoms.

Self-Assessment Questions (SAQs) for Study Session 14

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 14.1 (tests Learning Outcome 14.1)

What are the phases of anti-TB treatment and how do they differ from each other?

SAQ 14.2 (tests Learning Outcomes 14.1 and 14.2)

A 54-year-old farmer came to the health centre complaining of a cough that had lasted for over three weeks and produced whitish sputum. He also complained of low grade fever, drenching night sweat, marked loss of weight and decreased appetite.

- (a) How would you classify this farmer, and what would you do for him?
- (b) What additional test would you advise?

SAQ 14.3 (tests Learning Outcomes 14.1, 14.3 and 14.4)

W/r Almaz had experienced a cough with bloody sputum for one month; she was seen at a health centre and sputum examination showed positive for TB bacteria. She had no previous history of TB treatment.

- (a) How do you classify W/r Almaz based on the smear result?
- (b) Which type of patient is she (new, relapse, treatment failure, etc)?
- (c) What category of treatment is needed for this patient and what is the correct treatment regimen?

SAQ 14.4 (tests Learning Outcome 14.5)

A 34-year-old female was diagnosed by sputum examination to have pulmonary TB and started on anti-TB drugs two weeks ago. She noticed reddish discoloration of her urine, but has had no other symptoms for one week. She was worried and came to you.

- (a) What do you think is the most likely cause of discoloration of the urine in this patient?
- (b) What advice would you give her?

Study Session 15 Follow-up of Patients on Anti-Tuberculosis Treatment and Defaulter Tracing

Introduction

In this study session you will learn about the follow-up of patients put on anti-tuberculosis drugs during the intensive and continuation phases of treatment. You will also read about what to do when people with TB default (i.e. stop their medication in the course of treatment) and how to trace them. TB treatment is a long process and it is critical to maintain contact with patients throughout treatment to ensure successful outcomes. However, sometimes circumstances interfere with maintaining contact, so that these patients stop their medication or take their drugs irregularly, often resulting in development of drug resistance by the TB bacteria in the patient's body. This study session will describe how to maintain contact with patients, even in difficult circumstances, and thus improve the chances that they will complete treatment and be cured of their illness.

Learning Outcomes for Study Session 15

When you have studied this session, you should be able to:

- 15.1 Define and use correctly all of the key words printed in **bold**. (SAQ 15.1)
- 15.2 Describe how tuberculosis patients are monitored during the intensive and continuation phase of treatment with anti-tuberculosis drugs. (SAQ 15.1)
- 15.3 Describe the arrangements for medical referrals and transfer of tuberculosis patients to ensure that people with TB continue treatment. (SAQ 15.1)
- 15.4 Describe how you can trace those people with TB who default from tuberculosis treatment, and how you should try to resolve this problem. (SAQ 15.2)
- 15.5 Define the possible anti-tuberculosis treatment outcomes. (SAQ 15.3)

15.1 Monitoring of TB patients during treatment

In the first part of this study session you will learn how to follow patients throughout the course of anti-TB treatment by checking the results of sputum examinations and hence monitor their clinical response to treatment. For patients who interrupt their medication, we will also talk about possible reasons for them doing so and how such problems can be resolved.

Like any medical activity, TB programmes need continuous monitoring. To achieve this, patients need to be followed very strictly and the outcome of treatment needs to be clearly defined. As a health worker, your role is very important in ensuring patients are taking their drugs properly. This is called **adherence** to treatment. Part of your responsibility is to tell your patients very clearly not to interrupt their treatment and to look for side-effects of drugs of the type described in Study Session 14 and to seek help accordingly.

Monitoring is the regular observation and recording of activities and results taking place in a programme.

15.2 Refilling of medication and adherence to treatment

It is important for you to monitor all individuals with TB during treatment, both adults and children — checking that they are taking their medication properly during the intensive phase of treatment, and that they are periodically collecting their drugs during the continuation phase — this is called **refilling** their drugs.

Monitoring with sputum examination is readily available only for patients with sputum smear-positive pulmonary tuberculosis and these are usually adults and older children. Routine monitoring of treatment response by chest X-ray (recall from Study Session 14) is unnecessary and wasteful of resources because it is not readily available and also costly to the patient. But if patients with smear-negative TB and extra-pulmonary TB do not show clinical improvement (their symptoms do not improve and there is no weight gain), or if patients get worse during or after anti-TB drug treatment, you must refer such patients to a hospital for further evaluation. For such patients, it is essential that you monitor clinical symptoms and keep monitoring their weight over time.

- How is the monitoring that you do different in the intensive and continuation phases?
- In the intensive phase, monitoring drug taking involves directly observed therapy; in the continuation phase, you need to check that patients are refilling their anti-TB drugs from the health centre or hospital.

How can you ensure that patients are adhering to their treatment regimen? In all your interactions with patients, you need to be strong-minded and clear in your instruction, but also polite, considerate and respectful. Always treat the patient with dignity and give the patient every opportunity to voice concerns and to regularly ask questions.

Behaving in this way will help create a relationship of trust and confidence between you as the DOTS provider and the TB patient, which will help bring about the patient's adherence to treatment. Also, adherence is all the more likely if the patient and his or her family members learn from you the basic information about TB, including what is necessary for effective treatment and cure.

15.2.1 Monitoring of patients with sputum smear-positive pulmonary TB

As you have learnt in Study Session 13, sputum examination is required for diagnosis for all persons suspected of TB who are able to produce sputum; this test is also essential for follow-up of smear-positive TB individuals, as we will now discuss. Table 15.1 shows the required schedule of sputum examination for a smear-positive TB patient during treatment. You must refer the patient for testing at the times on this schedule.

Table 15.1 Monitoring of patients with sputum smear-positive pulmonary TB.

When to refer patients for sputum smear examination	8 month treatment regimen	6 month treatment regimen
At time of diagnosis	All persons suspected of having TB and producing sputum	All persons suspected of having TB and producing sputum
At end of intensive phase (end of two months)	Smear-positive TB patient at diagnosis needs sputum examination at end of two months	Smear-positive TB patient at diagnosis needs sputum examination at end of two months
In continuation phase	Smear-positive TB patient at diagnosis needs sputum examination at month five	Smear-positive TB patient at diagnosis needs sputum examination at month five
At end of treatment	Smear-positive TB patient at diagnosis needs sputum examination at month eight	Smear-positive TB patient at diagnosis needs sputum examination at month six

- Most patients improve their symptoms within the two months of the intensive phase of drug treatment and as a result some patients assume that they are cured. Should such patients stop taking their drugs if they feel better?
- No — it is essential that they continue taking drugs up until the end of the continuation phase, in other words that they fully adhere to the treatment.

Sputum smears at the end of the intensive phase

The majority of patients will have a negative sputum smear at the end of the intensive phase. If the sputum smear is still positive at this time, intensive phase treatment with the same four drugs 1 (RHZE) should be continued for four more weeks. When the sputum smear is checked again after this extra period, it is unlikely still to be positive. The continuation phase should be continued even if the sputum smear after the extra four weeks of intensive phase treatment is still positive.

Sputum smears in continuation phase

In eight month treatments, a positive smear at five months (or any time after five months) means treatment failure. In six month treatments, a positive sputum smear at five months (or any time after five months) means treatment failure. The patient treatment category changes to Category II (you should recall what this means from Table 14.2 in Study Session 14), and the re-treatment regimen described in Study Session 14 begins.

Sputum smears on completion of treatment

If a patient has a negative sputum result at the end of treatment and one additional result at the end of two months, or at five months, that is also negative — the patient is defined as cured.

15.3 Referral of people suspected of being infected with TB and TB cases

You know from Study Sessions 13 and 14 that a very important role for you is referring people suspected of having TB — specifically those with a cough for two or more weeks — to a health institution for TB diagnosis. Referrals can come about in other ways. Sometimes a doctor may diagnose TB and then refer the patient with the drugs to your health facility to continue their treatment under your supervision. Those patients need registration at your level and continued follow-up needs to be put into place.

If a patient is very sick or has major treatment side-effects (recall Study Session 14), it may be necessary to refer the patient to a doctor or to a hospital for care of the acute problem. However, sometimes such a patient then believes that, because of the treatment received at the hospital, there is no need to come to you for regular TB treatment and he or she may then discontinue treatment. When a referral of this type comes about, discuss the situation with the patient and their family and emphasise the need to return to your health facility to continue treatment after discharge from the doctor or hospital.

15.3.1 Coordinating transfers when a patient is moving

If a registered patient plans to move out of the area permanently, find out when and where the patient is moving and identify an appropriate treatment facility in the new area. In your discussions with the patient in the period before the move, stress the need to continue treatment and the importance of reporting to the new health facility (Figure 15.1). Make sure that the patient understands that to be cured, he or she must continue taking all of the required drugs for the entire time required. If necessary, provide self-administered doses for several days until the patient has reached their new home.

If you do not receive confirmation from the receiving health facility, contact the facility to ask whether the patient has reported for treatment. If not, tell the facility where to locate the patient. Ask the District TB Coordinator whether there is any new information about the patient. If the transfer is never confirmed (i.e. the patient never reports to the new facility), the patient's treatment outcome will be recorded as a 'transfer out (transfer TB patient to other health facility)'. If the transfer is confirmed, at the appropriate time, ask the new health facility where the patient was referred about his or her treatment outcome, so that you can record it on the patient's registration.

So, remember that it is the responsibility of the originating health facility (in other words, the first one involved) to find out about the treatment outcome for a patient who transfers out, but you can help the process. When you receive a patient from another health facility, make a note that this is a transferred-in patient to remind you to report the treatment outcome to the originating health facility. When any patient completes treatment, check to see whether the patient has been transferred in. If so, contact the originating health facility and report the treatment outcome.



Figure 15.1 A health worker discusses the needs of a TB patient who is about to move to another area.

It is important that you are in contact with the District TB Coordinator — this is the person who controls and coordinates TB activity at district level. If the patient originates from your district, it is your district's responsibility to find the treatment outcome for the patient.

15.3.2 Arrangements for patients who travel

During their regular treatment visits, ask patients to inform you if they have plans to travel, so that arrangements can be made to continue treatment without interruption. If a patient is to travel out of the area, or will be unable to have directly observed treatment for one or more days, provide instructions and drugs for a short period of self-administration; if necessary, you may provide drugs for up to two weeks.

If the patient's drugs are not pre-packaged, prepare a separate packet of drugs for each day that the patient will be absent (Figure 15.2). Give the patient careful instructions, in your conversation with him/her and in writing, about how to take the drugs. Point out the number and colour of the drugs in each day's packet and tell the patient to take the drugs at the same time each day, take the pills with water and take all of the drugs for the day together.



Figure 15.2 Anti-TB drugs are being sorted into separate packages for a patient who is about to travel to another district (Photo: courtesy of the World Lung Foundation/Gary Hampton).

Ask questions such as 'how do you take the medication?' and 'do you divide the dose?' to make sure that the patient understands when and how to take the drugs. On the patient's registration, record the days when you observed treatment and then draw a line through the days on which the patient will take self-administered drugs.

15.4 Tracing patients who missed doses and defaulters

What about patients who miss doses and those (called **defaulters**) who discontinue their treatment during the course?

15.4.1 Conducting home visits for patients who miss a dose

If a patient misses a dose of anti-tuberculosis medication during intensive treatment for more than 24 hours, find the patient by making a home visit within the next couple of days. Use the address on the patient's TB registration to find the patient. When you go on the home visit, take the patient's drugs with you. If the patient is not at home, ask the family or neighbours where the patient is and see if you can find out why treatment was missed. If necessary, visit the contact person listed on the patient's TB registration.

If a patient will be travelling or absent for longer than two weeks, identify a health facility in the area where the patient's treatment can be followed.

Give the patient the missed doses one day at a time. Do not give an extra dose on any days.

When the patient is found, talk to the patient and the family about the problem that caused the interruption in treatment. Ask direct questions such as: ‘Why did you miss your appointment?’ and ‘Will this problem happen again?’ When you have found the cause of the problem, try to help the patient to solve it with the help of the information given in Table 15.2.

Table 15.2 Some examples of possible causes and solutions for missed doses of anti-TB medication.

Examples of possible causes of missed doses	Possible solutions
Coming to the health facility is inconvenient.	Identify a convenient community TB treatment supporter.
Patient dislikes coming to the health facility because of the long queue.	Make arrangements so that TB patients do not have to wait in a queue. For example, let them enter through a back or side door.
Supervisor at work kept the patient late.	<ul style="list-style-type: none"> • Offer to talk with the supervisor and explain the importance of the treatment, or • Identify a community TB treatment supporter at work.
Patient had troublesome side-effects.	<ul style="list-style-type: none"> • Give appropriate advice for side effects, or • Refer the patient for further evaluation.
Patient had difficulty swallowing because of pain (due to oral ulceration, common in AIDS patients).	Give appropriate advice and refer patient as necessary for further evaluation.
Patient cannot leave small children at home and is tired of bringing them to the health facility.	<ul style="list-style-type: none"> • Suggest that a family member or neighbour watch the children. • Remind family members/neighbours that the patient must continue treatment to protect their health, and particularly the health of the children. • If possible, identify a community TB treatment supporter closer to the patient’s home.
The patient may simply need to be forced to comply and be reminded of the reasons not to interrupt treatment.	<p>Remind the patient of the need to take all of the recommended drugs together, for the recommended time, to be cured. Even after beginning to feel better, the patient must continue taking the drugs for the entire period of treatment.</p> <p>Motivate the patient with statements such as the following:</p> <ul style="list-style-type: none"> • TB can be cured if you keep coming for the medicine, and then you will not have to worry about it any more. • You only have 10 more doses to take every day. After that, you will come less often. • These are the safest, most effective drugs available to treat TB anywhere in the world. • Almost all patients who take their medicines as recommended are cured. • If you keep taking your medicine, you will not spread TB to your family.

15.4.2 Home visits for patients who fail to collect drugs for self-administration

Suppose a patient on a self-administered continuation regimen fails to collect the drug supply on the appointment day. What should you do? If a patient does not come for the drugs within a week, visit the patient’s home to find the

patient, deliver the drugs and determine the problem. Try to solve any problems after discussion with the patient, as outlined in Table 15.2.

15.4.3 Tracing patients who interrupt treatment

If you cannot locate a ‘defaulter’ patient who has interrupted treatment at the home address recorded on the TB unit register form, try to find the patient through the contact person listed on the card. Seek information and leave messages with neighbours and relatives or at the patient’s workplace. Try to find out whether the patient is just temporarily missing or has permanently moved. If the patient has moved, try to find out the new location and notify the District TB Coordinator. In this way the patient may eventually be transferred to the care of another health facility.

If a patient is found and resumes treatment within a month, the same treatment should be continued and should be prolonged to make-up for the missed doses. If treatment is interrupted for between one and two months, the patient will need a new sputum examination before the appropriate treatment can be determined. If treatment is interrupted for two months or more, the patient has defaulted. The treatment outcome ‘default’ should be entered on the TB unit register form. If the patient returns, he or she will need to be re-assessed to determine the appropriate treatment.

15.5 Treatment outcomes

As you know, treatment is completed when the patient has taken the correct number of doses of the continuation-phase drugs. If the patient has missed some doses along the way, the duration of the treatment extends until all the doses in the patient’s drug box are taken, which will be some days or weeks longer. Some patients do not complete treatment, either because they die during treatment or more likely they stop coming for treatment and cannot be located. When each patient completes treatment or stops coming for treatment, record that patient’s outcome on the TB treatment registration form.

Possible treatment outcomes are defined as follows:

Cured

An intensively smear-positive patient who is sputum smear-negative at completion, or one month prior to the completion of treatment, and on at least one previous occasion (usually at the end of the second or fifth month).

Treatment completed

A patient who completed treatment but for whom smear results are not available at month seven or one month prior to the completion of treatment.

Treatment failure

A patient who remains or becomes again smear-positive at the end of month five or later during treatment. The same outcome would apply to a patient who was sputum smear-negative at the beginning of treatment and smear-positive at the end of the intensive phase.

Died

A patient who dies for any reason during the course of treatment.

Defaulter

A patient who has been on treatment for at least four weeks and whose treatment was interrupted for eight or more consecutive weeks.

Transfer out

A patient who started treatment and was transferred to another reporting unit and for whom the treatment outcome is not known at the time of evaluation of treatment results.

Treatment success

The total number of patients who are declared ‘cured’ and those who have ‘completed’ treatment.

At the end of treatment of tuberculosis with anti-TB drugs the outcome for the treated patient should be documented and reported to the District Health Office. You will no doubt be very pleased with ‘cures’ and you should achieve some satisfaction that as a HEP you have contributed to making such a difference to a person. In fact, for all the TB patients that come into your care, you are in a position to make an important contribution to improving their well-being and increasing the chances of success.

Summary of Study Session 15

In Study Session 15, you have learned that:

- 1 Patients on anti-TB drugs must be monitored throughout the course of treatment for adherence and potential side-effects.
- 2 Sputum examination during follow-up is important for smear-positive TB patients and looking for symptom improvement is essential for other forms of TB.
- 3 When a TB patient is referred to a hospital or clinician for special care, inform the patient and the receiving clinician that the patient is expected to return to the original health facility for continuing TB treatment after referral care is completed.
- 4 When a patient moves and transfers to a new treatment facility, follow-up to ensure that the transfer is successfully completed.
- 5 It is the originating (first) health facility’s responsibility to find out the treatment outcome for a patient who transfers out.
- 6 The outcome ‘transfer out’ is used only if the patient was transferred and another outcome cannot be determined.
- 7 If TB patients must travel, drugs may be provided for up to two weeks of self-administration (if the patient will be absent for more than two weeks, a transfer should be arranged).
- 8 If a TB patient misses a dose for more than 24 hours, make a home visit within the next 24–48 hours, give patients the missed dose only, finding out reasons for missed treatment.

- 9 If a TB patient on a self-administered regimen fails to refill the drug supply within a week of the scheduled day, use a home visit to find the patient, deliver the drugs and determine the problem.
- 10 If a TB patient interrupts treatment, make every effort to find the patient through family, neighbours and the contact person listed on the TB registration form.

Self-Assessment Questions (SAQs) for Study Session 15

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 15.1 (tests Learning Outcomes 15.1, 15.2 and 15.3)

For each of the following statements, decide if it is true or *false*. In each case explain your reasoning.

- A Monitoring of TB treatment is the regular observation and recording of activities taking place during treatment of patients with anti-TB drugs.
- B Smear-positive patients do not require sputum examination at five months into treatment.
- C After a temporary referral to a clinician or hospital, a patient should return to the original health facility to continue treatment for TB.
- D When a TB patient transfers to a new facility, that facility should notify the original health facility that the patient has reported for treatment.

SAQ 15.2 (tests Learning Outcome 15.4)

Suppose a known TB patient has been on anti-TB drugs for six weeks and they interrupt treatment for two weeks. What would you do for this patient and what advice would you give him/her for the future?

SAQ 15.3 (tests Learning Outcome 15.5)

For each of the following scenarios, write down the appropriate treatment outcome:

- (a) A TB patient who developed severe skin rash is referred from your health facility to the health centre health officer. The patient never returns to the health facility. The rash went away, but the health officer has not seen the patient for two months.
- (b) A TB patient plans to move and transfer to another health facility. You send the patient with a TB referral/transfer form. The receiving health facility never confirms that the patient has reported.
- (c) A TB patient on treatment transferred to a new health facility, but you do not receive written confirmation. Later you contact the new health facility and find that the patient has reported there for treatment. At the appropriate time you contact the health facility again and find that the patient has been cured.

Study Session 16 Tuberculosis Treatment in Special Conditions: TB in Children, HIV/TB and Drug Resistant TB

Introduction

In this study session, you will first learn about diagnosis and management of tuberculosis in children and how this differs from the adult (Section 16.1). Section 16.2 discusses what happens with patients who are infected with both TB and HIV — an example of a **co-infection** — and how this is managed. Finally, in Section 16.3 we look at the situation where patients have TB that is resistant to drugs.

Of all TB cases registered with the National Tuberculosis programme in Ethiopia, up to a fifth occur in children. Children can present with TB at any age, but the most common age is between one and four years. In most cases, TB in children is a result of primary TB (i.e. the first infection) from an infectious adult or older child, unlike cases in adults which are most often due to reactivation of a previous TB infection. The best way to prevent childhood TB is therefore by proper identification of those who may be infected with TB, and treatment of active TB patients in the home and community.

The HIV epidemic has made the position with regard to TB worse by increasing the risk of reactivation of latent TB infection and by facilitating more rapid progression of TB disease. TB can readily be transmitted to both HIV-negative and HIV-positive households and to other close contacts of infectious patients.

Learning Outcomes for Study Session 16

When you have studied this session, you should be able to:

- 16.1 Define and use correctly all of the key words printed in **bold**. (SAQ 16.3)
- 16.2 Describe the key differences in the diagnosis and management of TB in children and adults. (SAQ 16.1)
- 16.3 Identify the key factors that will help you look after patients with HIV/TB co-infection. (SAQ 16.2)
- 16.4 Describe the main causes and consequences of drug-resistant tuberculosis. (SAQ 16.3)

16.1 Diagnosis and management of TB in children

In this section, you will learn how to diagnose and treat TB in children and how to follow their progress after treatment. The diagnosis is made at the health centre or hospital and children will be referred to you to continue treatment in the community under your supervision. The families of children who have TB may ask you questions regarding the drugs that their child is required to take, so it is very important to know a little about the major anti-TB drugs, even though you are not the key person involved in diagnosing TB and prescribing anti-TB drugs.

Note that sputum smear-negative, but culture positive patients are also infectious, but to a lesser degree.

Very often children who are exposed to a positive contact within their close environment (especially the household), will acquire tuberculosis infection. A **close contact** is defined as someone living in the same household, or being in frequent contact with a person who is sputum smear-positive for TB. This exposure leads to the development of a primary (the first or original) lesion in the lungs, which is likely to spread to the regional lymph node(s). In the majority of cases, the child's immunity will control the disease process at this stage. Progression to TB disease occurs more commonly in children under five years of age and in children who are HIV infected (because their immune systems are therefore compromised), or who have had measles, or who are malnourished.

16.1.1 Symptoms of childhood TB

Children with TB develop chronic symptoms in most cases, and TB may be a more acute disease in the presence of HIV infection. The commonest symptoms that parents notice are:

- *Chronic cough*: persistent cough (present for more than two weeks) and not improving.
- *Fever*: fever of greater than 38°C for 14 days, after common causes such as malaria and pneumonia have been ruled out.
- *Weight loss*: documented weight loss or failure to gain weight.



Figure 16.1 A mother suspected of TB coughing and releasing droplet nuclei into the air that could infect other members of the household, particularly children. People with HIV are at greater risk of being infected with TB.

16.1.2 Signs of childhood TB

The clinical picture of pulmonary TB in older children is similar to that of pulmonary tuberculosis in the adult. For older children capable of producing sputum, samples should be collected as for adults. A range of additional physical signs are suggestive of EPTB. These can include swelling over the spine (called a gibbus) and/or an enlargement of the side of the neck, and neck rigidity not responding to treatment with antibiotics. Other signs are abdominal swelling and non-painful enlarged joints. If a child has the symptoms of pulmonary or extra-pulmonary TB, you should refer him or her for investigation.

The diagnosis of TB in younger children (less than a year of age) can be more difficult. One of the indicators that you should be aware of is contact with a family member or close associate with TB. Another key factor in diagnosis is loss of weight and failure to thrive. One of the problems is that children of this age rarely produce sputum and, as you know, this laboratory test is the main method of diagnosis in adults.

In those cases of younger children where you suspect TB, you must tell the family to take the child to a higher health facility for diagnosis. To make the diagnosis of childhood TB with a fair degree of accuracy, one or more of the tests outlined in Box 16.1 are generally followed.



You should always ask adult TB suspects and patients if there are children in their households. Any child suspected of having TB should be referred for investigation.

Box 16.1 Recommended approach for diagnosing TB in children

- Careful history-taking, including history of TB contacts and symptoms consistent with TB
- Clinical examination, including growth assessment; where you see failure to grow, especially in younger children, and weight loss, suspect TB and send the child for investigation
- Sputum examination; children able to produce sputum should submit sputum for examination
- Chest X-ray; this investigation is relevant for suspected pulmonary TB cases not producing sputum and for extra-pulmonary TB
- Biopsy for extra-pulmonary TB; this procedure was mentioned in Study Session 14
- HIV testing; where appropriate, advise the parents of a child TB suspect to agree to an HIV test for the whole family.

16.1.3 Diagnosis of tuberculosis in HIV-positive children

As in adults, pulmonary TB (PTB) is the most common manifestation of TB in HIV-positive children. The diagnosis of PTB in children under four years old has always been difficult, and infection with HIV makes the effective diagnosis of TB in such cases more challenging.

The approach to diagnosing TB in HIV-infected children is essentially the same as for those children who are HIV-negative, i.e. the presence of three or more of the characteristic symptoms indicates a diagnosis of TB. It is especially important to look for chronic symptoms suggestive of TB, and for physical signs that are highly suggestive of TB — including the results of chest X-ray findings (refer to Study Session 14). Children who present with chronic symptoms suggestive of TB also need testing for HIV infection.

16.1.4 Treatment of tuberculosis in children

As you read in Study Session 13, DOTS (Directly Observed Treatment, Short-course) should be used for all children with tuberculosis. Even when drugs are given under DOTS, tolerance of the medications must be closely monitored. Do not rely solely upon the parents of the child to supervise DOTS; you are responsible for monitoring.

Table 16.1 show different categories of TB cases that you are already familiar with, together with the drug treatment regimen required in children (the number of months for each treatment is indicated by the number in front of the bracket containing the drug combination).

Table 16.1 TB diagnostic category and the recommended treatment regimen in children.

TB treatment category	TB cases	Regimen (daily or three times every week)	
		Intensive phase	Continuation phase
I	<ul style="list-style-type: none"> • New smear-positive pulmonary TB • New smear-negative pulmonary TB with extensive involvement of lung tissue • Severe forms of extra-pulmonary TB (other than TB meningitis) • Co-infection with HIV disease 	2 (HRZE)	4 (HR)
I	TB meningitis	2 (HRZS)	4 (HR)
II	Previously treated smear-positive pulmonary TB: relapse, treatment after interruption and treatment failure	2 (HRZES) followed by 1 (HRZE)	5 (HRE)
III	New smear-negative pulmonary TB (other than in category I). Less severe forms of extra-pulmonary TB	2 (HRZ)	4 (HR)
IV	Chronic and MDR-TB	Specially designed standardised or individualised regimens	

- What are the differences in the drug treatment regimens for adults and children for each category? (Hint: compare Table 16.1 and Table 14.3).
- In general, the treatment of TB in children is similar to that used to treat adults. However, there are some important differences; if you study Table 16.1 very closely, alongside Table 14.3 from Study Session 14, you will notice some differences. For children, the continuation phase in Categories I and III uses isoniazid and rifampicin in combination (HR), and during the intensive phase for Category III, a combination of three drugs is used (isoniazid, rifampicin and pyrazinamide (HRZ)). For cases of TB meningitis in children, streptomycin is used instead of the preferred drug for adults, ethambutal.

16.1.5 Management of TB in HIV-infected children

Children with TB should be screened for HIV; likewise, HIV-positive children should also be investigated for TB. International guidelines recommend that TB in HIV-infected children should be treated using a six-month drug regimen similar to that used for HIV-negative children; however rifampicin should be given for the entire duration of treatment. It has been found in HIV-infected adults that higher relapse rates occur when ethambutol is used in the continuation phase.

16.1.6 Follow-up and referral of children with TB

As a health worker, you will need to do all you can to administer the chosen treatment and ensure that patients adhere to what they have been told to do. Many children with TB can be managed on an out-patient basis. However, some conditions, such as TB meningitis and other types of EPTB where the infection has spread to organs of the body other than the lung, may require hospitalisation, usually for the first two months of anti-TB treatment. If you find cases where children have respiratory distress, TB involving the spinal cord or they develop severe side effects, they should also be referred to a hospital.

At a minimum, follow-up should include an assessment of symptoms, an evaluation of adherence, an inquiry about any adverse events or side-effects, and the weight of the child should be measured. If the child is losing or gaining weight, they should be referred, because it may be necessary to adjust their medication. As with adult patients, children who were smear-positive for TB at the beginning of treatment should be referred for follow-up sputum smear microscopy at two months, five months, six months and eight months. A child who is not responding to TB treatment should also be referred for further assessment and management.

16.2 TB/HIV co-infection

A person not infected with HIV usually has some natural immunity against tuberculosis. However, the HIV-infected person will be more vulnerable to infection because they will have lost some of their natural immunity. This provides the TB bacteria with a favourable environment in which to multiply and bring about the full disease, showing all the common signs and symptoms. Raising awareness of **TB/HIV co-infection** is an important role for all health workers (Figure 16.2).

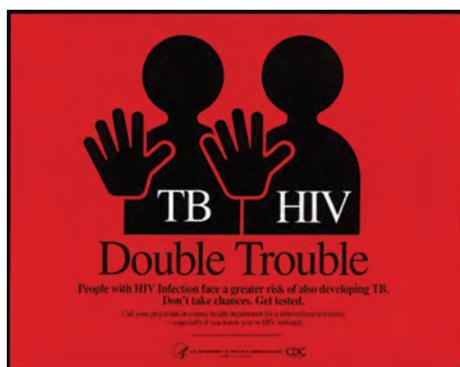


Figure 16.2 Poster campaign to raise awareness of TB/HIV co-infection. (Source: Center for Disease Control and Prevention, USA, accessed from: http://apps.nlm.nih.gov/againsttheodds/exhibit/action_on_aids/new_disease.cfm)

16.2.1 Effect of HIV on tuberculosis

Ethiopia has one of the highest levels of TB/HIV co-infection in Africa. The WHO Global Report of 2008 estimates that in Ethiopia, 40% of TB patients tested for HIV were HIV-positive, while routine data from 1999 EFY (2006/7) estimates that as many as 31% of TB patients were co-infected with HIV.

Health workers should strongly recommend and routinely offer HIV testing to all TB patients and TB suspects, after providing adequate information on the benefits of such testing.

HIV increases the risk of infection with *M. tuberculosis*, and more importantly, increases the risk of progression to TB disease, and hence the incidence and prevalence of active TB. In addition, the HIV pandemic has led to an increase in the number of patients developing side-effects to anti-TB drug treatment. This has produced an increase in the workload for healthcare providers, which can compromise the quality of service and deplete resources. It has also been found that latent TB infection in HIV-positive persons reactivates at a rate of 10% per year, as opposed to 5–10% over a lifetime for HIV-negative persons. HIV-positive persons are prone to re-infection with new strains of TB from the community, and drug resistance may occur more frequently in TB/HIV co-infections.

16.2.2 Effect of tuberculosis on people living with HIV

TB is the leading cause of illness and death among people living with HIV (PLHIV). It increases the occurrence of other infections, increases the rate at which HIV progresses, and influences antiretroviral therapy (ART) in various ways. Late diagnosis and delayed treatment of TB contributes to increased death rates in PLHIV.

A new strategy for tuberculosis control in high-HIV prevalence populations has been developed and the various approaches are summarised in Box 16.2.

Box 16.2 New strategies for dealing with TB/HIV co-infections

Activities directed against TB control are:

- Intensified case finding (look actively for TB suspects and investigate for TB)
- Treatment of TB cases (reduces risks of transmission)
- Isoniazide Preventive Therapy (IPT) for patients who are HIV-positive but do not have an active TB infection. This is also recommended for children in contact with active pulmonary TB and children investigated for TB but found to be normal. This treatment prevents progression of TB infection to active disease.
- BCG vaccine, given to children at birth. It is a modified ‘live’ vaccine for the prevention of severe forms of TB (TB meningitis, disseminated TB) which usually occur in childhood. It is one of the vaccines in Ethiopia’s Expanded Programme of Immunization (EPI).

Activities directed against HIV (and therefore indirectly against tuberculosis) are:

- Safer sexual practices (e.g. use of condoms) to prevent transmission of the virus
- STI (sexually transmitted infection) treatment to reduce the risk of transmission of HIV
- Cotrimoxazole Preventive Therapy (CPT) prevents development of other opportunistic infections
- Antiretroviral therapy (ART) to suppress HIV multiplication and increase natural immunity against TB infection.



If an HIV-positive patient develops symptoms of TB, it is essential you encourage them to seek treatment and refer them to a treatment facility.

BCG vaccination is described in the *Immunization* Module.

All of these topics are covered in detail in the Study Sessions on HIV/AIDS in Part 3 of this Module.

16.2.3 TB classification in HIV-positive patients

Classification of TB for those individuals who are also HIV-positive differs slightly from the classification categories described in Study Session 14. They are all category I patients, but can be further classified into one of three revised sub-categories. This revision was introduced by the WHO in 2009 and you will need to be aware of these revised categories for registration and the follow-up of patients with both diseases. The revised sub-categories are listed below:

- (a) Smear-positive pulmonary tuberculosis (one or more sputum smears found to be positive for TB bacteria)
- (b) Smear-negative pulmonary tuberculosis
- (c) Extra-pulmonary tuberculosis.

16.2.4 Diagnosis of TB in HIV-positive patients

The following methods are used for diagnosis of TB in HIV patients; whenever you suspect patients having both diseases you need to send them for investigation.

Clinical examination

Pulmonary tuberculosis is the most common manifestation of tuberculosis in adults infected with HIV. Tuberculosis occurs at various stages of HIV infection, with the clinical pattern correlating with the patient's immune status and could broadly be classified as early and late presentation. If a patient presents during the early stages of HIV-infection, the symptoms of TB are usually similar to those seen in non-HIV patients. However, if the patient comes at a late stage of HIV-infection, the presentation of TB is similar to primary TB, or it may spread to different organs. The clinical features in pulmonary TB are generally similar in HIV-infected and HIV-negative patients. However, cough and spitting of blood are reported less frequently by HIV-infected patients.

Sputum examination

Most HIV-positive pulmonary TB patients are sputum smear-positive. However, the proportion of smear-negative tests is much greater in HIV-positive than in HIV-negative TB patients, especially in the late stage of HIV.

Chest X-ray in HIV-positive patients

If the sputum smear remains negative, chest X-ray can be of additional value in diagnosis. However, the appearance of the X-ray may not be typical for TB. Diagnosis of TB in the HIV-infected patient is difficult.

Diagnosis of smear-negative TB in HIV patients

Important diagnostic methods have been developed recently by the WHO. This was necessary because HIV-positive patients were presenting with a cough of two to three weeks duration and then on investigation with sputum microscopy were found to be TB negative. However, if the symptoms and clinical state still strongly suggest TB, such patients are to be divided into the ambulatory ill (which means they could walk) and the seriously ill.



HIV-positive patients who you suspect may have extra-pulmonary TB should be referred.

The adult patient will be classified as seriously ill if one or more of the following danger signs are present:

- Unable to walk unaided
- Respiratory rate over 30 breaths per minute
- Fever of more than 39°C
- Pulse rate of over 120 heart beats per minute.

A patient classified as seriously ill on this basis should immediately be referred to a higher level health facility. When immediate referral of this type is not possible, the following measures should be undertaken in the nearest health facility with the necessary equipment and trained staff:

Sputum microscopy: at least two sputum specimens should be taken and examined, one of which should be an early-morning sputum, produced after an overnight sleep. One positive smear will be sufficient to classify a patient as a smear-positive case if the patient is HIV-positive, or if there is strong clinical suspicion of HIV infection.

HIV testing: HIV testing should be routinely offered along with sputum examination in HIV-prevalent settings for patients presenting with cough of two to three weeks' duration. A person with an unknown HIV status (e.g. because of unavailability of HIV test kits or refusal to be tested) can be classified as HIV-positive if there is strong clinical evidence of HIV infection.

16.2.5 Prevention and management of TB among PLHIV

- *Isoniazid preventive therapy (IPT)*: IPT is given to HIV patients after investigation where there is no evidence of TB. It is given for six months; you are expected to follow those patients on IPT for adherence and possible side-effects.
- *Cotrimoxazole preventive therapy (CPT)*: It is well-documented that administration of CPT decreases illness and deaths among HIV-infected TB patients. Cotrimoxazole is given for this category of patients and to all HIV-positive TB patients.
- *Treatment of TB in PLHIV*: When patients with TB/HIV are treated with anti-TB drugs and ART, problems related to the medication regimen may result. This group of patients therefore needs frequent follow-up and support; you should be alert for possible side-effects and prepared for early intervention and referral.

Sometimes TB drugs and ART can produce adverse reactions that may worsen or cause new infections. Patients should be advised to continue their medication and report any problems.

16.3 Drug-resistant TB and multi-drug resistant TB

The emergence of resistance to anti-tuberculosis drugs, and particularly of **multidrug resistant-TB** (MDR-TB) arises when TB bacteria develop resistance to rifampicin and isoniazid. MDR-TB has become a major public health problem in a number of countries and an obstacle to effective global TB control. When a patient has TB with bacteria that are no longer sensitive to one or more anti-TB drugs, for instance isoniazid, using this antibiotic will not be helpful. Other drugs (known as second-line drugs) have to be used instead of the first-line drug regimens.

A good TB control programme — especially with regard to patient follow-up and adherence, will not generate much drug resistance. Resistance to TB drugs usually occurs as a consequence of inadequate treatment, be it irregular, too short or too weak. Resistant TB bacteria can be transmitted to other people like any other form of TB.

16.3.1 Drug sensitivity testing (DST)

Drug sensitivity testing (DST), performed in a reference laboratory, is the only means by which resistance to anti-TB drug(s) can be confirmed. DST involves growing TB bacteria and treating the culture with one or more anti-TB drugs and seeing if the bacteria are killed or not. If the bacteria are not killed by giving the drug(s), they are considered resistant.

Table 16.2 makes the point that there are three sources for the development of drug resistance. The first and most important category reflects shortcomings by health providers — they can give an inadequate drug regimen, or the wrong guidelines, or they can fail to treat correctly through lack of training and a poor monitoring system. The second category is related to the drugs themselves — they can be of poor quality, in short supply or they can be poorly stored. The last factor contributing to the development of drug resistance relates to the TB patients themselves, and reflects factors such as poor adherence, lack of information about the disease and the influence of social barriers, any one of which can result in patients discontinuing the drugs.

Table 16.2 Causes of inadequate anti-tuberculosis treatment contributing to development of MDR-TB.

Healthcare providers	Drugs	Patients
Inadequate regimens	Inadequate supply	Inadequate drug intake
Inappropriate guidelines	Poor quality	Poor adherence (or poor DOT)
Non-compliance with guidelines	Unavailability of certain drugs (stock-outs or delivery disruptions)	Lack of information
Absence of guidelines	Poor storage conditions	Lack of money (no treatment available free of charge)
Poor training	Wrong dose or combination	Lack of transportation
No monitoring of treatment		Adverse side-effects
Poorly organised or funded TB control programmes		Social barriers
		Poor absorption of drugs
		Substance dependency disorders

Treatment of MDR-TB is more complicated and takes longer than treatment of TB that is not resistant to the first-line drugs. In Ethiopia, the management of MDR-TB is currently available only at St Peter Specialized TB hospital, but there are plans to expand provision to other regions. As a health worker, the most significant way in which you can help now and in the years ahead is to do all you can to ensure that patients adhere to their treatment, in order to increase the number of cured cases and reduce the incidence of drug-resistant TB.

Summary of Study Session 16

In Study Session 16, you have learned that:

- 1 Children are usually infected with TB by an adult or an older child with sputum smear-positive PTB, often a family member.

-
- 2 The best way to prevent childhood TB is therefore by proper identification and treatment of infectious patients, but diagnosis can be difficult for younger children not able to produce sputum.
 - 3 The DOTS strategy is applicable to all patients with TB, including children and those with TB/HIV co-infection.
 - 4 TB is a leading cause of morbidity and mortality, and the spread of HIV has increased the TB epidemic in Ethiopia. HIV increases risk to infection with *M. tuberculosis*, the risk of progression to TB disease, and the incidence and prevalence of TB.
 - 5 All patients diagnosed with TB should be encouraged to undergo counselling and testing for HIV, and all HIV-positive patients should be screened for TB.
 - 6 Sputum smear microscopy remains the main method to confirm a diagnosis of pulmonary TB, including in HIV-positive patients. It also helps in identifying infectious patients so that transmission can be stopped.
 - 7 Most of the time, drug-resistant TB is due to inadequate treatment, poor adherence to drug regimens, poor quality or insufficient drugs, and lack of training of healthcare providers in drug prescribing, monitoring and follow-up.
 - 8 For all TB patients, do all you can to ensure adherence to drug regimens, which will reduce the prevalence of TB, including the drug-resistant forms.

Self-Assessment Questions (SAQs) for Study Session 16

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 16.1 (tests Learning Outcome 16.2)

When do you suspect tuberculosis disease in children?

SAQ 16.2 (tests Learning Outcome 16.3)

A 32-year-old male patient was diagnosed with HIV three months ago; he was started on ART 10 weeks ago. He presented with cough productive of whitish sputum and low grade fever of one month duration. What will you do for this patient and what advice would you give him and his family?

SAQ 16.3 (tests Learning Outcomes 16.1 and 16.4)

What is multidrug resistant-TB (MDR-TB)?

Study Session 17 Tuberculosis Infection Control

Introduction

TB infection control is a combination of measures aimed at minimising the risk of TB transmission within a population. The foundation of TB infection control is early and rapid diagnosis, and proper management of TB patients.

In this study session you will learn about TB infection control and the methods you can use to control TB infection at the health facility, in your community and at home. You will learn that when you use more than one method at a time, you will get better results than when you use only one method. Your knowledge of the methods will enable you to provide proper advice to the community members you are hoping to help, in order to control TB infection at home, in the community and health facility. The different approaches you will learn about need to be promoted as a package because their adoption in that way reduces transmission of TB in healthcare facilities.

Learning Outcomes for Study Session 17

At the end of this study session, you should be able to:

- 17.1 Define and use correctly all of the key words printed in **bold**. (SAQ 17.1)
- 17.2 Define the general principles of infection control applied during handling of TB suspects or TB cases. (SAQ 17.1)
- 17.3 Explain how you would limit TB transmission in the community and at household level. (SAQs 17.1, 17.2 and 17.3)
- 17.4 Describe the main elements of TB infection control measures used at the community health facility level. (SAQs 17.1 and 17.2)
- 17.5 Describe the measures for TB infection prevention in areas where many people gather, at homes and in the community. (SAQ 17.3)
- 17.6 Explain how you would inform, educate and persuade community members to participate in TB infection control. (SAQ 17.3)

17.1 Principles of TB infection control

In this study session you will learn about the general principles of infection prevention measures that should be taken when dealing with patients and in particular about infection control of TB. First, three main TB control measures that are used to prevent TB infection are sometimes called the **three Is**, given that they all three start with that letter. You already know about the first two from reading earlier study sessions and it is the last topic we are going to focus on in this study session.

- Intensified case finding for TB
- Insoniazid preventive therapy (IPT) for prevention of TB amongst people living with HIV
- Infection control for prevention of TB.

17.1.1 What is infection control?

In general, **infection control** refers to the interventions required to prevent the transmission of micro-organisms from infected patients to other patients and health workers. Infection control measures are based on an understanding of how different diseases are transmitted. Types of infection control include:

Standard precautions, which should be applied regardless of disease or type of institution. For this reason, they are also known as *universal precautions*.

Transmission-based precautions, which should be applied in specific circumstances, depending on the transmission routes of various diseases.

17.1.2 What are standard or universal precautions?

Standard precautions are those which should always be applied when dealing with any patients, including TB patients. These include:

- Hand washing and antisepsis
- The use of personal protective equipment (e.g. gloves)
- Appropriate handling of patient care equipment and soiled cloths
- Prevention of accidental needle stick/sharp injuries to healthworkers
- Environmental cleaning and spills management
- Appropriate handling of clinical waste (e.g. swabs).

For TB, the transmission-based precautions are those that protect people from airborne bacteria entering the body through inhalation, as you will now learn.

17.2 TB infection control measures at community health facility level

The control measures — or interventions — that need to be brought into play at the level of the health facility fall into the four broad categories shown in Box 17.1 (on the next page). They begin with managerial activities and under that heading a range of national and sub-national interventions are listed that help give managerial order and direction to what happens at the level of the health facility to enable effective TB infection control. The other categories give similar detail on what happens by way of administrative controls, environmental controls and also at the level of the individual health worker.

Describing TB control measures using the headings in Box 17.1 is a useful way of explaining their importance to you as a health worker. We will introduce each of these categories in turn — you will then have a sound understanding of how each intervention operates at a particular point in the airborne TB transmission process. In a later section, we'll use the same four headings to describe the interventions that are appropriate for places where people gather (congregate settings) in the community and at the level of the household.

Box 17.1 Interventions for TB infection control in health-care settings

Managerial activities

- Identify and strengthen coordinating bodies, and develop a comprehensive human resources plan for planning and implementation at all levels
- Conduct surveillance and assessment at all levels of the health system
- Engage civil society and promote communication and social mobilisation
- Conduct monitoring and evaluation
- Enable and conduct operational research.

Administrative controls

- Develop strategies to promptly identify potentially infectious cases (triage), separate them, control the spread of pathogens (cough manners) and minimise time in healthcare settings.

Environmental controls

- Natural ventilation
- Mechanical ventilation
- Ultraviolet germicidal irradiation (UVGI) fixtures
- Health facility design and renovation.

Personal protective interventions

- Respirators
- Package of prevention and care for healthcare workers, including isoniazid preventive therapy (IPT) for HIV-positive health-care workers.

17.2.1 Managerial controls

Managerial activities need to be given a high priority in this package of measures since they establish the overall programme for the implementation, operation and maintenance of the other interventions. As a health worker, you do not have the responsibility of taking on these managerial activities but it is important you know about them. You will see from Box 17.1, that these managerial activities include assessing the scale of the problem, setting up the periodic evaluation of activities, establishing coordinating bodies at all levels, and planning and evaluating the outcomes of the control interventions.

17.2.2 Administrative controls

This component of TB infection control is more important for you since you need to apply these interventions at the health facility level. As you will read later on, these same interventions are also important in places where people gather and at the level of the household.

Administrative control interventions needed at healthcare facility level are described below:

Triage

The term **triage** refers to the process of identifying of TB suspects and referring them for investigation. People who you suspect of having TB must be separated from other patients and placed in well-ventilated areas, *where the movement of the air is in a direction from non-TB suspects to TB suspects*. Instruct TB suspects on cough manners, following advice you will learn about in a moment. Once you have separated the TB suspects from those who do not have TB (i.e. reduced the risk of airborne transmission), you should refer them for diagnosis and treatment.

- Why do you think it is important that the movement of air should be in a direction from non-TB suspects to TB suspects?
- The spread of TB is largely by inhalation of droplet nuclei containing the bacteria. By making sure non-TB suspects are not *downwind* from TB suspects you reducing the risk of transmission.

Separation

Separation of potentially infectious patients needs to continue after the process of triage, isolating suspects or confirmed pulmonary TB cases as much as possible. In particular, patients living with HIV and other forms of immunosuppressive illnesses should be physically separated from those with suspected or confirmed infectious TB. Drug-resistant TB suspects or patients should be separated from other patients, including other TB patients. In general, after providing the *immediate* services that TB suspects and cases might require, try to shorten their stay in the health facility; send them home as soon as possible, in order to minimise exposure for non-infected patients.

Cough manners (or cough etiquette)

In order to minimise the generation of potentially infective droplet nuclei, any coughing patient with a respiratory disease — in particular TB patients or those suspected of having TB — should be educated on good cough manners. The key points of **cough manners** are listed below and illustrated in Figure 17.1:



Figure 17.1 A poster ‘Getting across the message on cough manners’. (Source: FMOH Ethiopia, 2009, *Guidelines for Prevention of Transmission of TB in the Health Facility*)

- To cover their nose and mouth when sneezing, coughing or talking by using a *gabi*, *nethela*, handkerchief or scarf, piece of cloth, tissue paper and if there is nothing available, place the arm in front of the mouth.
- The same applies to health workers, visitors and families in healthcare (or indeed all places where people gather). Those who cough should cover their mouth and nose with a physical barrier which can be a piece of cloth, a tissue, a surgical mask or an arm placed in front of the mouth.
- The information, education and communication (IEC) activities given at health facilities should strongly focus on *cough manners*.
- Good respiratory hygiene includes proper disposal of tissue paper, pieces of cloth and masks used for covering the mouth. Proper disposal of sputum should be enforced *immediately* when a TB suspect is identified. Spitting on floors has to be stopped; collect sputum in a cup and bury it.

Patients and their families should also be educated on the signs and symptoms of TB disease. TB is a treatable disease; explain the risks of not completing treatment. Public health and awareness messages can be delivered as simple posters on the walls and presentations by health educators.

17.2.3 Environmental controls

When environmental controls are implemented, managerial activities and administrative controls need to be in place to ensure proper use and maintenance of equipment and the effective training of staff. The most successful approach is to use the administrative and environmental control measures together. Environmental controls aim to reduce the concentration of infectious respiratory particles in the air. The most important steps are outlined below.

Natural ventilation

A simple but effective approach — and one that is not expensive — is to ensure air from areas where there are TB patients is diluted and moved away from areas where there are patients without TB. This you can do by increasing *natural ventilation* through open windows and doors, as shown in Figure 17.2.

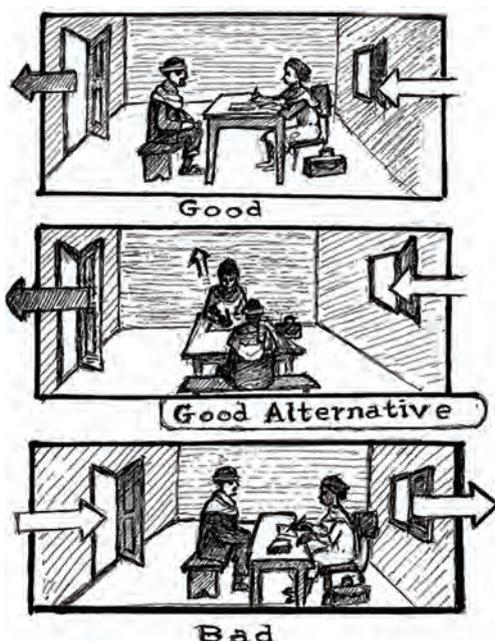


Figure 17.2 Use of natural ventilation to reduce the risk of airborne transmission of TB bacteria from the patient (on the left in the top and bottom diagrams) to the healthworker.

As a healthworker, always try to be *upwind* of a TB patient — which should ensure that clean air will flow from behind you towards the patient, rather than the other way round.

Ventilation refers to the removal of old, stale or ‘diseased’ air, and replacing it with new, fresh or ‘clean’ air. This has the effect of removing infectious particles, and diluting those that remain, so that the chances of inhaling infectious particles are kept to a minimum. Good ventilation means that air flows from less contaminated to more contaminated areas, not the other way round.

The important point for you is to ensure that at your health facility, doors and windows should be opened, to encourage natural ventilation.

You might ask the question ‘Is mechanical ventilation (air conditioning) better than natural ventilation?’ The problem with mechanical ventilation is that it is costly, needs regular maintenance, a reliable electricity supply and testing which can be especially difficult for developing countries such as Ethiopia. A research study done in Peru, which measured how much of the air within a room is replaced over a period of time, showed that natural ventilation is almost always more effective in maintaining ventilation than mechanical ventilation.

17.2.4 Personal protective interventions

Personal protective equipment helps to prevent the individual healthworker or other TB-free individuals from getting infected. Key items for personal protection against TB are respirators and surgical masks (sometimes called procedure masks) and there are important differences between them (see Figures 17.3 and 17.4).



Figure 17.3 N95 respirators of different sizes. (Source: FMOH Ethiopia, 2009, as in Figure 17.1)

Surgical or Procedure Masks

Respirators vs. Masks



Respirator: Has only tiny pores and relies on an airtight seal around the entire edge



Surgical mask: Has large pores and lacks airtight seal around edges

Figure 17.4 Health professional wearing a respirator (left) and mask (right). (Source: FMOH Ethiopia, 2009, *Guidelines for Prevention of Transmission of TB in the Health Facility*)

Respirators

There are different respirators and the most commonly used type in the prevention of TB is the N95 class of respirator (also recommended by the WHO); examples of this type of respirator are shown in Figure 17.3.

Respirators have very small pores (too small to see with the naked eye) that allow the wearer to breathe but prevent infectious agents from passing through (they are too big to pass through the pores). Importantly, these respirators form a tight seal around their entire edge so that the air you breathe has to pass through the respirator. Wearing these devices substantially reduces the risk of acquiring a TB infection. Health workers should use respirators when providing care to infectious TB patients or suspects, particularly those individuals who you suspect of having a drug-resistant form of the disease.

It is important that you know how to fit a N95 respirator, ensuring that you have a good seal between the mask and your skin.

Masks

Surgical masks prevent the spread of micro-organisms from the wearer (the surgeon, healthworker or TB patient, etc.) to others by capturing the large wet particles found in the wearer's breath near the nose and mouth, and also limiting the distance aerosols are expelled when coughing, sneezing and talking. Surgical masks do not provide adequate protection to the wearer from inhaling infectious droplet particles produced by TB patients (Figure 17.4). This is because masks fit loosely over the mouth and nose, which means they allow free entry of aerosols that may be contaminated with *M. tuberculosis*.

Surgical masks do not adequately protect wearers from inhalation of air contaminated with *M. tuberculosis* and should not be used for that purpose.

17.3 Infection control where people gather, at community and household level

We can now build on your understanding of the control interventions already outlined at health facility level to look at other places in the community where people gather. You will learn about interventions that operate at the managerial, administrative and environmental level, as well as personal protective interventions, following the structure adopted in the last section. The term **congregate settings** is used in the following sections of this study session — the term applies to all the types of public place where people gather (or congregate).

17.3.1 Infection control for congregate settings

The recommendations for congregate settings are less specific than those for healthcare facilities, because congregate settings are so diverse. They include a mix of settings that range from correctional facilities and military barracks, to homeless shelters, refugee camps, dormitories and nursing homes. Each facility differs in the type of population it contains and the duration of stay; in turn, this affects the dynamics of TB transmission. Congregate settings are often divided into two categories — long-term (e.g. prisons) and short-term (e.g. jails and homeless shelters) — to reflect the different duration of stay of the inhabitants.

Managerial activities in congregate settings

The full set of national and sub-national managerial activities already described should also apply to congregate settings. This level of activity may involve other ministries besides the Federal Ministry of Health, such as the Ministry of Justice, plus a range of other stakeholders. In any congregate setting, overcrowding should be avoided because it can lead to non-infected individuals being exposed to TB. Any information, education and communication (IEC) material needs to include a specific focus on congregate settings, including the monitoring and evaluation of TB infection control measures at this level.

Administrative controls in congregate settings

The administrative controls used in healthcare facilities were introduced earlier in this study session and they are also equally important in congregate settings. Cough manners and respiratory hygiene should be implemented, as should early identification of TB suspects and cases, followed by separation and proper treatment of infectious cases.

In long-term residential facilities and similar long-stay congregate settings, occupants should be screened for TB before entry. All staff should be given appropriate information and encouraged to undergo TB diagnostic investigation if they have signs and symptoms suggestive of TB. People suspected of having TB should be diagnosed as quickly as possible. In short-term residential congregate settings, such as jails and homeless shelters, a referral system for proper case management should be established.

In congregate settings with a high prevalence of HIV (particularly in correctional services), patients living with HIV and other forms of immunosuppression should be separated from those with suspected or confirmed infectious TB. All staff and persons residing in the setting should be given information and encouraged to undergo HIV testing and counselling. In congregate settings with patients having, or suspected of having drug-resistant TB, such patients should be separated from other patients (including other TB patients), and referral for proper treatment should be established.

Environmental controls in congregate settings

Buildings in congregate settings should fulfil national norms and regulations for ventilation in public buildings, and the specific norms and regulations for prisons, where these exist. In congregate settings in which there is a high risk of TB transmission and where adequate ventilation cannot be achieved, other (mechanical) ways of maintaining ventilation should be adopted.

Personal protective equipment in congregate settings

When a person is a long-term resident and suspected or diagnosed as having TB, but is physically separated from other people, then the same recommendations on personal protective equipment apply as for healthcare facilities (outlined in Section 17.2.4). In short-term residential congregate settings, appropriate strategies for referral should be organised.

17.3.2 Infection control in households

The important steps in effective infection control in households is the early identification of cases, adherence to treatment and implementation of proper TB infection control measures (e.g. cough manners and respiratory hygiene), before and after a diagnosis of TB in a family member. To reduce exposure in households the following additional measures should be taken:

- Houses should be adequately ventilated, by opening doors and windows, particularly rooms where people with infectious TB spend considerable time. Natural ventilation can be sufficient to reduce the likelihood of transmission of infection.
- Smear-positive TB patients should spend as much time as possible outdoors. They should sleep alone in a separate, adequately ventilated room, and spend as little time as possible in congregate settings or on public transport.
- The importance of infection control in the community should be promoted.
- In households with TB patients, additional guidance is important. Cough manners (including use of masks) and respiratory hygiene need to be adopted when in contact with people. Ideally, health service providers should wear respirators when attending patients in confined spaces.

Ideally, family members living with HIV, or family members with strong clinical evidence of HIV infection, should not provide care for patients with culture-positive drug-resistant TB. If there is no alternative, HIV-positive

family members should wear respirators, if available. Children below five years of age should spend as little time as possible in the same living spaces as culture-positive drug-resistant TB patients. Such children should be followed up regularly with TB screening and, if positive, should be tested for drug-resistance and treated. If possible, renovation of the patient's home should be considered, to improve ventilation (e.g. constructing a separate bedroom, or installation of a window or wind catcher, or both).

17.3.3 Community-based TB control

It is useful at this point to remind you of a range of TB control measures that are important at the level of the community. Importantly, these are the community-based TB control measures that need to be coordinated and delivered by *you* as the health worker and include the following:

- Create community awareness about TB transmission, the treatment of TB and the prevention methods used to stop the spread of the disease
- Identify and refer TB suspects in the community as early as possible
- Provide BCG vaccine to children at birth
- Refer TB patients for sputum examination or arrange for sputum collection
- Monitor adherence to prescribed anti-TB drugs during the intensive and the continuation phases of treatment
- Keep records on what you are doing for TB control
- Trace patients who miss doses or default on medication and ensure medication is resumed
- Give support for patients throughout the course of treatment
- Ensure TB/HIV co-infection patients benefit from both programmes; advise TB patients to be screened for HIV and HIV-positive patients to be screened for TB
- Coordinate TB control activities of volunteers/model families in their *kebeles* and report their monthly activities.

Ensuring that treatment is resumed reduces the risk that the patient will develop Multi-Drug Resistant TB.

17.3.4 Information, education and communication (IEC)

The aim of communication is to increase awareness of the community regarding basic information about tuberculosis. By giving adequate information about this disease and raising levels of community awareness you can influence what is socially normal and acceptable. This has an impact on TB control; it also changes behaviour in both individuals and groups of people. It is a good idea to involve previously treated and cured TB patients in what you do — they can help improve communication and counselling between people with TB, their families and providers.

Do all you can to ensure that the community you are part of is well-educated about TB infection, prevention and control. Patients should understand that they should know their HIV status, that they may be eligible for isoniazid preventive therapy (IPT) and have a right to rapid TB diagnosis and treatment. They should know that TB can be spread by coughing and they should be encouraged to adopt good coughing manners. IEC campaigns should include messages such as 'Our community is TB-safe' or 'Our health facilities are stopping TB', which will help create a positive and forward-looking attitude in your community that you will have helped to establish.

Summary of Study Session 17

In Study Session 17, you have learned that:

- 1 TB infection control is a combination of measures aimed at minimising the risk of TB transmission within the population. Its foundation is the *early* and *rapid* diagnosis of people with TB and their proper management.
- 2 TB infection control is part of the national infection prevention and control policies for health in general. It also extends the national policy by targeting airborne infections.
- 3 The interventions of TB infection control fall into four main categories; managerial, administrative, environmental, and personal protective interventions.
- 4 Managerial activities involve assessment, establishing coordinating bodies at all levels and planning and evaluating the performance of infection control interventions.
- 5 Administrative controls include policies and procedures which promptly identify potential and known infectious cases of TB, separating and treating them with minimal delay.
- 6 Natural ventilation is a simple, but effective and inexpensive environmental technique to move and dilute air from TB-patient areas away from people without TB, by maximising airflow through open windows and doors.
- 7 The use of personal protective equipment, such as respirators and masks, helps to protect healthworkers from airborne transmission of TB. They should also follow standard precautions for infection control.
- 8 Healthworkers have an important role in community-based TB control, especially in identifying TB suspects and guiding, supporting and following-up patients during treatment.
- 9 Healthworkers can make an important contribution to TB control in their communities by providing information and education (for example, about cough manners) and communication more generally, helping to change social norms and behaviours.

Self-Assessment Questions (SAQs) for Study Session 17

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 17.1 (tests Learning Outcomes 17.1, 17.2, 17.3, 17.4 and 17.6)

- (a) What is meant by TB infection control?
- (b) What are the standard (universal) precautions that should be taken when dealing with TB suspected cases?

SAQ 17.2 (tests Learning Outcomes 17.4, 17.5 and 17.6)

- (a) What administrative control interventions are needed for TB control at the level of the healthcare facility?
- (b) What are the personal protective measures you would recommend for a healthworker giving care to drug-resistant TB patients in their homes?

SAQ 17.3 (tests Learning Outcomes 17.3, 17.4, 17.5 and 17.6)

What community-based TB control measures could you use in your village to limit the spread of TB? Try to think of at least five ways you could help to reduce TB in your community.

Study Session 18 Leprosy Diagnosis

Introduction

Leprosy is a mildly infectious chronic disease caused by the bacterium *Mycobacterium leprae* — a type of bacterium similar to the one that causes TB. After entering the body, the bacteria grow very slowly and usually affect the **peripheral nerves** (nerves situated close to the body surface). However, as you will shortly learn, leprosy bacteria can have an influence on other organs of the body, such as the skin and eyes.

Leprosy patients have to deal with stigma and discrimination associated with the disease – feelings of shame or disgrace about the condition and unfair treatment from others. Leprosy patients are often referred to as lepers, but nowadays this is not acceptable; you should refer to them as *people with leprosy* or *leprosy patients*. Leprosy is curable with **multidrug therapy (MDT)**, treatment using combinations of anti-leprosy drugs. You will learn all about it in Study Session 19. MDT kills the bacteria responsible and stops the spread of the disease. Early detection and treatment will prevent disabilities.

In this study session, you will learn how to identify a leprosy ‘suspect’ and confirm a leprosy patient. In addition, you will learn how leprosy affects the body and how you can provide support for people living with leprosy. The knowledge and skills you gain will enable you to provide information to the community about leprosy. You will also be able to advise them on what they can do to prevent the spread of the disease, support patients during treatment and help to reduce stigma and discrimination suffered by persons affected by leprosy.

Learning Outcomes for Study Session 18

When you have studied this session, you should be able to:

- 18.1 Define and use correctly all of the key words printed in **bold**. (SAQs 18.2 and 18.3)
- 18.2 Describe the burden of leprosy in the world, Africa and Ethiopia. (SAQ 18.2)
- 18.3 Describe the mode of transmission of leprosy and how the disease is treated. (SAQ 18.3)
- 18.4 Explain how you would identify a person with suspected leprosy and diagnose the condition. (SAQs 18.1 and 18.4)

18.1 Leprosy and its control

18.1.1 What is leprosy?

The sources of infection are untreated **multibacillary leprosy** patients – patients that have a large number of leprosy bacteria lodged in their body, especially inside the breathing tubes leading to the throat, mouth and nose.

Leprosy affects all age groups and both sexes, with the most affected being the 15–45 years age-group. In the majority of persons infected with leprosy bacteria, the body’s natural immunity is able to kill the bacteria. Only about 5% of individuals infected will develop the disease during their lifetime. Because the bacteria grow very slowly in the body, the incubation period varies from six months to 20 years. As the condition develops, the immune

In Study Session 19 you will also learn about *paucibacillary leprosy* patients, i.e. those who have few bacteria in their body. Pauci is the Latin word for ‘few’.

system of the body shows a number of inflammatory responses (called **leprosy reactions**, which you will learn more about in Study Session 19), which can come about in both treated and untreated patients. Damage to nerves is one commonly-seen reaction, including those that control the function of the hands, feet and eyes, and inflammation of the skin is another.

If the disease is untreated, leprosy leads to severe loss of function of organs – one or more disabilities, such as loss of fingers/toes, disfigurement of the nose and blindness (see Figure 18.1).



Figure 18.1 Damage to the eyes, face, hands and feet of leprosy patients. (Photos: courtesy of All Africa Research and Training Centre (ALERT), Addis Ababa.)

18.1.2 How can leprosy be controlled?

Access to leprosy information, diagnosis and treatment with MDT remain key elements in the strategy to eliminate the disease as a public health problem (see Box 18.1). **Elimination** is defined as reaching a prevalence rate of less than one leprosy case per 10,000 population.

Prevalence refers to the total number of cases existing at a given time.

Box 18.1 Leprosy control measures

- Early case finding of infectious persons.
- Adequate treatment using combination of anti-leprosy drugs, multidrug therapy (MDT) and support for all leprosy patients.
- Public education about early signs and symptoms of leprosy, control measures and action against stigma and discrimination.

18.2 Burden of leprosy in the world

Leprosy once affected every continent and left behind a terrifying image of mutilation, rejection and exclusion from society. But what is encouraging is that leprosy is now a communicable disease 'in retreat'. Of the 122 countries where it was considered to be a public health problem in 1985, in 119 of them, including Ethiopia, the disease has been eliminated in recent years.

In Ethiopia, 5,004 new cases of the disease were reported between the last quarter of 2007 and the third quarter of 2008 (European calendar), with the lowest number (seven cases) reported by Harar region and the highest number (2,610 cases) reported by Oromia region. Although Ethiopia has attained a leprosy elimination level of 0.57 cases per 10,000 population nationally, over the last few years the number of new child cases, and the number of new cases detected with disabilities of the type shown in Figure 18.1, are seen as unacceptably high by WHO standards. Rates at this level usually indicate continuing transmission of leprosy bacteria in the affected communities.

18.3 Transmission, identification and diagnosis

The exact route of *transmission* for leprosy is still uncertain at the present time. However, the inside lining of the nose and the mouth is thought to be the main route through which the leprosy bacteria enter the human body – in other words, the main **portal of entry**. When an untreated leprosy patient coughs or sneezes, the droplets of mucus containing the leprosy bacteria are expelled into the air and can be inhaled by a susceptible person.

Suspecting and then diagnosing someone with leprosy is called **case finding**. The next section explains how you can do this in your community.

18.3.1 Case finding

The main purposes of case finding are to:

- Identify the sources of infection in the community
- Diagnose and cure leprosy cases before irreversible nerve damage and disability occur.

There are two general strategies for case finding:

Passive case finding: where you ask about, or observe, symptoms and signs of leprosy when individuals attend the health facility or meet you in your community work.

Intensified/active case finding: where you examine all household contacts of a leprosy patient to identify leprosy cases early.

Whenever you are in doubt whether an individual has leprosy or not, encourage and refer such a person to the nearest health facility capable of diagnosing leprosy.

18.3.2 Diagnosing leprosy

Diagnosis of leprosy is most commonly based on the clinical features. The signs and symptoms will be easy for you to look for and observe after a short period of training, based on the descriptions in this section. In rare instances, laboratory and other investigations are necessary to confirm a diagnosis of leprosy. An individual should be regarded as having leprosy if one or both of the following very significant cardinal signs are present:

- **skin lesion:** an area of skin with definite loss of sensation (lack of feeling), with or without thickened nerves (we will explain about such nerves shortly);
- **positive skin smears:** in a small proportion of cases, leprosy bacteria may be seen in the smears taken from the affected skin when examined under a microscope.

Other symptoms and signs of leprosy are:

- Numbness or tingling of the hands and/or the feet
- Weakness of eyelids, hands or feet (tests for muscle weakness are described later)
- Painful and/or tender nerves
- Burning sensation in the skin
- Painless swelling or lumps in the face and earlobes (see Figure 18.2a)
- Painless wounds or burns on the hands or feet
- Loss of eyebrows and or eyelashes.

The skin lesion can be single or multiple, usually less pigmented than the surrounding normal skin (see Figure 18.2b). Sometimes the lesion may be reddish or copper-coloured. The variety of skin lesions which may be commonly seen include **macules** (which are flat), **papules** (raised), and **nodules**.

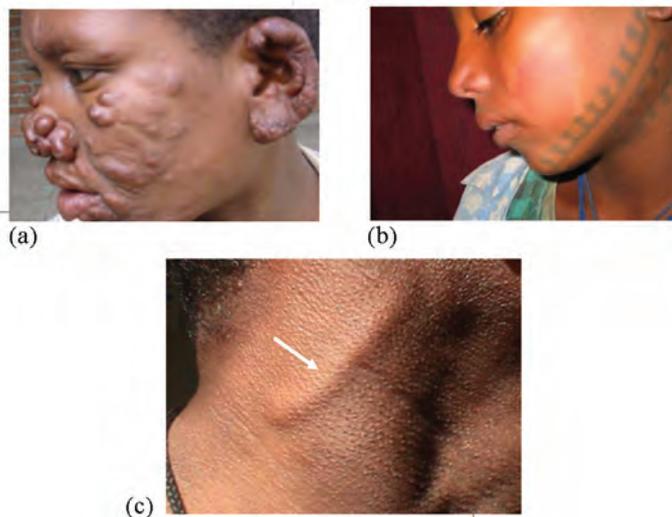


Figure 18.2 (a) Nodules on the face, (b) skin patch on the face, (c) an enlarged nerve in the neck. (Photos: courtesy of All Africa Research and Training Centre (ALERT), Addis Ababa)

Doctors often call key signs such as these **cardinal signs**; the term can be applied to the key signs of any disease or health condition.

Features of the skin that are *not* indicative of leprosy

Skin patches:

- that are birth marks
- where there is normal feeling
- that itch
- that are white, black or dark red
- with scaling
- that appear or disappear suddenly and spread fast.

If you are not sure about the cause of the skin lesion, you should refer to a clinician.

Thickened nerves (see Figure 18.2c) constitute another feature of leprosy. These occur mainly on peripheral nerve trunks, which are nerve bundles close to body surface. Nerve thickening is often accompanied by other signs of damage, such as a loss of sensation in the skin and weakness of muscles supplied by the affected nerve. Nerve thickening by itself, without sensory loss and/or muscle weakness is usually not a reliable sign of leprosy.

18.3.3 What to do if you suspect leprosy

An individual may present with skin lesions or symptoms suggestive of nerve damage, but the cardinal signs may be absent or doubtful; such a person should be called a **leprosy suspect** in the absence of any immediately obvious alternative diagnosis. Such individuals should be informed about the basic facts of leprosy and advised to see you again if their symptoms persist for more than six months, or if at any time the symptoms worsen. In these circumstances, suspect cases should be referred to health facilities with more capacities for diagnosing leprosy. Use Box 18.2 to help you take a history from a person you suspect may have leprosy.

Box 18.2 Checklist for history-taking from leprosy suspects

Make the individual comfortable, and ask for the name, age, sex, address, etc. Take a history of the present illness by asking:

- How long has the skin patch been there? How did it start? Has it changed? (Leprosy patches usually appear slowly.)
- Do the patches itch? Is there pain? (Leprosy patches do not itch and are not usually painful.)
- Does the person have unusual sensations in the hands or feet, such as numbness, tingling or burning feeling? (Unusual sensation in the hands or feet, chronic ulcers and eye problems are all signs of leprosy.)
- The nature of the first lesion or symptom, including the time (when) and site (where) the lesion first appeared and the subsequent development of the disease.
- Did the person have any treatment for leprosy in the past? If yes, which type, and for how long?
- Is there any other person in the family with similar symptoms or signs, or who has been treated or is being treated for leprosy?

18.4 Examining the person with suspected leprosy

In this section, we will teach you how to examine someone whom you suspect may have leprosy.

18.4.1 Checklist for examination of the skin

- Ask the person to remove all his/her clothes/garments.
- Examine the skin under adequate light and ensure privacy for the person to feel at ease.
- Examine the person systematically from the head to toe. Examine the front side of the body first and then examine from the back.
- Examine, count and record the presence of skin lesions; look for pale or reddish discoloration of the skin (see Figure 18.3a).
- Examine for loss of sensation in the skin lesions by rolling the end of a wisp of cotton into a fine point and explaining to the person the purpose of the test is for him/her to point to the spot where he/she feels the touch of the cotton wool. Then touch the skin patch lightly until the cotton wisp bends, first of all while the person has his/her eyes fully open and wait for the reaction of the person to the touch.
- Now repeat the test when the person's eyes are closed (see Figure 18.3b). If the person points away from where the skin is tested, the skin patch has no sensation and the suspect is probably a case of leprosy. If he/she points accurately to the spot or near the spot where you touched the skin patch with the cotton wisp, and if there are no other signs of the disease, they probably don't have leprosy.
- Look for loss of eyebrows and/or eyelashes. These are signs of leprosy when they are not due to deliberate removal for cosmetic reasons.

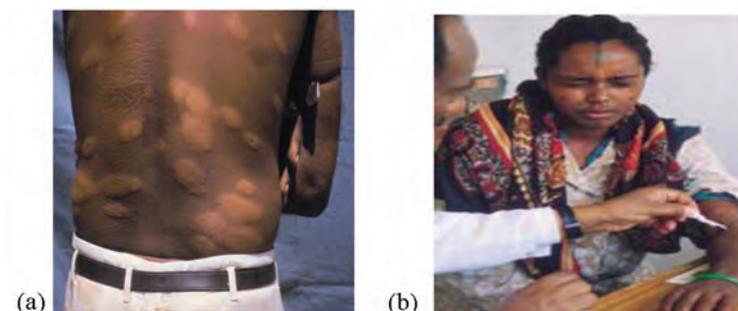


Figure 18.3 (a) Pale skin lesions on the back of a person with leprosy; (b) Demonstration of how to test skin sensitivity – notice the person has his eyes closed. (Source: How to Diagnose and Treat Leprosy, International Federation of Anti-Leprosy Associations (ILEP), 2001.)

18.4.2 Examination/palpation of the peripheral nerves

The examination of the nerves is an important part of examination of a person suspected of leprosy. The two most commonly affected nerves in leprosy patients are the ulnar and peroneal nerves, and can be felt quite easily (see Figure 18.4). Palpate ('feel') the nerves shown in Figure 18.4, starting from the head to the feet; do so following the technique described in Box 18.3 and the photos in Figure 18.5.

Box 18.3 Palpating the nerves in a person with suspected leprosy

- Peripheral nerves are examined for enlargement or thickening and for tenderness
- When palpating a nerve always use two or three fingers (see Figure 18.5)
- The nerve should be rolled over the surface of the underlying bone
- The same nerve on the left and right sides of the body must always be compared.

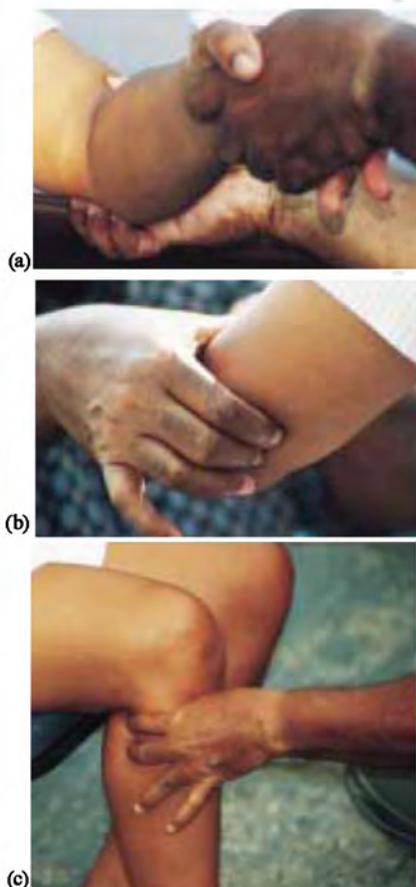


Figure 18.5 Palpating (a) and (b) the ulnar nerve, and (c) the peroneal nerve. (Source: ILEP, 2001, as in Figure 18.3)

18.4.3 Examination of hands and feet for loss of sensation

The sensation test (ST) is an examination to test sensation in the hands, served by the ulnar and median nerves, and also in the feet.

Your aim is to compare the sensation in the little finger with that of the thumb, and the sensation of one hand with the other, to see if there is any difference. Then repeat the test on the feet. If you have done these tests on the same person previously, compare the findings with those shown on any earlier records.

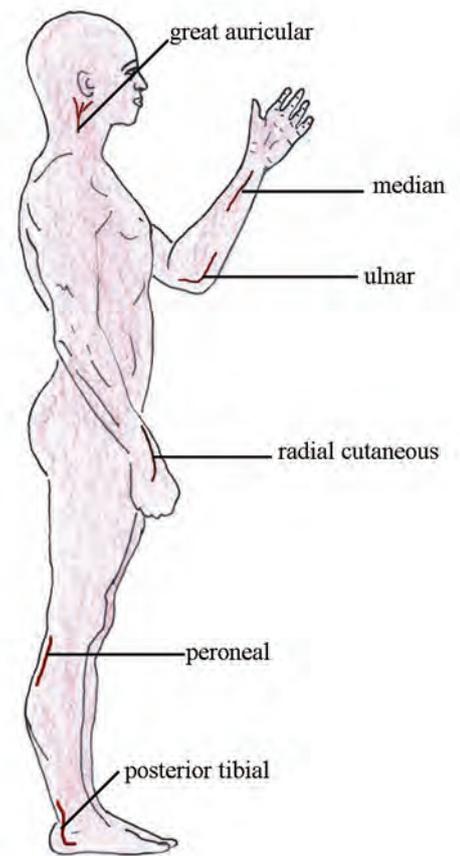


Figure 18.4 The main nerves that may be affected in a person with leprosy.

Before you start the test, make a note of any wounds or cracks or bone loss on the hands/feet.

First, support the person's hand or foot so that fingers/toes are well supported to prevent joint movement during the test (see Figure 18.6).



Figure 18.6 Support the hand you are testing and record the results on the patient's record card. (Source: ILEP, 2001, as in Figure 18.3)

Make sure you get hold of a Record Card for a leprosy patient and spend time looking at it. On it, you can record all the important details that relate to the patient, such as the skin lesions you can see, the results of palpation and the outcomes of the voluntary muscle tests you will perform.

Explain the test to the person and rehearse it with him/her with eyes open. Then perform the test (described below) with the person's eyes closed. A book or another suitable object can be held in front of the eyes, so that the person cannot see.

Use the point of a ballpoint pen (biro) to dent the person's skin to a depth of 1–2 mm at the four test points (dots) on the palm of the hand (Figure 18.7a and c).

Do not allow the pen tip to slide across the skin – press it straight down and lift it straight up again. Ask the person to point to the exact site whenever he/she feels the pressure from the pen – first the 'rehearsal' with eyes open, and then with eyes closed. The test points should be pressed at irregular intervals and each test point should be chosen at random – don't test them in a fixed pattern, so that the person can't guess where you will test next. Avoid repetitive testing at any one test point. Provide time for a response: older people may need a little more time to respond.

Repeat this process at four test points (dots) on the feet (Figure 18.7b and d).

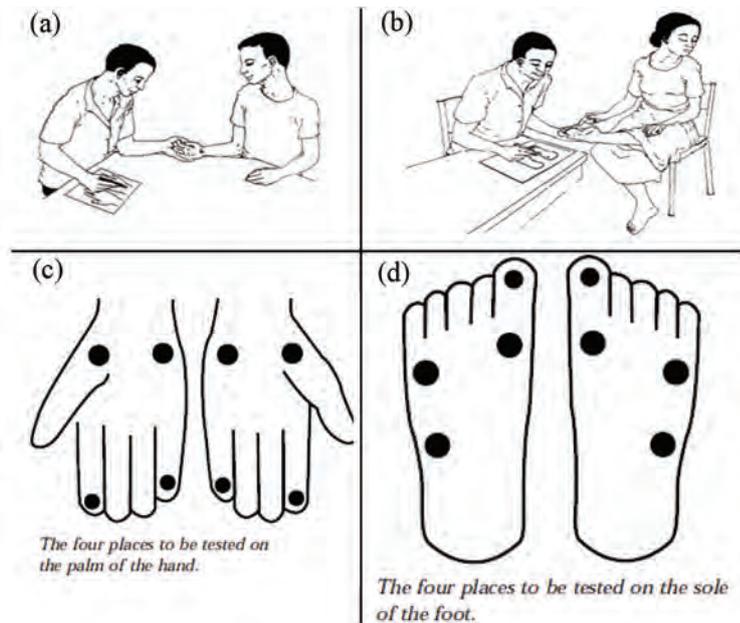


Figure 18.7 (a) The person's hand is first tested for sensitivity with his eyes open. (b) This person's foot is being tested for sensitivity with her eyes closed. (c) and (d) Test points on the hands and feet. (Source: ILEP, 2001, as for Figure 18.3)

Record the results in a leprosy patient record card, or mark the results on suitable diagrams of the type shown in Figure 18.7(c) and (d). On a record card, mark ✓ if the person feels the pressure at a particular test point, or X if he/she does not feel it.

Where possible, compare your findings with those shown on any earlier records – look for differences over time. Make sure that the change is real and not simply a result of one or other of the tests having been recorded in a careless and therefore inaccurate way.

18.5 Examining the eyes and eyelids

18.5.1 Testing for corneal sensation

The surface of the eye is called the cornea. It is very sensitive to being touched in a healthy person, who will blink if something touches the cornea. Corneal sensitivity is lost in a person with leprosy. Observe the person's blink when talking to him/her. If the blink is normal, corneal sensation will be normal and there is no need for the test. If there is no blink, the eye is at risk.

Look at Figure 18.8 and Box 18.4 (on the next page) to see how the corneal sensation test is done.

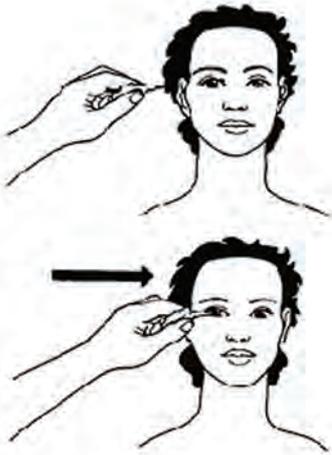


Figure 18.8 The corneal sensation test. (Source: Essential Action to Minimise Disability in Leprosy Patients, Jean M. Watson, second edition, 1994)

Box 18.4 Steps in the corneal sensation test

- 1 You should wash your hands before testing. Then make a point out of a wisp of cotton wool and explain the test to the person.
- 2 The person should look to the opposite side and upwards, away from you.
- 3 You should:
 - Approach from the side
 - Touch the edge of the cornea with the cotton wisp
 - Observe the person's reaction.
- 4 Take note or record on the person's record card: Write *yes*, if he/she blinks, which means corneal sensation is normal; write *No* if sensation is absent (no blink).

18.5.2 Eyelid closure to test facial nerve function

Ask the person to close his/her eyes as in sleep. A lid gap may be a sign of leprosy. You can also test the strength of the eyelid muscles by asking the person to close his/her eyes tightly and to resist your gentle efforts to part the eye lids. Record full eye closure with full strength as 'S' = Strong. This type of test is known as a **voluntary muscle test** (or VMT).

Next we will look at somewhat similar VMT tests on the hands and feet of a person you suspect may have leprosy.

18.6 Examination of hands and feet for muscle weakness

By testing the strength of the voluntary muscles (which means the muscles we can move at will, e.g. in our arms and legs), you can find out if the person's nerve function is normal, or has been weakened or paralysed by leprosy. The findings are recorded as follows:

- *Paralysed* (P): the muscle has lost all strength and cannot produce any movement;
- *Weak* (W): there is some movement, but muscle strength is reduced;
- *Strong* (S): the muscle strength is normal.

18.6.1 'Little finger out' test of ulnar nerve function

The muscles that move the little finger are activated by the ulnar nerve. Keep the person's hand flat, palm level and facing the ceiling during this test, as shown in Figure 18.9.

As shown in the left of Figure 18.9, first ask the patient to move his little finger all the way in (touching the side of the ring finger) and all the way out until he can make no further movement at the joint). Is the movement full? How large is the gap between the little finger and the ring finger?

If movement is full, ask the patient to hold his little finger out fully while you give resistance to the outward movement at the base of the finger by pushing it in. Resistance can also be tested in the way shown in the diagram to the right of Figure 18.9. Record your findings.

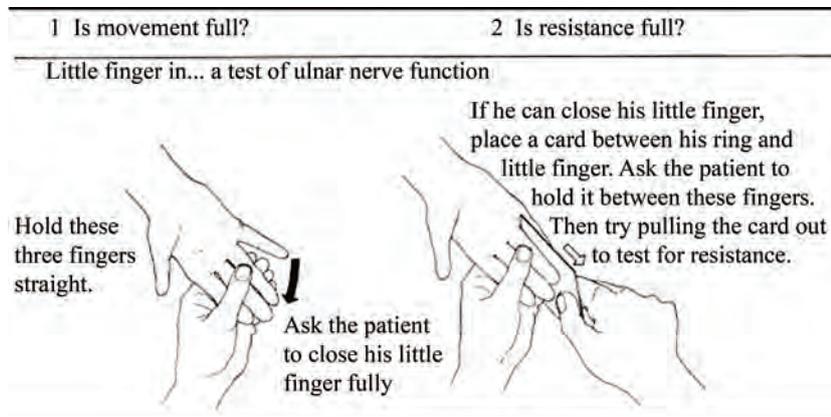


Figure 18.9 The 'little finger out' test. (Source: Watson, 1994, as for Figure 18.7)

18.6.2 'Thumb up' test of median nerve function

The muscles that move the thumb are activated by the median nerve. Keep the hand flat, palm level and facing the ceiling and the wrist slightly extended backwards during this test, as shown in Figure 18.10.

First, ask the patient to bring his thumb up in front of the index finger but as far away from it as possible, in the way shown to the left of Figure 18.10. Focus your attention on the degree of movement that is possible at the base of the thumb rather than the tip. Can the patient achieve this starting position for the test? Is movement full?

Now test the strength of this movement as shown to the right of Figure 18.10 – seeing if the individual can resist the pressure you apply to the side of the thumb. Ask the patient to stare at you during the test, while you try to push his thumb out and across, away from his little finger.

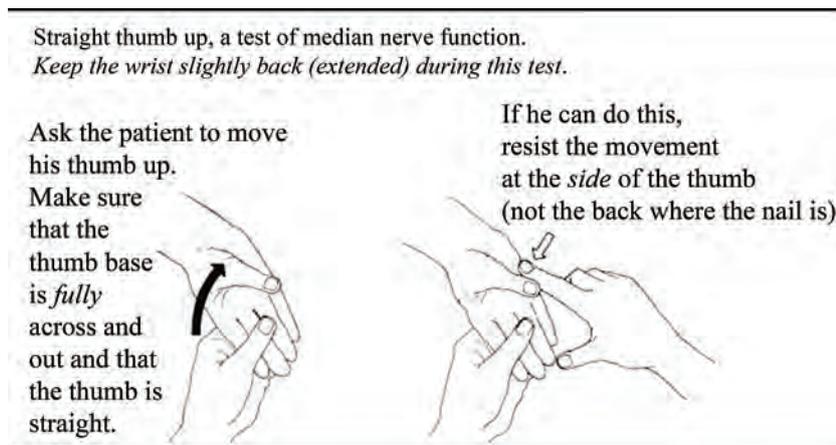


Figure 18.10 The 'thumb up' test. (Source: Watson, 1994, as for Figure 18.7.)

18.6.3 'Wrist back' test of radial nerve function

Study Figure 18.11, which shows you how to perform the test for radial nerve function. Again you are testing for how much resistance there is to pressure you apply, this time to the individual's raised hand, while you support the wrist.

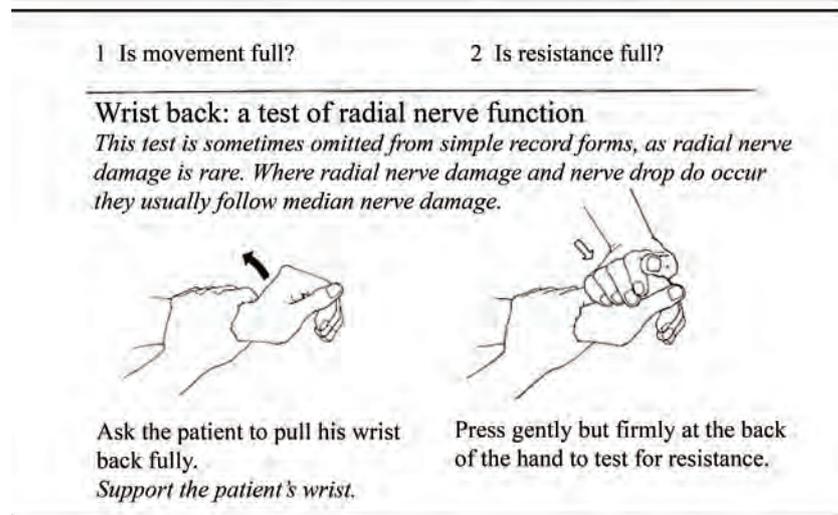


Figure 18.11 The 'wrist back' test. Source: Watson, 1994, as for Figure 18.7.

18.6.4 'Foot up' test of peroneal nerve function

The movement of the foot is due to muscles activated by the peroneal nerve and the test for muscle power in this case is shown in Figure 18.12. You apply pressure to the top of the raised foot by trying to push it down. Can the person still lift up the foot against your pressure? A second test of this type is shown at the bottom of Figure 18.12.

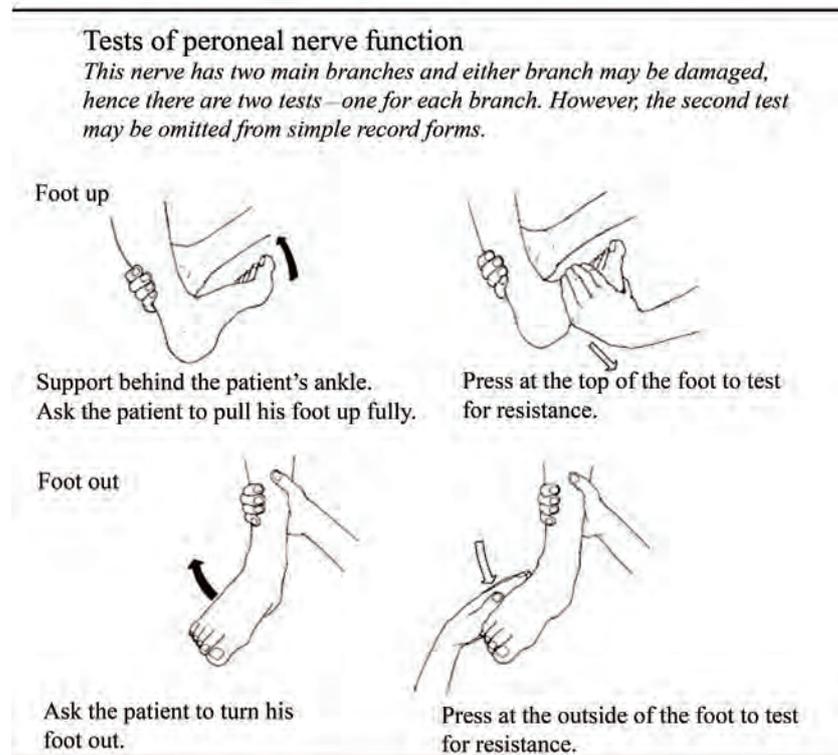


Figure 18.12 The 'foot up' test. (Source: Watson, 1994, as for Figure 18.7.)

It is useful to have ended the main part of this study session by describing these different tests of voluntary muscles. Along with palpation, these are very useful clinical tests for detecting the type of nerve damage typical of leprosy and therefore it is important that you know about them.

Summary of Study Session 18

- 1 Leprosy is a chronic infectious disease affecting mainly the skin and peripheral nerves. Its incubation period is between six months and 20 years.
- 2 Leprosy does not kill, but it can disfigure the sufferers. When discovered early and treated promptly it is fully curable and no disabilities will arise.
- 3 Cardinal symptoms and signs of leprosy are skin lesions, with a lack of sensation, and leprosy bacteria seen in positive skin smears. Thickened nerves are commonly associated with the disease, but they are not always present. Additional signs and symptoms include weakness of eyelids, hands or feet and painful and/or tender nerves.
- 4 Leprosy bacteria are expelled into the air when untreated leprosy patients cough or sneeze and can be inhaled by a susceptible person.
- 5 Diagnosis of leprosy is most usually based on the clinical features. Most often affected areas are the skin, peripheral nerves and the eyes. Palpation of nerves and the testing of a range of voluntary muscles, for example those associated with the hands and feet, are key methods of detecting nerve damage to aid diagnosis. So is testing for reduced skin and corneal sensitivity.

Self-Assessment Questions (SAQs) for Study Session 18

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 18.1 (tests Learning Outcome 18.4)

Look at the skin lesions in Figure 18.13(a) and (b). Identify, with reasons, which one shows the signs of leprosy. Keep in mind that in Figure 18.13(a) there is loss of sensation, but no loss of sensation or nerve enlargement in Figure 18.13(b).

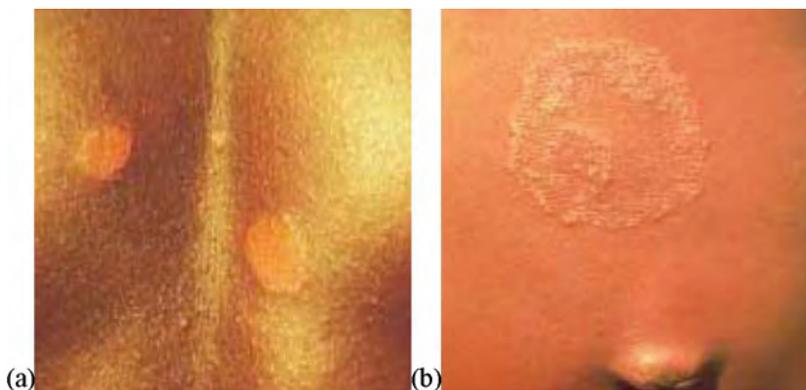


Figure 18.13(a) and (b) for use with SAQ 18.1. (Source: WHO, 2000, as for Figure 18.3)

SAQ 18.2 (tests Learning Outcome 18.2)

Is it right to say that leprosy has been eliminated in Ethiopia and that as a Health Extension Practitioner you therefore don't need to be looking out for cases of the disease?

SAQ 18.3 (tests Learning Outcomes 18.1 and 18.3)

Which of the following statements is *false*? In each case, explain what is incorrect.

- A The inside lining of the nose and the skin are major portals of entry of leprosy bacteria.
- B MDT has not proved successful in the fight against leprosy.
- C MDT treatment helps nerves and organs damaged as a result of leprosy to start functioning again normally.
- D If leprosy is untreated, organs such as the eyes can become damaged and fingers and toes can be lost.
- E Case finding is essential to the task of reducing the prevalence of leprosy.
- F Case finding involves only the process of carefully looking at individuals attending your health facility for signs of leprosy.

SAQ 18.4 (tests Learning Outcome 18.4)

- (a) Someone at your health facility presents to you with weakness of both hands. Should you suspect he has leprosy or not? What should you do to confirm your suspicion?
- (b) Another individual explains to you that she has some areas of skin that are sore and that are very itchy. When you test her, she has normal responses to VMT. Do you suspect leprosy or not?

Study Session 19 Leprosy Treatment

Introduction

As you learned in Study Session 18, early detection combined with prompt treatment is an effective way to prevent the spread of leprosy in the community. In this study session, you will learn how to treat a leprosy patient, monitor treatment progress, what you need to do if a patient interrupts treatment and what kind of advice you can give to a patient or a family member while a patient is on treatment.

Multidrug therapy (MDT) kills the bacteria responsible for leprosy and stops the spread of the disease. Leprosy patients can lead completely normal lives and if the disease is detected early and treated with MDT, leprosy need not lead to disabilities. In this study session you will learn about how to detect and manage leprosy complications to alleviate the sufferings of your patients.

Learning Outcomes for Study Session 19

When you have studied this session, you should be able to:

- 19.1 Define and use correctly all of the key words printed in **bold**. (SAQs 19.1, 19.6 and 19.8)
- 19.2 Explain how you would classify leprosy patients for the purpose of treatment. (SAQ 19.2)
- 19.3 Explain key features of leprosy treatment and management. (SAQ 19.3)
- 19.4 Explain how you would identify and manage patients who interrupt or default from leprosy treatment. (SAQ 19.4)
- 19.5 Describe how you would inform leprosy patients and supporters about their treatment in an effective way. (SAQ 19.5)
- 19.6 Describe how you would discharge leprosy patients after completion of treatment. (SAQ 19.6)
- 19.7 Describe the main complications of leprosy and what actions you would take. (SAQ 19.7)

19.1 Classification of leprosy

Classification of leprosy patients is based on the clinical features (see Table 19.1). The World Health Organization (WHO) distinguishes between two major types, one of which (multibacillary leprosy) was introduced in Study Session 18. **Paucibacillary leprosy** is characterized by the low number of skin lesions and the low number (or absence) of visible *Mycobacterium leprae* in microscope slides taken from these patients.

Table 19.1 Classification of leprosy types.

Clinical features	Paucibacillary (PB)	Multibacillary (MB)
Skin lesions	One to five lesions	Six or more lesions
Nerve damage	Only one nerve involved	Two or more nerves involved

Paucibacillary is pronounced 'pore-see-bass-ill-ary'. Pauci comes from the Latin word meaning 'few'.

19.2 Multidrug therapy (MDT) for the treatment of leprosy

Regimen is the term used to describe the drug dosages, the number of times the drugs are taken in any given period (e.g. per day), and the duration of treatment in days, weeks, months or years.

Multidrug therapy (MDT) is the treatment of choice for all leprosy patients. It entails the swallowing of a combination of anti-leprosy drugs on a daily basis, in the recommended doses for the recommended duration of treatment and according to the WHO leprosy classification.

19.2.1 MDT drug regimens

The drugs used in MDT leprosy treatment are rifampicin (R), dapsone (D) and clofazimine (C). There are two MDT regimens: PB-MDT for paucibacillary patients and MB-MDT for multibacillary patients, in dosages for adults and for children in blister packs; see Figure 19.1(a) to (d). Each blister pack contains treatment for four weeks.

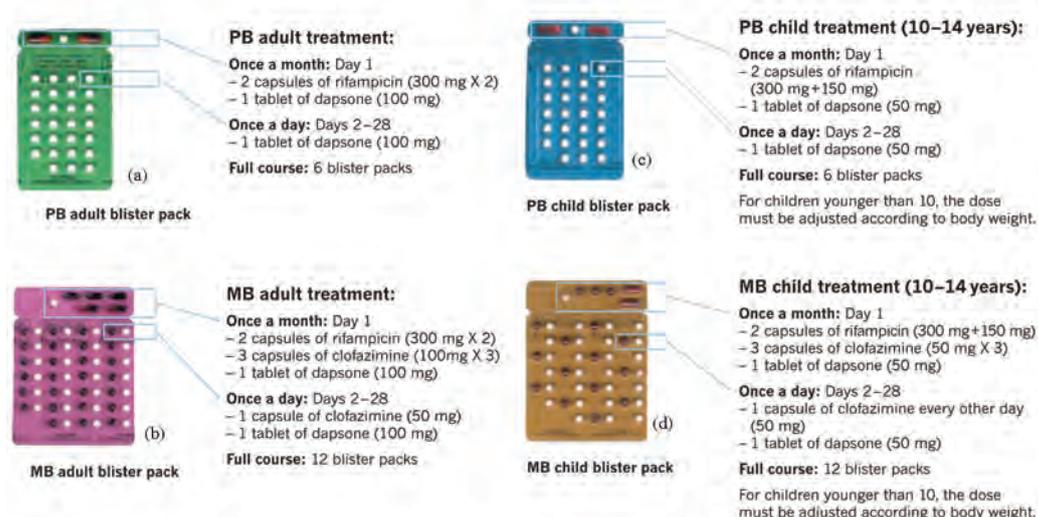


Figure 19.1 MDT regimens in blister packs, (a) paucibacillary treatment for adults, and (b) multibacillary treatment for adults; (c) paucibacillary treatment for children, and (d) multibacillary treatment for children. (Source: *Guide to Eliminate Leprosy as a Public Health Problem*, WHO, 2000, accessed from http://www.who.int/lep/resources/Guide_Int_E.pdf)

19.2.2 How to administer MDT for leprosy

Box 19.1 summarises how to administer multidrug therapy to treat leprosy.

Box 19.1 Before giving MDT you should:

- Count the number of skin patches and check nerve involvement in order to classify the patient as PB or MB for treatment, (see Table 19.1 above and Figure 19.2). If in doubt, classify as MB.
- Inform the patient and anyone accompanying the patient about the disease and its treatment. Encourage them to ask questions and clear up any doubts.
- Give the patient the first dose at home or in the Health Post under your supervision. Show them which drugs from the MDT blister pack should be taken every day for days 2–28. Give the patient enough blister packs to last until the next visit.

- Give patients the full course of treatment if it is difficult for you to visit them at home, or for them to come to the Health Post. Explain to them what they have to do (see later in this study session).



Figure 19.2 Recognising paucibacillary (PB) and multibacillary (MB) leprosy. (a) one to five patches indicates PB leprosy. The six blister packs should be completed within a maximum period of nine months. (b) More than five patches indicates MB leprosy. The 12 blister packs should be completed within a maximum period of 19 months. (Source: WHO, 2000, as for Figure 19.1)

19.2.3 Accompanied MDT

Normally, patients are given their MDT drugs every month when they come to the health facility for the next blister pack and their check-up. However, this is not always possible. **Accompanied MDT** is a type of treatment strategy where a patient is able to receive all the MDT drugs needed for the full course of treatment on their first visit after diagnosis. It is designed to address a frequent problem in rural programmes. Patients often have to interrupt their treatment because of a shortage of drugs at the health centre, poor access to the health services or simply because no one is at the health centre when they come to collect their drugs.

This approach means that the patient has to take more responsibility for adherence to the drug regimen, although a treatment supporter should accompany the patient when they collect the drugs. If the patient chooses accompanied MDT, give PB patients six PB blister packs and MB patients 12 MB blister packs. Reassure patients that they can lead normal lives. Tell patients to report any problems and to come back when treatment is completed.

- Yacob, a new leprosy patient, lives two streets away from a health centre. Should he be given accompanied MDT or not? Explain your answer.
- No. He is close to the health centre and is likely to be able to collect more drugs when he needs to.

19.2.4 Side-effects of anti-leprosy drugs

Serious side-effects of leprosy treatment are rare. The most serious side-effects are serious allergy to one of the drugs, or jaundice (yellowness of the eyes). If either of these happens, you should stop the treatment and refer the patient to a clinician. Whenever you refer a patient, write down details of the complaint, when this first occurred and medicines taken. Send this referral note with the patient to show to the clinician.

The patient may have other, less serious side-effects such as rifampicin turning urine red, or black spots on the skin due to dapsone, or change of the colour of the skin due to clofazimine. When this happens it is important to continue the treatment. You should let the patient know that they are not serious side effects and will go away when the treatment is finished.

19.3 Identifying and managing defaulters

A **defaulter** is an individual who fails to complete treatment within the maximally allowed period of time. Whenever a PB patient has missed more than three months treatment, or an MB patient more than six months treatment, they should be declared as defaulters from treatment and should be referred immediately to the clinician for further management. Any defaulter, particularly one who remains very irregular on treatment and repeatedly defaults despite every effort on the part of the health staff, should also be referred, so that a more experienced person can decide if further treatment is required and if so, how much.

You have an important role to play in helping prevent patients from interrupting treatment and becoming a defaulter. You can also retrieve a defaulter — taking steps to bring patients back into treatment by getting information about those who fail to show up on clinic day, by asking other patients or by sending a reminder directly to the patient. But if she/he does not turn up after 28 days, you should visit him/her at home to find out the reason for non-attendance. Then you should complete the defaulter retrieval form (make sure you know where these forms are located in your place of work) and take any other appropriate action, such as referring the patient to a clinician for assessment.

There are a number of ways in which you can help ensure that patients keep to their treatment until completion. You should always inform patients of what's required by way of treatment and why, and you should make sure that drug collection is accessible and flexible. Giving medicines regularly and identifying and referring patients with complications promptly are also important. Also, you should try to trace patients who miss a drug collection date or clinic day, carry out regular patient's review and discuss findings with them during clinic visits. As a Health Extension Practitioner, you have a big responsibility for helping to motivate patients by adopting a professional attitude and by using encouraging words. Box 19.2 summarises the key points you need to remember for patients and their families.

Box 19.2 Key points for patients and their families

- Educate patients, their families and the public about leprosy treatment.
- Ensure that patients adhere to treatment and that they get the support and encouragement they need.
- Tell patients and their families that leprosy is curable, and the drugs help stop the disease from spreading.
- Tell patients to keep the drugs in a safe, dry, shady place and out of the reach of children.
- Make sure patients know that if the drugs are spoiled (change colour or broken), they will be replaced, as MDT drugs are free of charge.

- Make your patients aware that leprosy drugs can turn their urine red or skin darker, but they should not worry if this happens because it will go away when treatment is completed.
- Tell your patients that MDT is safe during pregnancy, and safe for patients being treated for tuberculosis (TB) and those who are HIV-positive.
- Make sure patients tell you about any problems and that they come monthly for their check-up and to collect their medicines.

19.4 Discharging patients after treatment

Finally in this section, what about discharging leprosy patients after completing MDT treatment? Remember that MDT is therapy of fixed duration. When six doses of PB-MDT have been completed stop the treatment, examine the patient and record all clinical findings. Then refer the patient to the health centre for discharge as treatment is completed. Do the same when 12 doses of MB-MDT have been completed by MB patients.

19.5 Leprosy complications and management

You will remember that you learned in Section 18.1.1 that leprosy reactions are the body's immune response to the leprosy bacteria and are natural reactions as part of the normal course of the disease. Your patients need to understand that reactions are *not* adverse side-effects of MDT and do not mean that the disease is becoming worse or that the treatment is not working. Reactions can occur before, during or after the discharge of the patient from treatment.

19.5.1 Signs and symptoms of leprosy reactions

The symptoms and signs of inflammation in a leprosy patient include the appearance of new skin lesions, redness and/or swelling of skin lesions, swelling and/or increased tenderness of the skin lesions, plus the appearance of tender nodules in the skin. Figure 19.3 shows typical reactions of this type in two patients.

Other reactions relate to the affected nerves; there can be swelling and tenderness of peripheral nerves, with or without loss of nerve functions, and sudden nerve function impairments or loss, such as weakness of muscles of the hands and feet or inadequate closure of eyelids, due to untreated inflamed nerves. You will recall that you learnt about nerve examination in Study Session 18, so that you are able to spot signs and symptoms such as these and take appropriate steps by referral to a clinician.

19.5.2 Managing leprosy reactions

A range of factors can lead to or help bring about leprosy reactions. They include stressful conditions such as pregnancy and childbirth, acute infections, vaccination, physical exhaustion, mental stress and strain. You should be on the lookout for the presence of any of these conditions — including asking your patients directly about problems they face.

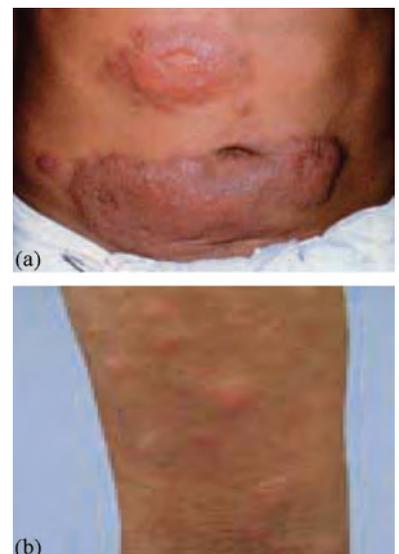


Figure 19.3 Signs of reactions to leprosy treatment: (a) on the abdomen, (b) on the leg. (Source: WHO, 2000, as for Figure 19.1)



Refer patients with leprosy reactions urgently to a higher health facility.

If a patient has any of the symptoms or signs of reaction, refer them immediately to a higher level health centre or hospital for appropriate management. Reactions require urgent treatment with special medicines as they can lead to irreversible deformities. Give aspirin or paracetamol to reduce pain and fever, but stress that it is important that patients continue to take MDT while they go to the higher health facility.

19.5.3 Disability

Disability in leprosy is an inability to perform some or all of the tasks of daily life. The disabilities associated with leprosy are mainly due to nerve damage. As you learned in Study Session 18, some nerves are responsible for the movement of the hands or feet or closure of the eyelids; others signal the sensation of pain, hotness or coldness, or trigger sweating in the skin. When leprosy reactions go untreated for a few months, they may result in damage of nerves which control the functions of the hands, feet or eyes; you saw some examples of these in Figure 18.1 in the previous study session. Primary nerve damage can lead to complications, which in turn affects other nerves (so-called secondary nerve damage); for example:

- Dryness of skin, leading to cracked skin, which may become infected.
- Loss of sensation, which may lead to ulcers (areas of damaged infected tissue that won't heal, usually on the legs).
- Weakness or paralysis, which may lead to 'claw' fingers or toes.

You should watch out for reduced skin sensation, impaired nerve function such as weakness in the hands or feet and/or eye closure, which you can detect using simple observation and history-taking; you learnt about voluntary muscle tests (VMTs) and sensation tests (STs) in Study Session 18. Where you see such indications of damage, refer the patients to the clinician for advice on how to manage them. You can prevent primary nerve damage by early diagnosis, prompt and adequate treatment and by regular VMTs and STs. Secondary complications can be prevented by teaching patients how to carry out self-care, which we will discuss in more detail shortly.

19.5.4 Measures to prevent and manage disabilities

Patients with insensitive hands or feet injure themselves without noticing it. They can develop wounds which can get infected and, over time, lead to irreversible deformities. It is the task of all health staff working with leprosy patients to *preserve nerve function* and to prevent further deformity and disability in those cases where there is some irreversible disability present at the time of diagnosis. The process and measures undertaken to preserve nerve function is often referred to as **prevention of disabilities (POD)** by:

- Early diagnosis and prompt treatment.
- Recognising signs and symptoms of leprosy reactions with nerve involvement and referring to a clinician for advice on what to do.
- Carrying out VMTs and STs regularly to detect nerve function impairment.
- Encouraging and training patients in the practice of self-care.
- Educating patients to recognise early signs of nerve function impairment and to report this immediately.

POD depends, to a very large extent, on the patients themselves. So, priority should be given to POD through training on self-care, i.e. what the patients can do themselves to prevent development and/or worsening of disabilities and by wearing protection on feet and hands. You should tell leprosy patients with insensitive feet not to wear closed plastic shoes because such shoes can lead to more sweating, formation of blisters and skin infections in the feet. Where wounds occur, you should manage them just like any other cuts or wounds, dry skin, or eye problems. Use Table 19.2 to guide you on simple measures you can take to prevent and manage disabilities at the community or health post level. Use it to teach your patients about self-care.

Table 19.2 Care of the hands, feet and eyes in people with leprosy.

Care of the hands	
Injury on hand while working/cooking	Clean wound and apply clean dressing. Advise rest. Advise and teach patient to use a cloth to protect the hands when touching hot or sharp objects.
Hands with dry cracks and fissures	Advise and teach patient to soak hands for 20 minutes every day in water and to apply Vaseline or cooking oil regularly.
Care of the feet	
Feet with dry cracks and fissures	Advise and teach patients to soak their feet for 20 minutes every day in water and apply cooking oil/Vaseline regularly. Advise them to use shoes or slippers to protect their feet from injury.
Blisters on the sole or between toes	Dress blister with clean cloth. Apply cotton wool and bandage. Teach patient how to do the same.
Feet with ulcers without any discharge	Clean the ulcer with soap and water. Cover with clean dressing. Advise rest.
Feet with ulcers with discharge	Clean the ulcer. Apply antiseptic dressing. Advise rest. If no improvement in four weeks, refer to hospital.
Care of the eyes	
Patient presents with red eye, pain, blurring of vision and discharge	Give aspirin or paracetamol. If available apply 1% atropine drops and steroid ointment. Keep eye covered with a pad. Whenever possible, advise to go to the hospital.
Patient with injury on cornea (corneal ulcer)	Apply antibiotic ointment if available. Keep eye covered with a pad. Wherever possible, advise to go to the hospital.



Source: WHO, 2000, as for Figure 19.1

Summary of Study Session 19

In Study Session 19 you learned that:

- 1 Leprosy is a disabling disease and complications can occur before, during and after treatment.
- 2 Patients are classified using WHO guidelines into paucibacillary (PB) and multibacillary (MB) for the purpose of treatment with multidrug therapy (MDT).
- 3 Prompt treatment with MDT is an effective way to prevent the spread of leprosy in the community. The duration of treatment for PB and MB patients is 6 and 12 months respectively.
- 4 If detected early and treated with MDT, leprosy will not lead to disabilities. Leprosy patients can lead completely normal lives.
- 5 Patients can collect their treatment at regular intervals from you or from the health centre, or (with accompanied MDT) take the entire course away with them when diagnosed.
- 6 As a health worker, you have an important role to play to ensure treatment adherence and completion and prevent patients from defaulting from treatment.
- 7 Leprosy patients can develop reactions, as part of the natural course of the disease. Urgent treatment is essential, otherwise irreversible impairments (e.g. reduced or partial loss of nerve function in the hand, foot or eye, along with loss of sensation, weak grips, impaired vision), or deformities (total or partial loss of hand, foot or eye functions, clawed fingers and toes, partial or total blindness) will develop.
- 8 Many complications of leprosy are due mainly to nerve damage and occur when reactions go untreated for a few months. The main result is damage of nerves which control the functions of the hands, feet or eyes.
- 9 Disabilities can be prevented and managed by early diagnosis and prompt treatment, plus a range of simple protective measures requiring patient self-care of the hands, feet and eyes.

Self-Assessment Questions (SAQs) for Study Session 19

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting. You can check your answers with the Notes on the Self-Assessment Questions at the end of this Module.

SAQ 19.1 (tests Learning Outcomes 19.1 and 19.2)

How would you classify the following leprosy patients?

- (a) Tesfaye with four skin lesions and weakness of both hands.
- (b) Hiwot has three skin lesions with loss of sensation.
- (c) Getachew reported with five skin lesions and inability to close his eyelids.

SAQ 19.2 (tests Learning Outcome 19.3)

What is the correct treatment for each of the following leprosy patients? Classify each person for either PB-MDT or MB-MDT and explain why you reached your decision.

- (a) Bizuwork has four skin patches located on the right upper arm.
- (b) Ato Mesele complains of weakness in both hands and there is also a big skin patch on his back.
- (c) Yohanes has three skin lesions on his back and two lesions on his face, but no muscle weakness.

SAQ 19.3 (tests Learning Outcome 19.3)

What would you do when a leprosy patient on treatment comes to you for a monthly visit and why?

SAQ 19.4 (tests Learning Outcome 19.4)

Briefly describe all the actions and attitudes of healthworkers like you that will help to prevent your leprosy patients from defaulting.

SAQ 19.5 (tests Learning Outcome 19.4)

Hailemariam started MB-MDT treatment eight months ago under your care but has not collected his MDT drugs in the last three months due to illness. He returns to see you today. What should you have done before now? What will you do today?

SAQ 19.6 (tests Learning Outcomes 19.1 and 19.5)

How would you educate a leprosy patient who is about to commence MDT?

SAQ 19.7 (tests Learning Outcome 19.6)

What should you do before discharging a leprosy patient from MDT treatment?

SAQ 19.8 (tests Learning Outcomes 19.1 and 19.7)

John has been on MB-MDT treatment for six months. He has come to you today to complain of redness and pain in his skin lesions. He feels unwell and has not been able to go to the farm for four days. What is wrong with John? What would you do and why?

Notes on the Self-Assessment Questions (SAQs) for Communicable Diseases, Part 2

Study Session 13

SAQ 13.1

In language a lay person could understand, you would say first that TB is an infectious disease caused by TB bacteria (germs). It is a disease that normally affects the lungs, though it can infect other parts of the body too. The symptoms of TB are a persistent cough, weight loss, chest pain, tiredness, difficulty breathing, sweating, fever and sometimes the spitting up of blood. When someone with TB coughs or sneezes they breathe out droplets that contain the bacteria. If these droplets are breathed in by a healthy person, they could also become infected with TB.

Most people infected with TB bacteria do not go on to develop TB. Instead the bacteria remain 'asleep' in their bodies, and in some cases they may even clear the bacteria completely. However, those who do develop an active infection will die in a few years if not treated. The treatment of TB takes many months and it is important that those undergoing treatment follow the treatment exactly. This ensures a good outcome and also prevents the development of drug-resistant strains of TB which are more difficult to cure.

Tell the person that if he or she suspects they or someone in their community may be infected, then please seek medical treatment at the nearest health facility. Children and those with other conditions, such as HIV, are very susceptible to TB infection.

SAQ 13.2

The global targets for TB case finding and treatment are to detect at least 70% of the smear-positive cases and cure at least 85% of the detected cases.

SAQ 13.3

326 new smear-positive TB cases are expected in 200,000 people. (Remember that in Ethiopia as a whole, in 100,000 people a total of 163 new smear-positive cases are expected every year. Therefore, in 200,000 people you would expect $2 \times 163 = 326$ cases).

SAQ 13.4

The main features of the Global STOP-TB Strategy are practising and scaling-up DOTS, addressing MDR-TB and TB/HIV co-infections, supporting the strengthening of the health system, and engagement with stakeholders such as public and private care-providers and the affected communities to raise detection, treatment and adherence to high standards. In addition, the strategy enables and promotes research into new drugs, diagnostic tools and vaccines.

SAQ 13.5

When an infectious adult coughs, sneezes, sings or talks, the *tubercle bacteria* may be expelled into the air in the form of droplet nuclei. Transmission of the TB bacteria occurs when a person in close contact inhales (breathes in) the droplet nuclei.

SAQ 13.6

Case finding strategies in these circumstances are intensified TB-screening in high-risk groups and screening of people who have been in close contact with them.

SAQ 13.7

The following people should be screened for TB in the family of someone with active TB:

- Children less than five years old
- Anyone who is HIV-positive
- All family members (children older than five years and adult) who have any symptoms of TB.

Study Session 14

SAQ 14.1

There are two phases in TB treatment: the intensive phase and the continuation phase. During the intensive phase the patient took anti-TB drugs in front of you, or another health professional, or another treatment supporter. While in the continuation phase, the patient collects their medication monthly and you check that timely collection and adherence to treatment is occurring.

SAQ 14.2

- (a) This patient has symptoms of TB and is therefore a TB suspect and in need of investigation for TB. So you should refer this patient for sputum smear examination to a TB treatment facility.
- (b) This patient also needs counselling for HIV testing, since there is significant overlap between these two diseases and HIV is one of the major risk factors for a patient to develop TB disease.

SAQ 14.3

- (a) W/r Almaz should be classified as 'smear-positive pulmonary tuberculosis'.
- (b) This patient is categorised as 'new' since there is no previous treatment for TB.
- (c) This patient is put under 'Category I' and treated with the following regimen:
 - Initial phase 2 (HRZE/S)
 - Continuation phase 4 (HR) or 6 (HE).

SAQ 14.4

- (a) The most likely cause in this patient is related to rifampicin, since this drug can cause reddish discoloration of urine.
- (b) Reassure the patient that this causes no harm; the patient should be advised to continue her medication.

Study Session 15

SAQ 15.1

A is true; when you monitor TB treatment you observe and record all treatment activities and this in turn helps to monitor the TB programme at national level.

B is *false*; at the fifth month a sputum examination is required for all TB patients with initial smear-positive results.

C is true; it is the responsibility of the original health facility to conduct subsequent follow-up once the patient is discharged from hospital.

D is true; it is the responsibility of the new facility to inform the original health facility that the transferred patient has reported for treatment.

SAQ 15.2

If a patient interrupts anti-TB treatment for less than one month the appropriate action is to trace the patient, solve the cause of the interruption and advise to continue treatment and prolong it to compensate for missed doses. Then you should advise the patient not to interrupt treatment again. Mention that if he or she continues interruption, the chances of cure will be lessened, as the patient may develop drug-resistant TB.

SAQ 15.3

- (a) Defaulter
- (b) Transfer out
- (c) Cure.

Study Session 16

SAQ 16.1

You suspect tuberculosis disease in children for one or more of the following reasons:

- (a) Presence of contact history with TB suspect or TB case in the family.
- (b) Chronic symptoms of TB – a cough for more than two weeks, fever, and sweating, decreased weight and decreased appetite.
- (c) Presence of a risk factor like HIV infection, malnutrition, after measles etc.

SAQ 16.2

This HIV patient should be suspected of having tuberculosis or other infections that occur at the late stage of HIV. You should refer the patient for possible TB diagnosis, including clinical evaluation, sputum examination and chest X-ray.

Advise him not to stop taking his ART drugs, or cotrimoxazole (CPT). You should also advise screening of family members for TB, as well as for HIV.

SAQ 16.3

Multidrug resistant-TB (MDR-TB) is active TB involving *M. tuberculosis* organisms that are resistant to at least isoniazid and rifampicin, the two most powerful anti-TB agents.

Study Session 17

SAQ 17.1

- (a) TB infection control is a combination of measures aimed at minimizing the risk of TB transmission.
- (b) Standard universal precautions include:
- hand washing and antisepsis
 - use of personal protective equipment (e.g. gloves)
 - appropriate handling of patient care equipment and soiled cloths
 - prevention of needle stick/sharp injuries
 - environmental cleaning and spills management
 - appropriate handling of clinical waste.

SAQ 17.2

- (a) Administrative control interventions needed at healthcare facility level are: triage (identify TB suspects and refer them for investigation), physical separation (cohorting) or isolation of patients or TB suspects, cough manners and minimizing time spent in healthcare settings.
- (b) Respirators for health workers and surgical masks for the patients.

SAQ 17.3

You could use the following measures:

- Create awareness about TB on routes of transmission, diagnosis, treatment and prevention.
- Identify and refer TB suspects to a higher health facility for diagnosis and treatment.
- Educate on TB vaccination (BCG), cough manners and respiratory hygiene.
- Supervise TB treatment for patients on anti-TB drugs.
- Keep TB patients' records updated.
- Advise TB patients to have HIV screening and HIV patients to have TB screening.
- Involve the community members and previous TB patients in TB awareness and prevention campaigns (advocacy, communication, social mobilisation).

Study Session 18

SAQ 18.1

Figure 18.13(a) is a photo from a leprosy patient, because it shows a skin lesion with accompanying loss of sensation. If you are told there is no loss of sensation or signs of nerve enlargement (Figure 18.13b) you should not suspect leprosy.

SAQ 18.2

Leprosy is understood to be eliminated in countries where fewer than 1 case for every 10,000 population is identified; the rate in Ethiopia is 0.57 cases per 10,000 population, so it has been eliminated in Ethiopia. However, this does not mean there are never any cases. So, as a HEP, you need always to be looking out for leprosy suspects to help reduce the incidence in Ethiopia even further.

SAQ 18.3

A is true: as you will have learned early in Section 18.3.

B is *false*: MDT has resulted in the elimination of leprosy in many countries.

C is *false*: MDT can stop the progress of the disease, but it cannot restore damaged nerves.

D is true: as you see in Figure 18.1.

E is true: case finding is a very important way of reducing the incidence of the disease.

F is *false*: this is only one part of case finding. Also involved (Section 18.3.1) is active case finding, where contacts of those with leprosy are examined.

SAQ 18.4

- (a) You should suspect leprosy because weakness of the hands is a sign of leprosy. You should take his history according to the guidelines in Box 18.2 and examine any skin patch for loss of sensation. In addition, you should do sensitivity tests (ST) and voluntary muscle tests (VMT) on both wrists.
- (b) Skin signs such as these do not suggest leprosy and the fact that the patient's responses to VMT are normal is further evidence that the disease is not present.

Study Session 19

SAQ 19.1

First, count the number of skin patches and check whether a peripheral nerve is involved in order to classify the type of leprosy into PB or MB (Section 19.1). If in doubt, classify as MB.

- (a) Tesfaye is MB because he has four skin lesions and weakness in both hands, which is a sign of nerve involvement.
- (b) Hiwot is PB because she has only three skin lesions.
- (c) Getachew is MB because he has five skin lesions and eyelid gap, an indication of involvement of the nerves serving both eyes.

SAQ 19.2

First determine the classification of the leprosy patient, then decide whether to give PB- or MB-MDT.

- (a) Bizuwork is a PB patient because she has four skin lesions. She should be given PB-MDT.
- (b) Ato Mesele is an MB patient because although he has only one skin patch he also has weakness in both hands (an indication that the nerves responsible for movements of both hands are involved). He should receive MB-MDT treatment.
- (c) Yohanes has a total of five skin lesions and no muscle weakness. He is a PB patient and should receive PB-MDT.

SAQ 19.3

You should ask the patient how she/he feels and whether she/he has any complaint since the last visit. Then carry out VMT/ST and record your findings. Then inform the patient about treatment, looking for feedback to check what you say has been understood and clarify any issues the patient may raise. Finally, give/supervise and record the first dose of MDT for the new month, give the patient the blister pack, and remind the patient to inform you about any complaints during the month.

SAQ 19.4

You can prevent patients from defaulting by giving medicines regularly and informing the patient about what is required. In addition, make drug collection accessible and flexible, identify and refer patients with complications promptly. It is also important that you trace patients who miss a drug collection date or clinic day, carry out regular patient reviews and discuss any findings or concerns during clinic visits. Overall, you need to display an encouraging and positive attitude, to help motivate patients.

SAQ 19.5

Before now, you should have visited him at home to find out why he has been absent from treatment and discuss how to prevent future treatment interruption. You should have reminded him about the need to keep treatment appointments to avoid worsening of illness and possible resistance of the bacteria to treatment.

On his return today, you should ask him about the progress of treatment and carry out a physical examination. Remind him that he has to complete the remaining seven blister packs within 11 months without fail. Tell him to always inform you in advance if he needs to be away from home so that you can give him his medicines for self-administration for the anticipated period of absence.

SAQ 19.6

Look back at Section 19.1 to check your recall of what to do; see how many of the following points you have remembered. You need to:

- Educate patients about leprosy treatment to ensure that she/he adheres to the treatment plan.
- Tell patients that leprosy is curable, and the drugs stop the disease from spreading.
- Remind patients to keep the drugs in a safe, dry, shady place, out of the reach of children.
- Mention that if the drugs are spoiled (change colour or broken), they will be replaced, as MDT drugs are free of charge.
- Tell your patients that leprosy drugs can turn their urine red or skin darker, but they should not worry because this will go away when treatment is completed.
- Make sure your patients know that MDT is safe during pregnancy, for patients being treated for tuberculosis (TB) as well as those who are HIV-positive.
- Ask your patient to inform you when they notice any problem and that she/he will be seeing you monthly for a check-up and to collect MDT.

SAQ 19.7

Prior to discharge from MDT you should examine the patient and record all clinical findings.

SAQ 19.8

Redness and pain in skin lesions of a leprosy patient are signs/symptoms of a leprosy reaction. So, in John's case you should inform him about his sickness, as you learnt in Section 19.3, then give him some aspirin or paracetamol tablets to relieve his pain, before referring him to a clinician for immediate management. John must continue to take MDT. If possible, you should accompany him to the clinic.

