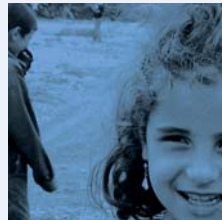


The Health Academy

avoiding tuberculosis

Selfstudy Program on Tuberculosis



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Acknowledgements

The content of this course on Tuberculosis was provided by the World Health Organization Stop TB department and has drawn from a variety of sources.

(A Human Rights Approach to TB: Stop TB Guidelines for Social Mobilization, Stop TB, 2001; Stop TB Annual Report, 2001; Tuberculosis "Colors Report," World Health Organization, 2003; World TB Day 2003 Highlights Report, 2003; WHO Report 2004 Global Tuberculosis Control Surveillance, Planning, Financing).

Useful Links

World Health Organization (WHO), Tuberculosis

www.who.int/gtb/index.htm

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table of contents

Overview

.4.

unit **one** ☐ - TB: An Ancient Disease in Today's World

.5.

Session One: TB Through the Ages and Around the World

.6.

Session Quiz

.11.

Session Two: An Introduction to Tuberculosis

.12.

Session Quiz

.13.

Unit One Self-assessment

.14.

unit **two** ☐ ☐ - The Bacteria and Its Effects on the Body

.15.

Session One: TB Transmission, Infection and Disease

.16.

Session Quiz

.21.

Session Two: The Link Between HIV/AIDS and TB

.22.

Session Quiz

.24.

Session Three: TB Testing and Diagnosis

.25.

Session Quiz

.28.

Session Four: TB Treatment and MDR-TB

.29.

Session Quiz

.32.

Unit Two Self-assessment

.33.

unit **three** ☐ ☐ ☐ - Tuberculosis and Society

.34.

Session One: Tuberculosis and Poverty

.35.

Session Quiz

.40.

Session Two: TB and Women, Children & Institutionalized Populations

.41.

Session Quiz

.45.

Unit Three Self-assessment

.46.

unit **four** ☐ ☐ ☐ ☐ - Solutions Paving the Way to Stop TB

.47.

Session One: The cure - DOTS

.48.

Session Quiz

.51.

Session Two: Overcoming the Challenges Ahead

.52.

Session Quiz

.56.

Unit Four Self-assessment

.57.

Answers

.58.

Glossary

.59.

overview

Vision

This program is intended to provide you with a basic understanding of tuberculosis transmission, prevention, and treatment. In doing so, it aims to empower you to challenge entrenched stigma associated with TB and to become active participants in the fight against the disease.

Program Objectives

This program is designed to provide you with the essential information that will allow you to prevent and manage Tuberculosis and to support others.

Specifically, upon completion of this program, you will be able to:

- Articulate that TB is a preventable and curable disease
- Describe the cause and transmission of TB
- Identify the key symptoms of both pulmonary and extra-pulmonary TB
- Describe action involved in prevention and treatment of this disease
- Recognise DOTS as the recommended public health approach to control TB
- Advocate for equitable access to TB drugs under DOTS
- Articulate the susceptibility of people with HIV to TB disease
- Communicate the link between TB and social conditions
- Identify and challenge stigma associated with the disease

unit one

An Ancient Disease in Today's World

session 1

TB Through the Ages and Around the World



Source: World Health Organization

From the tombs of Ancient Egypt to the halls of modern science

On the pale walls of the Luxor Temple, some 4,000 years ago in ancient Egypt, a Pharaoh carved an image of a man who had become ill when he breathed in a germ smaller than a speck of sand. The Pharaoh, as he sketched, may not have known that the disease he was describing on the wall was to become one of the largest single causes of death: a disease that would later be called tuberculosis. As he put the last touches on the drawing, the Pharaoh may have not known that around the world and down the pages of history, scientists and doctors would seek to understand what caused the disease and how it could be prevented and cured.

By the time the wind had worn smooth the carving, when two thousand years had passed, physicians in Greece set out once again to attempt and describe the disease – though now with words and not with pictures.

Writing in his journal in 460 B.C, the great thinker Hippocrates speculated that the coughing many of his patients endured seemed to have something to do with the air they breathed. Although Hippocrates was doubtful that any doctor could cure what he called the greatest disease of his time, he suggested that persons afflicted with TB take long rides on horseback. Perhaps, he reasoned, the fresh air in the open pastures would help his patients to breathe easier.

Many centuries later, the physician Celsius confirmed TB of the lungs as a separate disease. He, like

Hippocrates, made the connection between the air people breathed and TB, and recommended that his TB patients spend their days at sea and drink lots of milk. However, it was not until 1620, that a physician first glimpsed the internal toll of the disease. In that year, a physician by the name of Sylvius, noticed that all of his **consumptive** patients shared a similar symptom: each had an abnormal layer of cells, called **tubercles**, on their lungs. These tubercles were part of the body's effort to contain the disease.

Both Hippocrates' and Celsius' early suggestions that their patients "breathe open air" marked the beginning of efforts to help people recover from a disease that was generally recognized only by coughing and fever. It was not until much later that scientists were able to truly understand the cause of the disease.

When the carving on the Luxor wall turned 3,900 years old, a scientist by the name of Robert Koch, working in his laboratory in Germany, saw for the first time in history the organism that had taken so many lives. Peering down his microscope in 1882, Koch saw what an English doctor, Benjamin Marten, had once called "wonderfully minute living creatures". Koch, using a special staining method, identified these creatures as "tubercle bacillus". It was this bacterium that had caused the abnormal layers that Sylvius had noted in his consumptive patients.



Source: WHO/ TBP/ Jad Davenport, Bangladesh, 1997.

Sanatoriums helped contain the spread of disease

At that time, the cities across the continent of Europe were growing at a remarkable rate - and providing just the right conditions for tubercle bacillus to multiply. The "open air" that the ancient Greek doctors had recommended was becoming increasingly rare, as more and more people left the country-side to live and work in large towns. Entire families shared small, cramped rooms where germs - including the tubercle bacillus - could spread easily. As living conditions worsened and the rate of industrialization quickened, several physicians began to advocate [sanatoriums](#), or special hospitals in the countryside.

In these hospitals, TB patients could sleep on balconies that peered over manicured lawns and wake to days of rest and warm nutritious food. Sanatoriums helped contain the spread of disease, by keeping those infected with the disease away from the general population and by providing the right conditions for recovery. For almost a full century, this open-air treatment was thought to be only option available for people who had developed TB disease.

As sanatoriums began to become more commonplace in the industrialized world, a second important discovery was made that helped doctors more accurately diagnose TB. Until the close of the 19th century, a doctor examining a patient for TB was forced to rely solely on physical symptoms - such as coughing, weight loss, and general fatigue. This method of diagnosis, however, was often problematic, as TB can mimic many other diseases such as influenza.

So in 1895, when Wilhelm Röntgen discovered the [x-ray](#), a tool which enables doctors to look beyond external symptoms, it marked an important milestone in our understanding of the disease. Studying the [chest x-rays](#) of his patients, Röntgen was able to examine the lungs of living persons for signs of tubercular lesions, which form when defence cells gather around TB bacteria. Over the next century, the development of other means of seeing beyond the external, namely a [skin test](#) and [sputum microscopy](#), helped refine diagnosis methods.

As diagnostic methods began to improve, so too did prevention and treatment strategies. In 1921, at a time when their country was reeling from the aftermath of the first World War, two French scientists, Calmette and Guérin, invented a [vaccine](#) that is now known as [BCG](#) (bacille Calmette-Guérin). Calmette and Guérin hoped that this vaccine would prevent people from developing the disease that was rapidly stealing across the continent's crowded cities. However, even now, after decades of research, BCG remains of only limited use in halting the spread of TB - it can prevent against severe forms of TB, but has virtually no impact on the spread of the most common form, active pulmonary TB.

Then, in 1944, scientists developed a medicine that eventually replaced sanatoriums as the leading treatment and that has saved thousands of lives. In that year, an [antibiotic](#), or a medicine to kill bacteria, was used on a patient with impressive results. The coughing and fever, the same symptoms that had plagued the ancient Egyptian, stopped. The patient recovered. And for the first time, the bacterium had met its match.

X-ray marked an important milestone in our understanding of the disease

BCG vaccine was invented in 1921

With these new advances in science and improvements in the living conditions in industrialized countries, the White Plague that had terrorized children and adults alike began to disappear during the 1960s- but only in a small part of the world. In the 1990s, the World Health Organization established a new strategy for treating patients, called [DOTS](#), which we will learn more about in Unit Four. For hundreds and thousands of people, however, TB treatment is still out of reach and prevention difficult.

In the next session, we will

Describe, in simple terms, what tuberculosis is.

Identify key characteristics of the bacterium that causes tuberculosis.

List reasons why it is important to learn about tuberculosis.

TB around the world

Tuberculosis is the single greatest curable infectious killer in today's world. TB is a global problem - one that requires global solutions. Although the incidence of disease is concentrated in the developing world, there is evidence to suggest a new resurgence in industrialized countries. Let us look at some examples of TB spread around the world.

- In the United States, from the late 19th century to 1984, the number of people with TB decreased to a low of 22,000 in 1984. However, between 1985 and 1992, the incidence of TB increased by 20% nationwide. This increase was in part the result of increased immigration from countries with high incidence of TB, increased rates of HIV infection, and increased populations in homeless shelters and correctional institutions. Now, with new control measures, rates have decreased, with only 16,000 new cases reported in 2000.

- In the UK, there was a continuous decline in the number of cases from the middle of the 19th century until the 1980s. Since then, however the number of people with TB has increased steadily to the current figure of around 7000 a year. Two -fifths of cases are in London alone.

- Twenty three years of war in Afghanistan have resulted in the steady collapse of the public health system. This has led to poor access to TB treatment, and to frequent treatment failure. The huge influx of people returning from neighbouring countries could increase

the prevalence of TB. Political uncertainty and a lack of security continue to make TB control precarious. Recent reports show that Afghanistan has a high incidence of TB: 333 per 100 000 people.

- Health care systems in Bangladesh have improved over times, but there are still major obstacles to effective TB control - including inadequate training and supervision and lack of continuous drug supply. Bangladesh is ranked 5 in the incidence of TB, with a burden of 221 per 100 000.

Tuberculosis is the single greatest curable infectious killer in today's world

- Political changes following the 2000 general election led to reorganization of the Ministry of Health, and to adjustments in policies and plans on health care. Decentralization of public health services has presented a challenge to the implementation of TB diagnosis, treatment, and evaluation. Brazil is ranked 15, and has an incidence of 62 per 100 000.

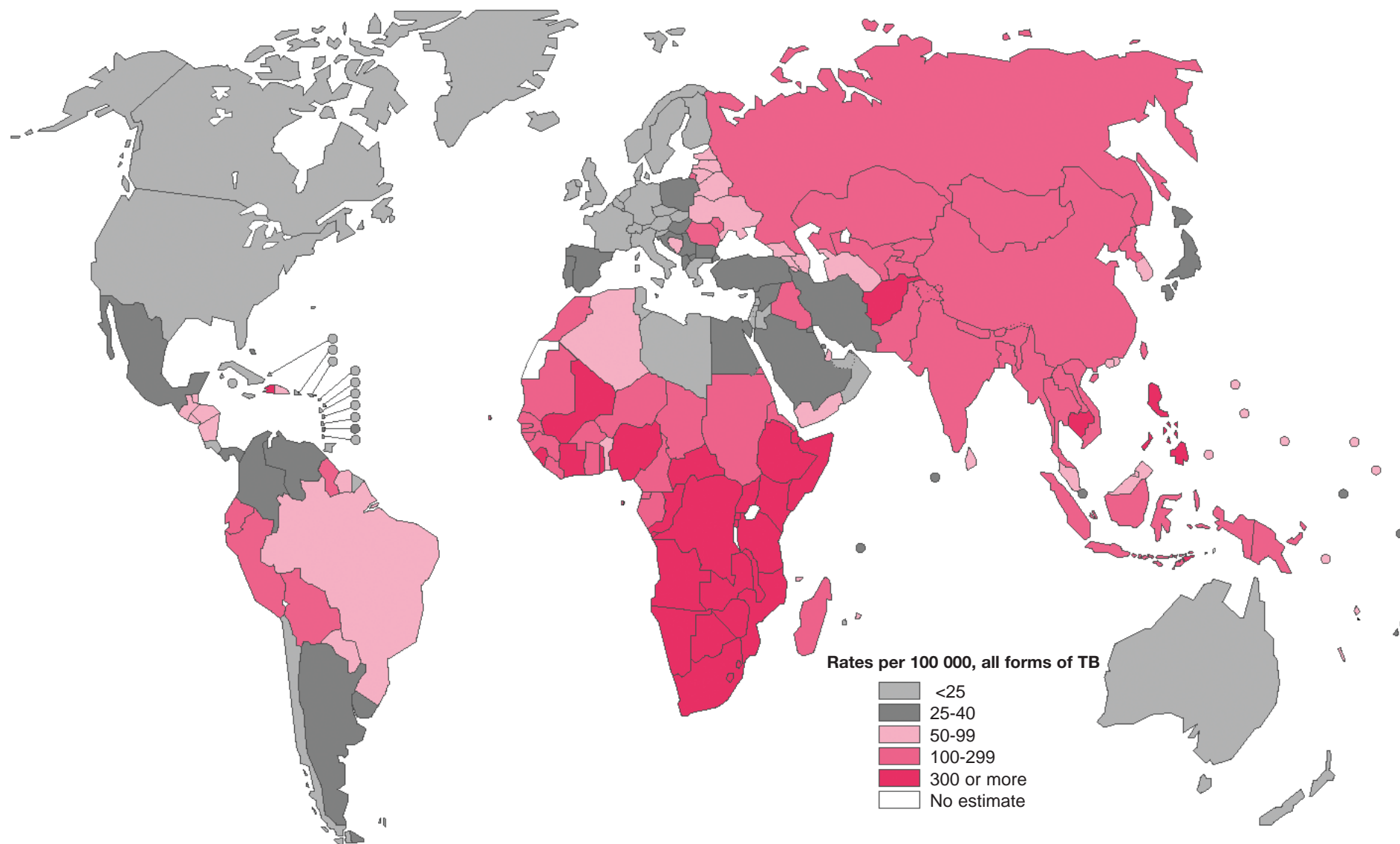
- Tuberculosis outbreaks have been shown to be only briefly local: drug-resistant TB and non-resistant TB have the capacity to spread rapidly across regional and national borders. Indeed, the pressures of globalization ensure that TB can travel to new settings through commerce, tourism, and migration. In the past decade alone, MDR-TB outbreaks have occurred in some of the world's richest countries - including Italy, the United States, and England. In London, for example, the number of cases has risen by 80%, while one area of the city now has a rate of TB higher than China's.

As a way to start thinking critically about the disease, please read and evaluate the following statements.

- 1• "The reasons why you get TB have to do with smoking and salt: if cigarettes get in contact with salt. And also pollution." (Christopher, Nigeria).
- 2• "We don't have TB in Finland any more. It's something linked to the throat and the cold." (Ehna, Finland).
- 3• "Is it waterborne?" (Angus, UK)
- 4• "You get it from dirt. The rats." (Paul, Zaire)
- 5• "You can get it by smoking." (Anti, Estonia)
- 6• "You can get it from a tiny creature, a creature so small you could fit a thousand in a piece of rice, a creature that loves to live in human lungs, but can affect many other parts of the body and can cause serious illness, even death." (Anonymous, Switzerland)

Of these statements, only the last is true. To understand why, we will take a closer look at the disease and the bacterium that causes it in the following sessions.

■ Estimated TB incidence rates, 2002



The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the local status of any country, territory, city or area of its authority or concerning the delimitation of its frontiers.

■ Over the course of history, from ancient Greece until the mid 20th century, which one of the following TB treatments have physicians and scientists consistently recommended?

- a. Milk diet
- b. Open-air
- c. Rest
- d. Antibiotics

■ ■ In those parts of the world that experienced a rapid growth of cities and industrialization during the 19th century, which one of the following best describes rates of TB?

- a. Decreased, because medicine became more accessible
- b. Increased, because living conditions became more cramped and the disease could spread at a quicker rate
- c. Decreased, because TB is most common in open-air environments
- d. Increased, because smoking rates increased with the rise of cities

■ ■ Which two of the following best describes the purpose of sanatoria?

- a. To punish people with TB
- b. To help people recover from TB by offering rest and nutritious food
- c. To help confine the disease through isolating infected persons
- d. To provide scientists with a place to research and study the effects of TB

■ ■ Which one of the following is part of the reason why in some developed countries, during the second half of the 20th century, TB incidence rates began to decline?

- a. Scientists developed a vaccine
- b. Rates of smoking decreased
- c. Scientists developed antibiotics
- d. People with the TB disease moved to sanatoriums outside of the major urban centres

■ ■ Which one statement most accurately describes the current incidence of active TB?

- a. The incidence of active TB is evenly distributed around the world
- b. There is a higher incidence of active TB in industrialized countries than in non-industrialized countries
- c. There is a higher incidence of active TB in non-industrialized countries than in industrialized countries
- d. It is impossible to estimate the distribution of active TB

Go to page 58
to check your answers

session2

An Introduction to Tuberculosis



Electron-microscope image of Mycobacteria Tuberculosis bacteria
Source: The Canadian Lung Association images

Meet Mycobacterium tuberculosis, the tiny germ that causes most cases of tuberculosis. Although you may not be able to tell from the photo, in reality, this deadly bacterium is so small that over one thousand of them could squeeze into this single letter, I.

Tuberculosis is one of the most damaging infectious diseases in human history and yet one of the most widely misunderstood.

Tuberculosis is a curable disease that, in its most common form, attacks the lungs but can affect almost any part of the body. This most common form is called active pulmonary TB disease, meaning "of the lungs."

A person with active pulmonary TB disease often suffers from a persistent painful cough, night sweats, weight loss, and fever. If left untreated, the disease can be fatal.

At first, it may be hard to imagine that something so tiny can - and does - kill more people every day than if 14 jumbo jets plunged into the ocean. To understand this enigma, let's take a closer look at the bacterium itself.

You may notice a grey line surrounding the rod-like organism. This is the bacterium's skin, or [cell wall](#). The skin is quite thick, making the bacterium a tough creature that can enter the human body through a single breath, travel to the lungs, and withstand attacks from the [immune system](#), which the body relies on to fight invading bacteria.

Although the bacterium can exist almost anywhere in the body, it usually remains in the lungs, where it will lodge itself into little sacs of tissue that contain air, called [alveoli](#). If this bacterium in the lungs begins to cause symptoms, the person is said to have active pulmonary TB. If, however, the bacterium travels out from the lungs and through the blood to other parts of the body, such as the kidney, spine, and brain, the

person is said to have [extra-pulmonary TB](#), meaning "outside the lung."

Because the bacterium is so tiny, any time a person with active pulmonary TB disease coughs, laughs, sneezes, or even just talks, the bacterium travels up through the lungs and out into the air in a bubble of liquid, called a [droplet](#). M. tuberculosis can exist in the air for up to six hours, during which time another person may inhale it.

M. tuberculosis does not discriminate against the people whom it meets.

It is estimated that every second, a new person is infected with TB

It is estimated that every second, a new person is infected with TB.

Some people who are infected with the disease, however, do not necessarily ever become sick; that is, they do not necessarily develop the disease and the symptoms described earlier.

If a TB bacterium finds its way to a new set of lungs, it may be killed or contained by the body's immune system. Bacteria that are contained in this way are said to be sleeping, or dormant. [Dormant](#) bacteria do not affect the body in any significant way: in fact, 9 out of 10 people who are infected with TB, that is, who have the TB bacterium somewhere in their system, will never become sick. Moreover, people who are infected with TB cannot pass the disease onto others. Certain factors can make someone more predisposed to developing the disease, including having a weak immune system.

If however, the sleeping bacteria 'wake up,' - which can happen if the body's immune system becomes weakened or if the number of bacteria increases - then the person will develop symptoms of TB and will be able to pass the disease onto others.

Now, let's return to some of the earlier statements about TB and evaluate their validity in the session quiz.

■ What is TB?

- a. TB is a symptom of HIV infection.
- b. TB is a hereditary disease that only affects children
- c. TB is an ancient disease that has been eradicated
- d. TB is an infectious disease that usually affects the lungs



Someone who wants to avoid getting TB should avoid **dirt and rats.**

- a. True
- b. False

■ ■ What causes TB?

- a. TB is caused by smoking
- b. TB is caused by eating too much salt
- c. TB is caused by breathing in polluted air
- d. TB is caused by tiny bacteria



On average, a single *M. tuberculosis* can **exist in the air for up to how long?**

- a. 6 hours
- b. 6 weeks
- c. 6 months
- d. 6 years



How is TB spread?

- a. TB can be spread through water
- b. TB can be spread by sharing food with a person infected with TB
- c. TB can be spread through the air when an infected person coughs or sneezes
- d. TB can be spread through holding hands with an infected person



Which of the following statements best **describes *M. tuberculosis*?**

- a. *M. tuberculosis* is a type of bacteria that is quite large in diameter, which allows it to easily infect the blood stream
- b. *M. tuberculosis* is a type of bacteria that does not have a cell wall and therefore, to survive, it inhabits protected regions such as the lungs
- c. *M. tuberculosis* is a type of bacteria that has a thick cell wall, which can serve as a form of protection against the body's immune system
- d. *M. tuberculosis* is a type of virus that effects the nervous system

Go to page 58 to check your answers

■ Approximately how many people die each day as a result of active TB?

- a. 5
- b. 500
- c. 5,000
- d. 50,000

■ ■ In what year did WHO first declare TB to be a global emergency?

- a. 1893
- b. 1903
- c. 1953
- d. 1993

■ ■ Which one statement best describes the relationship between alveoli and the bacterium?

- a. Alveoli are a type of antibiotic that is highly effective at destroying the bacterium
- b. Alveoli are a type of defence cell that is an integral part of the body's immune system and is partially effective in preventing the spread of infection
- c. Alveoli are tiny sacs of tissue in the lungs that can be infected by the bacterium
- d. Alveoli is a term that ancient physicians used to describe tuberculosis

■ ■ ■ Which one statement best describes the current global incidence of TB?

- a. The incidence of active TB is evenly distributed around the world
- b. There is a higher incidence of active TB in non-industrialized countries than in industrialized countries
- c. There is a higher incidence of active TB in industrialized countries than in non-industrialized countries
- d. It is impossible to estimate the distribution of active TB

■ ■ What two discoveries in the late 19th century helped advance scientific understanding of TB transmission and pathology?

- a. The X-Ray and the identification of the bacterium bacilli
- b. The sanatorium and a TB vaccine
- c. Antibiotics and sputum microscopy
- d. Tubercles and DOTS

Go to page 58
to check your answers

unittwo

The **Bacteria** & its **effects** on the body

In this unit, you will explore the effect of the bacterium on the body, namely modes of transmission, primary immune response and development of active TB disease. You will be asked to identify symptoms of TB and explain the biological underpinnings of treatment. Key concepts to be discussed include infection vs. disease, the importance of early diagnosis, HIV/AIDS co-infection, requisites for effective treatment, and MDR-TB.

session 1

TB Transmission, Infection and Disease



Source: World Health Organization.

■ After you have examined this poster, please answer the following questions.

The man wearing the blue shirt seems to be:

- a. Indifferent
- b. Concerned
- c. Sick
- d. Tired

The man wearing the green pants seems to be:

- a. Sick
- b. Tired
- c. Concerned
- d. Indifferent

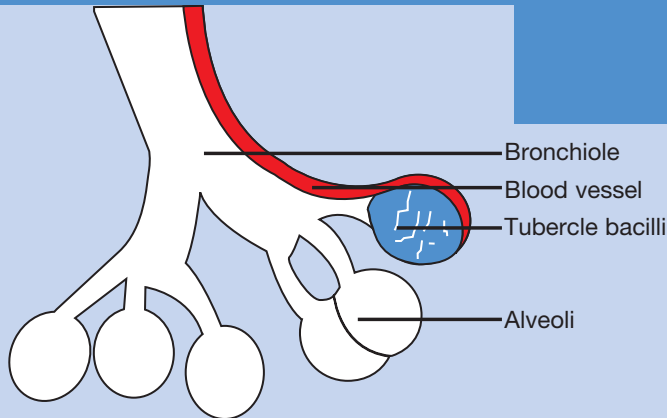
■ Based on what was covered in Unit One, if the man in the green pants has active pulmonary TB, do you think the man in the blue shirt should be concerned about his own health?

- a. No, because there is no chance that the bacteria released in the cough could infect him, because bacteria cannot exist in the air.
- b. Yes, because everyone who breathes in *M. tuberculosis* will develop the disease.
- c. No, because there is no skin contact between the two men in the picture.
- d. Yes, because there is a chance that the bacteria released in the cough could infect the man in the blue shirt.

Go to page 59 to check your answers

A closer look:

Tracing the Transmission of TB



When a person with active pulmonary TB coughs, bacterium can be released into the air and can infect another person. How does this happen?

Well, let us imagine that we could travel inside the lungs of the coughing man. There, deep in his lungs, we find a clan of the bacterium wedged in the alveoli. By tracing the route of these bacteria, we can understand how tuberculosis is transmitted.

As we learned in Unit One, TB bacterium can thrive in the deep, moist tissue of the lung. When someone with active pulmonary TB coughs, sneezes, laughs, or even talks, this bacterium can be dislodged and propelled up through his airways and into the air.

The TB bacilli, once in the air, can then be inhaled by someone standing nearby in close contact. Most of the larger droplets will become lodged in his nose and throat, or upper respiratory system. However, some bacterium will travel to his lung cavity.

Although the lungs are the most common site of infection among adults, TB can infect a wide range of regions within the body, including lymph glands, bones and joints, the brain, the urinary and reproductive tracts, and even the bloodstream.

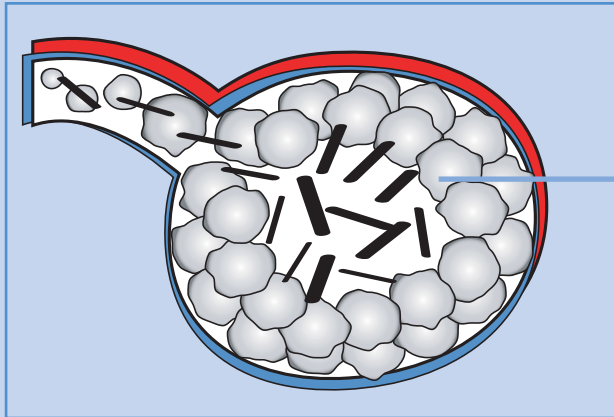
TB that has infected the bloodstream and circulated throughout the body is known as **Miliary TB**, which is a particularly serious form of the disease. Miliary TB generally occurs in young children and persons with weak immune systems.

A person may contract pulmonary tuberculosis from inhaling droplet from a cough or sneeze by an infected person

Granuloma in lung tissue



TB can infect a wide range of regions within the body



Hard shell breaks down and tubercle bacilli escape and multiply (in this example, TB disease develops in the lungs)

After the TB bacillus arrives in the moist tissue of the lungs, it begins to multiply. Gradually, it spreads towards the lymph glands in the middle of the chest.

This process is known as **primary TB infection**.

When we say that a person has a primary TB infection, we mean simply that the tubercle bacilli are in that person's body.

A person who has a primary TB infection cannot spread the disease to others and does not show any symptoms of illness.

Why is this so?

The answer lies in the body's ability to respond to invading bacterium.

Do you know how your body responds to invading bacterium?

After a primary infection, if you are fairly healthy, the body's special defence cells, or macrophages, will travel to the infected scene and eat the bacilli. However, as we learned in Unit One, the TB bacilli are tough: they have unusually strong cell wall. This protective skin allows the TB bacilli to survive - even when the macrophage eats it.

After the macrophage eats it, the bacillus then infects the macrophage. Once inside, the bacillus make itself at home inside the macrophage-living and growing as usual.

With the macrophages now defeated, the body's immune system next tries another defence strategy: walling in the TB bacilli. A new set of defence cells arrive in the lymph glands and surround the area of infection. These cells form a hard clump of cells known as **tubercle** - which, as we saw in Unit One, were first identified by Slyvius in 1620. These cells help kill the bacilli and, by forming a wall, prevent the infection from spreading further. In some cases, the defence cells may be able to permanently destroy all of the TB bacilli.

In many cases, however, the defence cells are not able to destroy all the TB bacilli. The survivors enter a dormant state, which may last for many years. During this time, the bacteria are "asleep" - the person shows no symptoms and cannot pass the disease onto others.

Given the right circumstances, however, dormant bacteria can re-awake, and break through the wall of defence cells, in a process known as **secondary TB infection**. Secondary TB infection can occur when the body's immune system grows weak and is unable to fend against the bacteria, or when the bacteria begin to multiply and overwhelm the immune system. Secondary TB infection usually happens within five years of the primary infection.

Secondary TB infection is often considered to be the onset of active TB disease.

So how does having a TB infection differ from having TB disease?

There are certain factors that make it more likely that a person who is infected with TB will develop TB disease. We will learn more about these factors in the next session. For now, though, it is important to note that in general, persons with weak immune systems are more likely to develop active TB disease than those with strong immune systems.

The following chart compares TB infection to TB disease:

Table 1.1 - TB Infection vs. TB Disease

TB Pulmonary Primary Infection	TB Pulmonary Active Disease
Tubercle bacilli in the lungs	
Sputum smear microscopy negative	Sputum smear microscopy positive
Chest x-ray usually normal	Chest x-ray usually abnormal*
Tuberculin skin test usually positive	
No symptoms	Symptoms such as cough, fever, weight loss
Not infectious	Often infectious before treatment
Not a case of TB	A case of TB

* Chest x-rays are not the main method of diagnosis, *Tuberculin skin tests are not used in the diagnosis
Source: Centers for Disease Control and Prevention

Table 1.2 - Risk Factors for the Development of TB Disease

Risk Factor	How many times higher is the risk of TB Disease? ⁽¹⁾
Acquired immunodeficiency syndrome (AIDS)	170
HIV infection	113
Recent TB infection (within past 2 years)	15
Certain medical conditions ⁽²⁾	3 - 16
⁽¹⁾ Compared to the risk for people with no known risk factors ⁽²⁾ For example, diabetes, certain types of cancer, or immunosuppressive therapy	

Source: Centers for Disease Control and Prevention

Symptoms of active TB

During a primary TB infection, there are usually no symptoms. However, when the dormant bacteria wake from their sleeping state to cause active TB, the person may experience a number of painful and uncomfortable symptoms.

A person with active pulmonary TB may have **any or all** of the following:

- Cough
 - often worse in the mornings, typically lasts for more than 3 weeks
 - may be accompanied by phlegm
 - may contain blood, owing to damage in the lungs
- Weight loss
- Fever and raised body temperature, especially at night
- Loss of appetite
- Tiredness
- Night sweats
- Shortness of breath

Extra-pulmonary TB produces different symptoms, as seen in the chart below.

Body Location	Symptoms
General	Feeling tired and / or weak, loss of appetite, nausea, weight loss, fever and chills, night sweats
Lungs	Cough lasting over 2 weeks, chest pain, coughing up fluid, called sputum (sometimes with blood)
Spinal cord / brain meninges	Severe headache, coma
Lymph nodes	Lymph node swelling
Bone marrow	Anemia
Back / Vertebrae (Pott's disease)	Back pain, paralysis

In the next session, we will **discuss**, why some people are more at risk for developing TB than others.

Specially, we will **examine** the link between HIV / AIDS and TB.

■ Which one of the following statements best describes the parts of the body that can be affected by TB?

- a. TB affects only the lungs
- b. TB affects only the lungs, bones and joints, and brain
- c. TB affects only the lungs, bones and joints, and urinary and reproductive tracts
- d. TB affects only the lungs, lymph glands, bones and joints, brain, urinary and reproductive tracts



Which one of the following is the correct advice that should be given if you have a friend who has coughed for a month, lost a lot of weight, and complains of sweating at night?

- a. Get more sleep, because rest is important
- b. Wear fewer clothes at night, to prevent sweating
- c. Go to a doctor, because there is a possibility that it could be TB
- d. Take cough medicine and nutritional supplements



Which one statement best describes the functions of a macrophage (body's special defence cell)?

- a. Macrophages damage the lung tissue
- b. Macrophages form a wall around the bacteria, preventing it from spreading
- c. Macrophages carry bacteria up from the lungs and out into the air
- d. Macrophages eat bacteria



Which one of the following is the best comparison of a person with a TB infection and a person with active TB disease ?

- a. Similar, because both persons are contagious and can transmit the disease to others
- b. Different, because a person with a TB infection is not contagious, while a person with active TB disease is contagious
- c. Similar, because both persons have symptoms
- d. Different, because a person with a TB infection has symptoms, while a person with active TB disease does not have symptoms



People with pulmonary TB may have the following symptoms:

- a. Coughing, fevers, night sweat, weight loss, shortness of breath, chest pains
- b. Coughing blood is the only symptom of TB
- a. Severe headache and weight loss
- d. Collapse of the immune system and development of AIDS

Go to page 58
to check your answers

session 2

The Link Between HIV/AIDS and TB

TB is too often a death sentence for people with AIDS.

- 50% of people with HIV/AIDS will develop TB.
- Having HIV makes it 30 times more likely that a primary TB infection will develop into a case of active TB.
- For an HIV positive person who contracts TB, the average life span is 5-6 weeks after infection.
- An estimated 15% of all new cases of TB are also infected with HIV.
- About 11 million people are dually infected with TB and HIV.

Together, TB and HIV/AIDS have created a catastrophe of unprecedented global proportions.



Source: World Health Organization.

Understanding the link

A TB bacillus enters the lungs and lodges among others like it in the alveoli. The alveoli wait for the arrival of the macrophages, the stalwarts of the immune system that should normally come to wage battle against the invading bacteria. But few macrophages come. Those that do are quickly defeated.

For another disease, one caused by the [human immune deficiency virus \(HIV\)](#), has already taken hold of the body's immune system. Unchecked, with no weapons or drugs to destroy it, the TB bacilli continue to multiply, forming a web across the lungs, and sending spasms of coughs that carry up blood and phlegm. Six weeks later, the bacilli that could have been cured with antibiotics have instead begun to work in tandem with HIV. Together, the two diseases debilitate the body until eventually, the lungs take their last breath, and another preventable death confirms TB/HIV as a dual and deadly epidemic.

As we saw in session one of this unit, certain factors can make an individual more likely to develop active TB. Of these factors, HIV infection is the most potent. To understand why, let's take a look at the effect that HIV infection has on the body.

HIV weakens the immune system; TB thrives in a weakened immune system

An HIV-positive individual is more likely to develop a form of TB that is not easily detected

HIV and the immune system

HIV weakens the immune system; TB thrives in a weakened immune system.

Thus, each disease speeds the other's progress.

HIV is a virus that attacks the immune system and makes the individual more susceptible to developing a number of diseases - including TB. Without a functioning immune system, a TB infection can quickly develop into a case of active TB.

TB has a similar compounding effect on HIV. The virus, like *M. bacillus*, can remain dormant for years before developing into a case of AIDS. Inhaling a TB bacterium, though, can trigger HIV to develop into full-blown AIDS.

An HIV-positive individual is more likely to develop a form of TB that is not easily detected. This means that it can be very difficult for doctors to diagnosis TB in HIV-infected persons. Without the right diagnosis, treatment can be delayed, and the disease can become all the more difficult to cure. Additionally, these delays in treatment can increase the number of infectious TB patients who are able to transmit the disease.

Is there any way to stop this cycle?

The simple answer is yes:

TB drug regimens for co-infected persons are just as effective as they are in non HIV positive persons – provided the diagnosis is made early enough and treatment is carried out for the required duration.

However, although a biological solution exists for stopping the spread of TB in a body ravaged by HIV, the story is far more complicated. Today, across the globe, a slew of social and economic barriers prevent hundreds and thousands of co-infected persons from receiving adequate treatment. In Unit Three, we will learn more about these barriers to treatment.

**In Unit Three,
we will learn more about
these barriers to treatment.**

■ Which one of the following actions should a person who is infected with HIV take to avoid contracting TB?

- a. Spend time and remain in close contact with people who have TB, so that the person who is infected with HIV can learn what it is like to have TB
- b. Avoid going to a medical clinic, which can be a risky place as a result of the many sick and contagious people who gather there
- c. Avoid close contact with people who have TB and consult regularly with a doctor
- d. Nothing, because once a person has become infected with HIV, it is impossible to avoid TB

■ ■ The average life span of an untreated HIV infected person who contracts TB is:

- a. 6 days
- b. 6 weeks
- c. 6 months
- d. 6 years

■ ■ Which one of the following statements best describes the relationship between HIV/AIDS and TB?

- a. HIV/AIDS and TB share a similar mode of transmission: both can be transmitted through unprotected sex
- b. An HIV infection and a TB infection produce similar symptoms, including fatigue, weight loss, and cough
- c. HIV promotes the progression from latent TB infection to active disease, and vice versa
- d. HIV/AIDS is a symptom of TB

■ ■ Delays in treatment for persons with HIV and TB co-infection may occur as a result of which one of the following:

- a. HIV produces a type of TB that is difficult to detect using sampling microscopy
- b. It is advisable that persons with HIV and TB wait for symptoms to lessen before beginning treatment
- c. It is advisable that persons with HIV and TB take treatment for the two diseases separately
- d. TB and HIV cannot be treated

■ ■ Which one of the following body systems does HIV affect?

- a. Respiratory
- b. Digestive
- c. Immune
- d. Excretory

Go to page 58
to check your answers

session 3

TB Testing and Diagnosis

When to Get Tested for TB

Meet Dga

He is 15 years old. For the past month, he has endured a painful cough that is especially bad in the mornings. He is tired all the time, and at night, he sweats a lot, even though he feels cold. His clothes are beginning to sag and he seems to have lost a lot of weight. Yesterday, when he was coughing, he became very nervous because there was blood in his cough.

What should he do?

- a. Go back to bed and try to get some sleep
- b. Realize that, in all likelihood, based on his symptoms, he has TB. He should therefore go immediately to the local pharmacy, buy antibiotics, and start taking his medicine.
- c. Realize that, in all likelihood, based on his symptoms, he is not getting the right nourishment. Accordingly, he should take nutritional supplements, increase his fruit consumption, and avoid engaging in any strenuous activity.
- d. Realize that, based on his symptoms, he might have active pulmonary TB. Accordingly, he should go to the nearest health facility and ask to be tested for TB.

Let us take a closer look at the given options.

- a. He has the symptoms of TB. If he crawls back to bed to get more sleep, he will delay getting tested for TB. This delay could pose a risk to himself and his family, as someone with a TB cough can transmit the disease to 10 -15 people in a single year.
- b. Although he has the symptoms of TB, it is not certain that he does in fact have the disease. Many other diseases, such as influenza, the common cold and other respiratory infections have similar symptoms. Taking medicine for a disease that you don't have can be very dangerous and expensive. Therefore, before he begins taking medicine, he should be tested for TB to ensure that he gets the right treatment.
- c. He has the symptoms of TB. Eating more fruit or altering his diet does not make TB go away - only a carefully monitored regimen of drugs can do this. Therefore, he should be tested for TB, instead of trying to recover by modifying his diet.
- d. RIGHT! He has the symptoms of TB, and should therefore be tested immediately for TB. A delay in seeking treatment means a risk to his health - and those around him.

The Importance of TB Detection

Detecting cases of TB is an important step in controlling and preventing the spread of the disease. Unless TB infection is detected, one is at risk of developing the disease and passing it to others. Approximately 10% of people with TB infection will develop the disease. A person with active pulmonary TB diagnosis is crucial to ensuring treatment: 50% of TB patients will die within 5 years if left untreated.

Knowing if you have a TB infection or disease can thus be a first step in preventing yourself and others from developing the disease. In the next session, we will discuss under what circumstances someone should be tested for the disease.

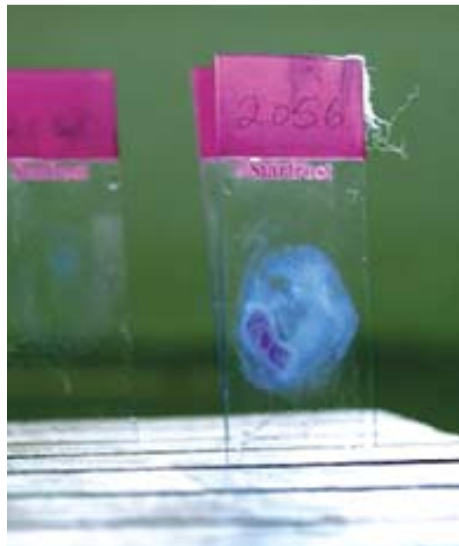
TB testing: What to Expect

Once one arrives at the centre, what should he or she expect?

It depends on the type of the health centre, but in general, there are four steps that a doctor may take to see if a patient has TB: discussion with the patient, sputum microscopy, and in some cases, culture and x-rays.

1. Discussion with patient

First, the doctor or nurse asks the patient about his symptoms and his exposure to the illness. The doctor or nurse inquires if he has been in close contact with anyone who has TB. These types of questions can help the doctor or nurse identify any relevant background information.



Stained slides of sputum smears.

Source: Stop TB partnership.
WHO/TBP/Gary Hampton, Uganda 2003.

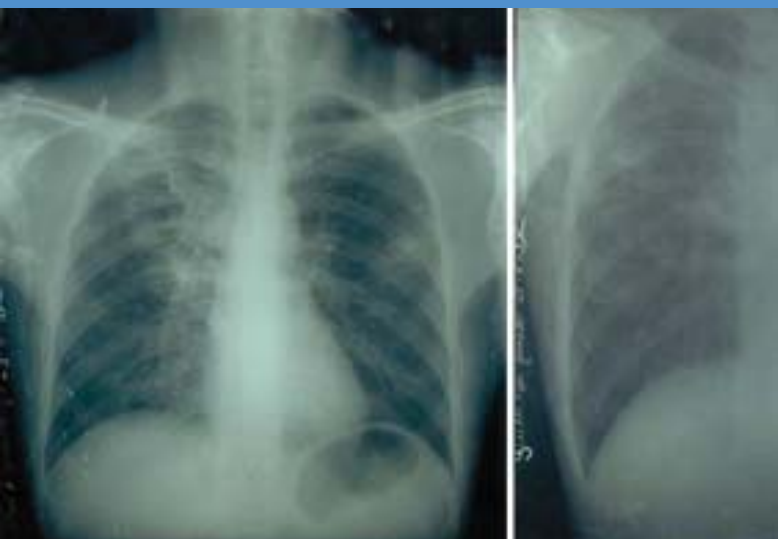


2. Examination of samples: sputum microscopy

Next, the doctor asks the patient to cough into a cup, as part of a process called [sputum microscopy](#). Sputum microscopy is the most accurate way of diagnosing TB. Using microscopes and staining methods, doctors can determine if there are any *M. tuberculosis* in a patient's sputum. [Sputum](#) is a fluid that is produced in the lungs and that can accompany a cough.

Diagnosis through sputum microscopy is based on three sputum analysis. This means that the doctor will ask the patient to cough into a cup at three different times. Then, the doctor will send the samples to the lab. Once the patient's sputum samples arrive in the lab, a microbiologist will look for TB bacteria using a microscope - just as Robert Koch did over a century ago.

The microbiologist will first stain the samples, so that he or she is able to see the bacteria, which will appear red under the lens. Then, the microbiologist will examine the sputum under a microscope, which will magnify the bacteria up to 100 times. If bacteria can be seen, the patient is said to be [sputum smear positive](#), indicating that he or she has active pulmonary TB. If there are no bacteria, then the patient is said to be [sputum smear negative](#).



Source: Stop TB partnership. WHO/TBP/Jad Davenport, Nicaragua 1997

3. Culture

In some countries, if bacteria are found, microbiologists will then try to grow more bacteria, in a special jelly called agar. Because *M. tuberculosis* grows very slowly, the laboratory diagnosis requires approximately four weeks. This is different from most bacteria, which can multiply in a few days.

4. X-Rays

In addition to talking with patients about their history, doctors will sometimes conduct a chest x-ray. This procedure is conducted to help determine whether the infection is dormant or if there is active TB disease.

As you can see from the picture, these x-rays can show the extent of damage to the lungs

Conducting a chest x-ray helps determine whether the infection is dormant or if there is active TB disease

Many people believe that testing through sputum microscopy is all that is needed to diagnosis TB. While this is true in most cases, there are certain situations in which a smear test is not enough. For example, in early stages of the disease, there may not be enough bacteria in the sputum to be detected by the microscopy test. Although as few as five TB bacteria in the lungs can start a new infection, a sample must contain 5,000 to 10,000 bacteria per milliliter for it to be detected.

Furthermore, in some instances, persons do not produce sputum at all. For example, persons with bone tuberculosis do not produce infected sputum, making the X-ray a necessary tool with which to assess the internal extent of infection. X-rays are also used to diagnosis patients suspected of spinal TB, for whom biopsies are not usually attempted.

It is important to note that an X-ray alone is not sufficient for diagnosis of active pulmonary TB, which requires sputum microscopy. In addition, X-rays can be difficult to interpret and often require highly trained specialists. In the majority of countries, these specialists are not available.

TB testing: What happens afterwards?

After he goes to see the doctor, our patient is diagnosed with TB. In the next session, we will look at the treatment of TB to understand how can our patient beat the disease.

In the next session,
we will look at the **treatment of TB**
to understand how can our patient
beat the disease

■ A person with a persistent cough, night sweats, and significant weight loss should take which one of the following actions?

- a. The person should go to a pharmacy, buy antibiotics, and begin taking the medicine immediately
- b. The person should modify his or her diet to include more nutrients
- c. The person should take cough medicine and get lots of rest
- d. The person should go to a clinic and request to be tested for TB

■ ■ If a person has laboratory tests and TB bacteria are found, which one of the following would be the diagnosis given to the person?

- a. Positive blood culture, therefore active extra-pulmonary TB
- b. Sputum smear negative, therefore dormant pulmonary TB
- c. Sputum smear positive, therefore active pulmonary TB
- d. Negative blood culture, therefore dormant extra-pulmonary TB

■ ■ Which one of the following statement best completes this sentence? *Delaying TB testing is...*

- a. Advisable, because TB tests become increasingly more accurate as disease progresses
- b. Unadvisable, because TB can be cured if it is diagnosed and treated early, which in turn, can prevent others from contracting the disease
- c. Advisable, because TB tests are less expensive once the disease has progressed from latent to active state
- d. Unadvisable, because TB will become MDR-TB if testing does not occur within one week of infection

■ ■ Which one of the following statement best describes the X-Ray as a diagnostic method for TB?

- a. An X-Ray is the most accurate method of diagnosing TB
- b. An X-Ray is useful in helping a doctor diagnose certain types of TB, although it must be accompanied with sputum microscopy for an accurate diagnosis
- c. An X-Ray is not useful in diagnosing any type of TB, because x-rays are difficult to interpret and require highly trained specialists
- d. An X-Ray is useful in helping a doctor diagnose certain types of TB, although it must be accompanied with discussion with patients

■ ■ What one of the following is the most accurate method of diagnosis for active pulmonary TB?

- a. Discussion with patient
- b. Sputum smear microscopy
- c. Culture
- d. X-ray

Go to page 58
to check your answers

session 4

TB Treatment and MDR-TB

Adjacent are two photos of different types of TB treatments, separated by some one hundred years and several pivotal scientific discoveries. What differences do you notice between the two methods of treatment? What is the emphasis in each photo? In which photo are patients more active? Which method do you think is more successful in treating tuberculosis?



Children take sun at a sanatorium.
Source: World Health Organization



Source: TB partnership. WHO/TBP/Gary Hampton, Uganda 2003.

These photos demonstrate the radical change in tuberculosis treatment over the past century. Until the 1940s, when anti-tuberculosis drugs were discovered, the most common form of treatment was the sanatorium, where doctors attempted to strengthen the patient's resistance to the disease through rest and good nutrition. As you can see from the first photo, in some sanatoriums, patients remained bed-ridden, while the sun and the clean mountain air were expected to purify the lungs.

By 2004, however, this conception of treatment has undergone a major revision, shifting from the external world of skin and sun to the internal world of bacteria and drugs. This move towards the antimicrobial occurred in 1944, when a new antibiotic, or medicine to kill bacteria, was developed from a sample of soil. Subsequent studies revealed that bacteria could be defeated inside the body through ingestion of drugs.

Note that the patients in the second photo are in a closed dark room: the emphasis here is on the work that happens inside the body - not outside the body. In this session, we will learn how these drugs work, the meaning of drug resistance, and the requisites for successful treatment. To do so, we will follow our patient through his treatment regimen, beginning at his first meeting with the doctor, when the doctor will prescribe his drugs.

Dga at his first meeting with the doctor

Dga: So TB is curable?

Doctor: Yes, TB is curable. The treatment that you will be starting today has five aims, one of which is to cure the patient. TB Treatment not only cures, though, it also prevents: it can prevent patients from dying of active TB, prevent patients from relapsing, decrease the chance that the patient will transmit TB to others, and prevent the development of acquired drug resistance.

Dga: Drug resistance, what's that?

Doctor: Drug resistance is when bacteria stop responding to the antibiotics, and the disease becomes much more difficult and costly to cure. This can happen either because the wrong treatment regimen is prescribed or because the patient does not take the right drugs for the whole course of treatment. Here, this sheet may be helpful - it defines what MDR-TB is.

Dga: So how long do I need to take the drugs to avoid developing MDR-TB?

Doctor: It depends, but at the very least six months. You may start feeling better though, within a few weeks.

Dga: I don't understand - if I feel better in a few weeks, why do I have to keep taking the medicine?

Doctor: Because even though your symptoms may disappear, the bacteria is still there in your system...and these bacteria are smart.

After a few weeks of heavy fighting with the antibiotic, the bacteria will have already figured out how the antibiotic works and how to beat it. So if you stop taking medicine before all the bacteria are killed, you will be left with some very smart bacteria. These bacteria can cause a relapse of the disease. Then, when you take the same medicine a second time, the bacteria will have already come up with a way to defeat the medicine. So it's very important that you keep taking the antibiotic for the entire course of treatment.

Dga: So if I take the medicine for the whole time, it will kill all the bacteria?

Doctor: That's right - if you take the antibiotics for the whole course of treatment, according to the scheduled regimen, it should cure the disease.

Dga: And if I don't take the medicine, the TB can come back?

Doctor: Yes, the TB can come back as MDR-TB. MDR-TB can be especially dangerous, as it is difficult and costly to treat: it can take up to 18-24 months to cure, and MDR-TB drugs are almost 100 times more expensive than regular anti-TB drugs.

Dga: I will definitely take the medicine through to the end then... Does everyone get the same medicine?

Doctor: No. There are different types of essential anti-TB drugs, for example: isoniazid, rifampicin, pyrazinamide, streptomycin, and ethambutol. These drugs are prescribed in different combinations and different doses, depending on the patient. For example, a pregnant woman should not take streptomycin, as it can pose problems for the fetus. That's why it is very important that people take only those drugs that a doctor has prescribed for them.

Those patients who have active TB and are seriously ill will receive a different prescription than those patients who have dormant TB, or who have already been treated. So to make it easier for doctors, we group drugs regimens into three categories. It's important to remember though, that these categories are not related at all to the severity of the disease. Instead, categories are used to help determine the appropriate treatment regimen.

These categories are not related at all to the severity of the disease. Instead, categories are used to help determine the appropriate treatment regimen.

Now let's take your case as an example. Your results from the lab were positive - so that means you are sputum positive. You have not yet been treated for TB, so here is your first dose of the antibiotics.

You will need to take drugs every day for the whole duration of treatment. I recommend that during this time, you find someone who will support you, someone who will remind you to take the medicine, and watch to make sure you take the right amount at the right time. This support will make it much easier for you to follow the treatment regimen. You'll also need to come back to the clinic in two months, so that we can repeat the sputum analysis and monitor your progress.

Dga: Okay - see you then!

He has now begun treatment. Because TB is a curable disease, He will soon be able to go back to his normal way of life. However, as we saw during the discussion with the doctor, he must complete the entire treatment for it to be successful - otherwise, he could develop MDR-TB.

One must complete the entire treatment for it to be successful - otherwise, he could develop MDR-TB

What is MDR-TB?

Multidrug-resistant tuberculosis (MDR TB) is a form of tuberculosis that is resistant to two or more of the drugs used for the treatment of tuberculosis.

How does MDR-TB develop?

Resistant forms of the disease occurs when the bacteria survives repeated antibiotic attacks and then passes this ability on to its progeny, or children.

How do you get MDR-TB?

There are at least three different causes of MDR-TB:

1. Inadequate treatment
2. Improper use of the anti-TB medications.
3. Exposure to someone with active MDR-TB.

Can MDR-TB be cured?

MDR-TB can be cured - but treatment for MDR-TB is much more expensive and difficult. Treatment can require up to 24 months, and is sometimes 100 times more costly than regular treatment regimens.

If I already have TB, and I am starting a drug regimen, how can I avoid developing MDR-TB?

MDR TB can be avoided by taking the right anti-TB medicine every day, for the entire course of treatment.

Let's review the important lessons we have learnt from this session:

- 1.** Even though your symptoms may disappear, the bacteria is still there in your system... and these bacteria are smart.
- 2.** There are different types of essential anti TB drugs. These drugs are prescribed in different combinations and different doses, depending on the patient.
- 3.** It is very important that people take only those drugs that a doctor has prescribed for them and they will need to take drugs every day for the whole duration of treatment.
- 4.** Our TB Patient needs to be checked after starting the medication in two months, so that they can repeat the sputum analysis and monitor his or her progress.

■ Which one of the following best describes MDR-TB?

- a. An effective drug regimen that can cure active pulmonary TB
- b. A side-effect of antibiotics used to treat active pulmonary TB, and is characterized by nausea and headaches
- c. A type of TB that is resistant to two or more anti TB drugs
- d. A type of TB that results when anti TB drugs multiply rapidly within the body



What actions should a person with active TB take to avoid developing MDR-TB?

- a. Remain in bed and get lots of rest
- b. Spend time outdoors, allowing the sun and open air to strengthen the lungs
- c. Stop treatment as soon as the symptoms stop, to prevent taking too much antibiotics
- d. Take the prescribed number of drugs every day for the duration of treatment and consult a doctor regularly

■ ■ Which one of the following statements best describes the consequences associated with MDR- TB?

- a. MDR-TB is easier and less expensive to cure than non-resistant TB
- b. MDR-TB is more difficult and costly to cure than non-resistant TB
- c. MDR-TB is less painful than non-resistant TB, because it is a relapsed form of the disease
- d. MDR-TB does not have any side-effects, while non-resistant TB produces many symptoms



Which one of the following statements best describes how TB drugs work?

- a. TB drugs force the bacteria to leave the body by inducing frequent coughing
- b. TB drugs eat bacteria that grow in the stomach
- c. TB drugs destroy Mycobacterium Tuberculosis that have infected various regions of the body, most often in the lungs
- d. TB drugs build new lung cells



What is the purpose of patient categories?

- a. Patient categories are used to determine the severity of the TB
- b. Patient categories are used to diagnose extra pulmonary and pulmonary TB
- c. Patient categories are used to assist doctors in prescribing treatment regimens through a standardized process
- d. Patient categories are used to decide which patients should be sent to sanatoriums for treatment

Go to page 58
to check your answers

■ Which one of the following statements applies to people who have a primary TB infection...

- a. Will develop active TB within five years
- b. Cough in the mornings, but not at night
- c. Do not show any symptoms, but are able to pass the disease to others
- d. Do not show any symptoms, and are not able to pass the disease to others

■ ■ Which one of the following is the most accurate method of diagnosing active pulmonary TB?

- a. Skin testing
- b. Conversation with patient
- c. X-ray
- d. Sputum microscopy

■ ■ Which one of the following is the greatest risk factor for development of active TB disease?

- a. AIDS
- b. HIV infection
- c. Recent TB infection
- d. Diabetes

■ ■ ■ Taking antibiotics that have not been prescribed by a doctor and without first being tested for TB is:

- a. Advisable, because not all TB tests are accurate and it is important to start taking medicine early
- b. Unadvisable, because self-treatment increases the likelihood of developing MDR-TB
- c. Advisable, because it is not necessary for medication to be prescribed by a doctor, as all cases of TB are the same
- d. Unadvisable, because TB is best treated with exposure to open-air and not through antibiotics, which are dangerous

■ ■ Which one of the following is the most common typical symptom of active TB disease?

- a. Stomach ache
- b. A productive cough
- c. Vomiting
- d. Weight gain

Go to page 58
to check your answers

unitthree

Tuberculosis & Society

In this unit, you will be asked to think critically about social issues related to tuberculosis. The sessions will explore the link between tuberculosis and poverty as well as analyse the sources of stigma associated with the disease. You will learn about the ways in which tuberculosis affects certain communities, namely women, HIV positive, and prisons. This survey is intended to foster awareness about the disease and encourage you to recognize and challenge stigma.

"Well ventilated houses reduce the spread of TB"



"Make sure that your house is always well ventilated"

"Ventilation and sunlight are very important to have in the house."

Source: World Health Organization.

Compare the above illustration with the photo below. The emphasis is on the need for ventilation and sunlight. Notice how windows and fresh air are a key focus of the posters.

Now, compare this message with the following photo:



Source: Stop TB partnership. WHO/TBP/ Jad Davenport, Peru 1997.

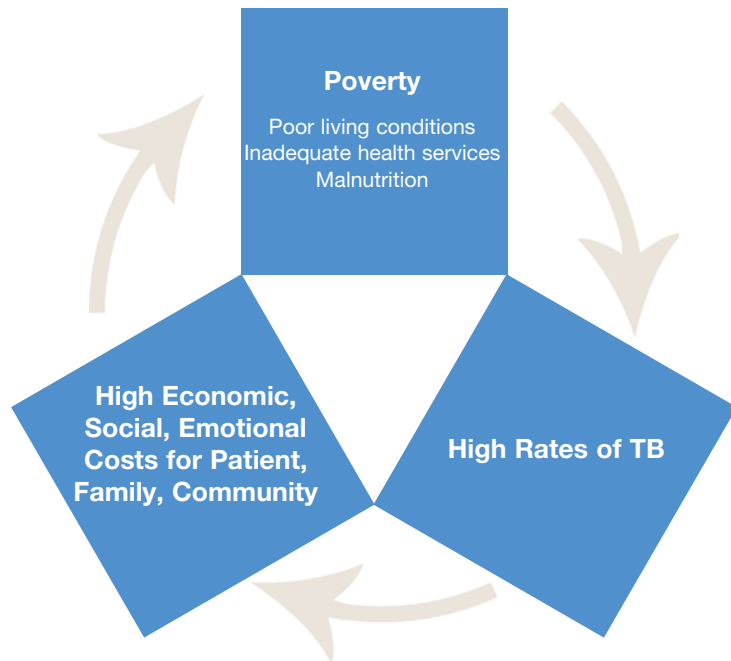
How does it compare with the message of the above illustration? What impact do you think such illustration would have in a neighbourhood like this?

session 1

Tuberculosis and poverty

Cycle of Disease/Poverty

Tuberculosis and poverty are inextricably linked in a viscous cycle, as diagrammed in the figure below.



The Silverio family, clockwise from bottom right: Alejandro, Julia, Julio, Thalia, Mayra, Alex, Zoila.

Source: WHO/TBP/Colors Magazine

Poverty

This is a true story of a man who once brought gardens to life and is now finding it difficult to breathe. He is 25, sits propped up on his back, and not face-down because of the pain that comes in his chest. From where he is, he can see a paper garden: a photo of four bouquets of flowers that hangs on the wall. He knows that beyond the photo and outside the dark room, on the slopes that shelter those who cannot afford the luxuries of running water and school-days, a row of shacks extends through the most abject poverty in the country. New shacks crop up throughout the year here, as thousands of people turn to the hills, in a place where four families share the same roof, and where one of the only things in abundance is a disease that kills through suffocation: TB.

These mountains are not unique in the abundance of poverty and TB. Across the world, in the very poorest of regions, TB runs rampant and unleashed. Every year, the shanty-towns and slums of developing countries play host to a full 98% of all TB related deaths and 95% of all new cases every year. These areas are fine hosts to the disease, catering to its every whimsy and preference. Poverty-stricken regions offer overcrowded, impoverished dwellings through which TB can easily travel and slip into undefended lungs. Without basic medical care and adequate nutrition, people living in these regions often have compromised immune systems and are more vulnerable to developing tuberculosis.

Poverty-stricken regions offer overcrowded, impoverished dwellings through which TB can easily travel and slip into undefended lungs

The man in the story we just heard, who developed TB while living in such conditions, has lost two siblings to the disease, which now preys on the lungs of both of his parents and his wife.

Costs of TB

Indirect Economic Costs

Loss of income is the largest indirect economic cost of TB around the world. On average, a TB patient loses three to four months of work time, equivalent to 20-30% of annual household income. In Uganda, for example, 80% of wage earners had to stop work because of their illness. Even those that remain working do so at a slower pace - 95% of Ugandan subsistence farmers who had TB reported lower productivity. Indeed, by the time patients in Bangladesh presented for treatment at the public TB clinic, some had already lost more than a year in work time.

As household income spirals downwards, a host of other indirect costs begin to mount. Families without income often resort to selling assets, such as land and livestock. 40% of TB patients in Bangladesh, for example, sold land or livestock to make up for lost income. While this sale of assets generates some cash flow in the short term, it can lead to a huge debt burden. In India alone, 20% of rural patients and 40% of urban patients borrowed money to pay for expenses.

These statistics point to an alarming reality that is being played out across the globe. Increasingly, countries with high incidences of TB face stunted economic development. Because 75% of TB patients are men and women in the most economically active age group, between 15 and 54, the cost of disease falls not just on the individual, but on the whole country.

Because 75% of TB patients are men and women in the most economically active age group, between 15 and 54, the cost of disease falls not just on the individual, but on the whole country

Direct Economic Costs

Half way across the world from the shanty-towns of Huascar, in Bangladesh where poverty is even more acute, TB has been given a new name: the "King's Disease." The name was coined because it is said that only kings can afford the direct costs of treatment and diagnosis. That is, very few can afford the cost of travel to a health centre that may be a day's journey away, let alone the chest x-rays, the advertised nutritional supplements, and the antibiotics that are often not provided for free.

A recent survey showed that TB patients in Bombay, India spent nearly 10% of income travelling twice a month to collect their drugs, while treatment of the disease amounted to more than 15% of annual income.

These types of economic costs are only one aspect of the disease that has taken hold of the Silverio household.

Patients with TB may experience depression and anxiety, both of which can make the burden of disease all the more difficult to carry

Emotional and Social Costs

The family we talked about earlier in this session have a three year old daughter. She has left them, because they are sick and there is no money to buy food. She could have stayed in the house with the flowers on the wall, and like many other children of TB parents around the world, came to know what it is to wake up in the morning with a pain in the stomach where there should be food and a space in the day where there should be school. But her parents, who have watched TB kill their siblings, decided it was not safe for their daughter to remain at home.

Other parents with TB have made similarly difficult decisions. Parents who can no longer work are often forced to take their children out of school and send them to find jobs that may or may not exist.

Their daughter was too young for school when she left, but not too young to need good nutrition every day. Her parents realized that if she had stayed in a home with no income, foodless days would have become the norm, and the heavy tolls of malnutrition would have begun to bear fruit. And so, with no other alternative, the parents said goodbye to their daughter.

these parents, like many parents suffering from TB, feel guilty because they were not able to provide for their child. "When you're sick, it's really depressing and very hard to help each other," explains the mother. These feelings of guilt are just one of TB's many emotional costs. Patients with TB may experience depression and anxiety, both of which can make the burden of disease all the more difficult to carry.

Stigma

Perhaps though, one of the greatest obstacles that people with TB must face is the stigma associated with the disease. At a time when support is most needed, TB patients often

find themselves most shunned. "Even my old friends reject me and stay away" explains one TB patient.

One of the greatest obstacles that people with TB must face is the stigma associated with the disease

This type of rejection is a common form of stigma, which shifts the blame from environmental factors to the person afflicted with the disease. In most instances, stigma is born out of fear and misinformation.

In some communities, it is assumed that TB is the result of poor hygiene, a lack of education, and destitution. In reality, as we have seen, factors such as poor hygiene and destitution can increase the likelihood of transmission and progression of TB. However, these factors do not cause TB: instead, it is the tiny bacteria whom we met in session one that can slip into anyone's lungs - regardless of income, race, or age.

In other settings, TB is thought to be the result of previous wrong doings, witchcraft or poisoning. Do you think it is effective? What misinformation is it trying to correct?

Because of stigmatization, many people with TB retreat into a world of silence and isolation, out of fear they will be ostracized if their condition is known.

"People say we are disgusting...they say we are contagious and should be kept in isolation," explains one TB patient who was a victim of stigmatization.

A social worker in India, who has worked with TB patients for over seven years, has often witnessed the type of reaction that was just described. He explains that because of stigma, many people with TB deny that they have the disease.

"Many TB patients do not want me to visit their homes. They are afraid that neighbours and community members will find out they are infected. If they find out, they will tell the person to put something over their face and tell them to stay home in isolation." This response can lead many persons with TB to delay seeking treatment, which can in turn lead to higher rates of transmission.

In most instances, stigma is born out of fear and misinformation

While these costs of stigma are high, solutions do exist. In the next unit, we will look at concrete actions that individuals can take to help break the cycle of poverty and disease.

Obviously, though, there are no simple solutions.

Telling families to build a new house with lots of windows is not practical advice and will not help halt the spread of TB. But encouraging them to identify symptoms, to seek treatment, to petition their government for access to anti TB drugs, and to educate others about TB could be one small, but important step towards a TB-free world.

TB is caused by a germ which is spread through the air by talking, sneezing, and coughing.



Some people think it is caused by a curse or witchcraft. This is not true

Source: World Health Organization

■ A baker who was diagnosed with TB six months ago and who has just completed his treatment returns to the bakery and asks for his old job. The owner of the bakery responds that people with TB are not allowed to work in the bakery because anyone who has ever had TB is should not work because they are dirty.. **Based on what was learned in this chapter, which one of the following conclusions is best supported by the facts?**

- a. He should not get his job back because the owner needs to protect others from contracting the disease and the baker could pass TB to others through the food
- b. He should not get his job back because people with TB are unclean
- c. He should get his job back , provided he does not come in contact with the customers
- d. He should get his job back, because he has been adequately treated and presents no risk to the customers

■ ■ Which three of the following statements are false and exhibit stigma?

- a. Low income persons are more likely to contract TB than high income persons because they have poor personal hygiene
- b. Low income persons more likely to contract TB because they do not care
- c. Low income persons often live in conditions that are characterised by malnutrition, overcrowding, and lack of medical services, which can increase the likelihood of TB transmission and development from latent to activedisease
- d. TB is inherited therefore, it is easily passed through low income families

■ ■ Which one of the following shows the correct percentage of TB related deaths that occur in developing countries?

- a. 50%
- b. 60%
- c. 70%
- d. 95%

■ ■ Which one of the following is generally considered to be the greatest indirect economic cost to the family, associated with TB?

- a. Loss of social status
- b. Loss of income
- c. Loss of educational opportunities
- d. Loss of nutrition

■ ■ "Imagine that you have just found out that your close friend has active TB and he/she does not wish to seek treatment. Which one of the following actions would be the most likely to encourage that person to seek treatment?"

- a. Telling everyone in the community that your friend has active TB
- b. Making fun of the person's health in a public setting, so that the person will realize the importance of going to seek treatment
- c. Pretending that you do not know your friend has active TB, and choosing never to discuss it with him or her
- d. Having a conversation with your friend and explaining that TB is curable with the right drugs

Go to page 58 to check your answers

session 2

TB and women, children & Institutionalized populations



Amena is one of 30 women receiving treatment at the Kart-e-Parwan Women's TB Institute in Kabul. Afghan women with TB are often stigmatized.

Source: WHO/TBP/Colors Magazine/Roshanak B./ Webistan, Afghanistan 2003

TB and women

Worldwide, TB is the greatest single infectious cause of death in young women. While fewer women than men are diagnosed with TB, a greater percentage of women die of the disease - and a greater percentage live with the daily burden of stigma.

Women often have minimal or no access to the tools that can help lower the risk of developing TB

Why do more women than men die of TB?

In regions where TB flourishes, women often have minimal or no access to the tools that can help lower the risk of developing TB. In a poverty stricken community, it is women who are most likely to be denied access to good nutrition, health services, educational and employment opportunities - all the things that can make it less likely that a person will develop TB.

The higher TB death rate among women can also be explained, in part, by cultural barriers that restrict women's freedoms in seeking treatment. For example, in Bangladesh, as in some other cultures, women are not allowed to go to a health clinic without a male relative to accompany them. This relative is then free to discuss the woman's health with the doctor - even if the woman is not in the room. Cultural barriers such as these can rob women of their rights to information and participation, freedom of movement, privacy and individual autonomy.

Finally, in addition to inequality and cultural barriers, women with TB are often the targets of stigma, which can prevent them from seeking treatment.

Women with TB are often the targets of stigma, which can prevent them from seeking treatment

What are the consequences of stigmatizing women with TB?

For married women who contract TB, there are a number of possible consequences. As we saw in the activity above, these consequences include:

- ostracism (or forced expulsion),
- abandonment by the husband and/or his family
- divorce, or the husband's taking of a second wife
- the loss of social and economic support, housing, and access to children
- higher risk of death.

For unwed women, being infected with TB - or just being related to someone with TB can seriously affect marriage chances. Women may have particular difficulty in finding a husband. Because of this, families often go to great lengths to deny or hide an unmarried daughter's illness.

Yes. Stigma often stems from misinformation or inadequate information about the disease. By raising awareness about the transmission of TB, and educating communities that TB is a curable disease that can be treated at little or no cost, stigma can be overcome. In unit Four, we will consider specific actions that individuals can take to promote TB awareness.

Excerpted from Ministerial Conference TB and Sustainable Development, Amsterdam 2000)

Our stigmatized patient died of TB at age 26. She weighed barely 28 kg. "Her coffin weighed no more than a sparrow's" said her grieving mother. The mother believes that her daughter died due to neglect and psychological abuse stemming from her TB disease.

"She came to visit us one year after her marriage and we were shocked at her appearance. We took her to see a doctor who took x-rays and various tests. She tested negative for TB but the doctor warned that she was very weak and would be susceptible to TB. He prescribed a three-month treatment to prevent this. We got the medicines he prescribed, but the very next day her in-laws came and took her back. We protested but they didn't listen."

Her in-laws are a family of traditional healers. They said they did not believe in allopathic medicine (though when their son, Her husband, had been ill with meningitis, he was treated by allopathic doctors.) Her health steadily deteriorated and her mother was finally allowed to take her back home to Lahore.

She saw more than one doctor and was prescribed different regimens of drugs. In the 11 months she was with her family, her treatment cost them US 4000, which they scraped together by borrowing, selling her mother's jewellery and using up their entire savings.

TB and children

In some societies, TB is considered to be a disease of the old. Popular images of coughing, feeble, grey haired men and women tend to distort the reality of entire populations of children who suffer from TB every day.

For example, in some developing countries as many as forty percent of TB notifications are children. Because TB can be particularly troublesome to diagnose, however, (as children do not produce the sputum that is usually used for detection), children are often left untreated until it is too late. In total, TB kills some 100,000 children a year.

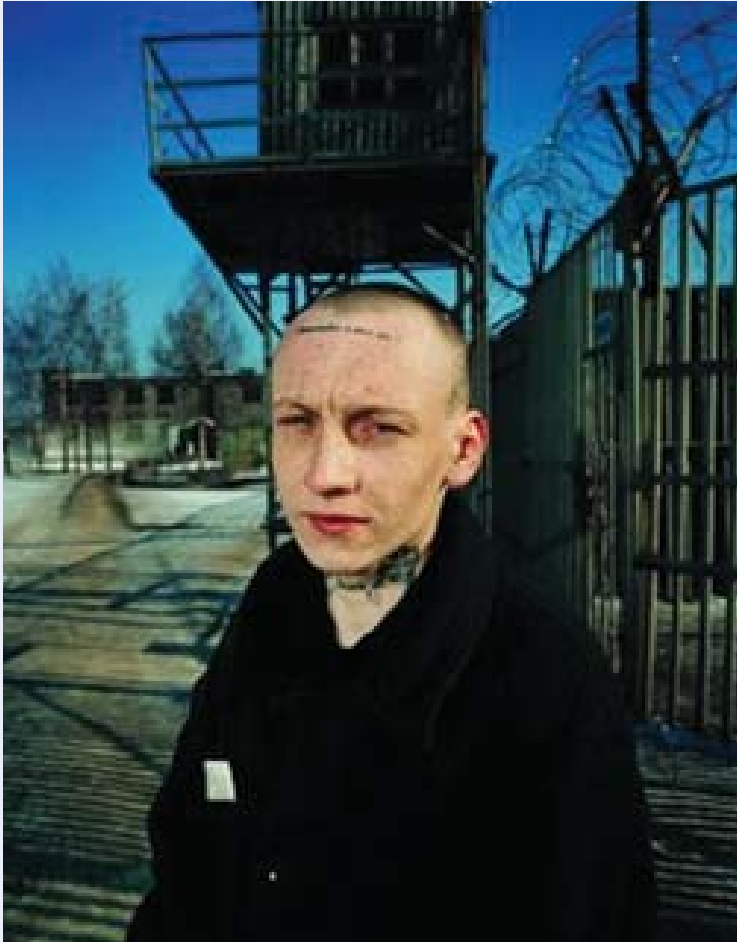
Children usually contract the disease through contact with infectious adults - which could have been why, as we saw in the last session, the parents decided to send their youngest daughter to another home. However, if adults are treated, they are no longer contagious, and children can remain at home.

As we saw in the last session, children in poor households can suffer even if they themselves do not have TB. Parents with the disease are often unable to provide care when it is most needed, and are sometimes forced to send their children to work instead of to school. In households where the primary care giver becomes sick, there is often a risk of malnutrition, which in turn, increases the likelihood the child will contract TB.

Children are especially vulnerable if their mother becomes sick and dies. A study in Bangladesh revealed that a mother's death is associated with an increased child mortality rate of 50 per 100 000 among sons and 144 per 100 000 among daughters - whereas a father's death increased child mortality rates by only 6 per 100 000 for both sons and daughters.

In the next unit, we will look at efforts currently under way to help lower these child mortality rates.

TB and institutions



TB spreads rapidly in institutions such as refugee camps & prisons.
source: Stop TB partnership. WHO/TBP/Colors Magazine/J. Mollison.

A prison in Russia. A refugee camp in Sudan. A juvenile detention centre in the United States. Separated by oceans and distinct in the stories that the walls of each holds within, these institutions are united by the rapid pace at which TB leaps from lung to lung, stealing breaths from those who have no freedom to leave.

Institutions like these, namely prisons, refugee camps, and juvenile detention centres, are often breeding grounds for TB. Overcrowding and poor ventilation allow M. tuberculosis to travel quickly through prison cells and holding pens, where persons with weak immune systems sit waiting, unable to defend against the disease. In particular, in prisons, HIV infection, malnutrition, and substance abuse can render inmates especially vulnerable to developing active TB.

And when the coughing starts and the disease takes hold of the body, there is often no access to diagnosis - let alone adequate treatment - allowing the numbers of deaths to plough steadily higher.

It is largely because of these conditions that TB in institutions is much higher than in civilian populations. Indeed, the level of TB in prisons has been reported to be up to 100 times higher than outside the prison walls. Overwhelmed with the burden of disease, institutions are often unable to provide and/or monitor treatment, resulting in a high incidence of multi-drug resistant TB. In prisons,

where many inmates self-treat because of lack of medical care, some 24% of TB cases suffer from MDR forms of the disease. In Russia, at least 60% of all TB patients who have MDR TB are in prison.

The incidence of tuberculosis in institutions is of concern not only because of the suffering it inflicts on those in confinement - who should have the right to the same level of medical care as those in civil society - but also because of the risk it poses to the broader community. Staff, visitors, and former inmates can carry the disease out from the confines of the barbed-wire and walls and pass it onto others.

In Russia, for example, between 10 and 30,000 prisoners are released each year with active TB. A recent study in New York showed that 80% of all MDR-TB cases can be traced to jails and prisons. Molecular biologists subsequently determined that the New York MDR-TB strains had spread not only into New York's public hospitals and homeless shelters, but all across the United States as well.

The incidence of tuberculosis in institutions is of concern not only because of the suffering it inflicts on those in confinement

In the next unit, we will learn about efforts now underway to halt the spread of TB. We will also consider the role that individuals can play in advocating for equitable treatment.

■ A woman has just developed TB disease. Which three of the following statements are false and exhibit stigma in some cultures? The woman should be

- a. Ostracised (or forced expulsion)
- b. Abandoned by the husband and/or his family
- c. Divorced
- d. Given adequate care and treatment

■ ■ Why is there a higher rate of TB infection in prisons than in the general civilian community?

- a. Prisoners are more likely to be engaged in hard manual labour activities, which can increase the likelihood of contracting TB
- b. Prisoners are confined in often cramped living conditions, which can facilitate the spread of TB
- c. Prisoners are not interested on how TB is spread
- d. Prisoners are more likely to be engaged in high-risk activities, namely substance abuse, which can facilitate the spread of TB

■ ■ Which one of the following statements best describes why there is a higher death rate among women with TB than among men with TB?

- a. Women are not as physically strong as men, and are thus more likely to die of TB
- b. Women are not as emotionally strong as men, and are thus more likely to die of TB, a disease that has a high emotional cost
- c. Women, in some communities, generally do not have the same access to same social and health services as men
- d. Women are more likely to commit suicide if they have TB than men

■ ■ A high rate of MDR-TB in prisons can be explained in part by which two of the following statements?

- a. High rate of self-treatment, owing to lack of adequate health services
- b. Cramped living conditions, which facilitate spread of TB
- c. High levels of depression and suicide
- d. Poor personal hygiene

■ ■ Which one of the following figures shows an average of how many children die of TB globally each year?

- a. 5,000
- b. 10,000
- c. 20,000
- d. 100,000

Go to page 58
to check your answers

■ Which one statement best describes why TB was historically nicknamed the "King's Disease"?

- a. TB tends to concentrate amongst wealthy populations, including royal families
- b. TB is hereditary, and can be easily passed down through royal lineages
- c. TB treatment and diagnosis remains very costly in some countries, and is only affordable to "kings"
- d. TB can be cured through proper nutrition and lifestyle changes - an infected person who eats like a "king" will recover quickly

■ ■ A mother is giving advice to her daughter, who has recently heard that her school teacher has TB. Which one of the following statements can be identified as an example of stigma associated with the disease?

- a. "If your teacher is coughing a lot in school, you should avoid close contact with her because TB is highly contagious."
- b. "Your teacher got the disease because she is poor and unclean and does not know how to take care of herself."
- c. "Your teacher should be tested immediately and should begin treatment so that she can recover."
- d. "Your teacher may have already transmitted the disease to you and the other you, so you should be tested for TB."

■ ■ Children are prone to developing active TB for which one of the following reasons?

- a. TB spreads more rapidly among children than it does between adults
- b. Children are more likely to engage in high-risk activities, such as playing outdoors, and are thus more likely to contract TB
- c. Children spend most of their days in school, where TB is very common
- d. Detecting TB in children can be more difficult than in adults, therefore, delays in treatment are common

■ ■ In which one age group are the majority of TB cases to be found among the general population?

- a. 0-15 years old
- b. 15-54 years old
- c. 54-70 years old
- d. 70 and above

■ ■ Which one of the following statements is correct about the role that stigma plays in the cycle of poverty and TB?

- a. Stigma encourages every person with TB to seek treatment, and thus helps break the cycle
- b. Stigma can discourage people with TB to seek treatment, and thus helps perpetuate the cycle
- c. Stigma ensures that every person in a low-income region will contract TB at some point in their life
- d. Stigma only exists in low-income regions and does not exist in high-income regions where there is good education systems

Go to page 58 to check your answers

unitfour

Solutions **Paving the Way to Stop TB**

In this unit, you will learn about global strategies that are currently underway to control TB and explore how the individual can play a role in promoting these efforts. Practical suggestions for steps that individuals can take to slow the spread of TB, namely, identifying symptoms, seeking and continuing treatment, advocating for equitable access to treatment, and educating others as to the cause and cure of TB, will be discussed. In addition, the basic principles of DOTS, the need for global DOTS expansion, obstacles to DOTS expansion, and the role of advocacy will be discussed.

As far as stigma is concerned: The community can be engaged in the process of stopping TB by fighting the stigma surrounding the disease.

session 1

The Cure - DOTS

Imagine that you are a doctor and this is your clinic.



Source: Stop TB partnership. WHO/TBP/ Jad Davenport, Nicaragua 1997.

Yesterday, a husband and wife set out from their home in seek of your help. After a long day's journey, they arrived at the clinic, weary and tired. Both complained of painful persistent coughs, night sweats, and fever. Tomorrow, they must return to their village, where there children are waiting. As a doctor with many years experience, how do you respond? What would you need to diagnose and, if necessary, treat these patients? How would you ensure that both of your patients took their medicine? Based on what we have learned in the previous three units, brainstorm at least five things that you would need to help them.

Afterwards, we will look at how other doctors in your situation have responded to the same need, and the solution that has developed from their efforts.

The Origins of a Solution: DOTS

The term “DOTS” is the WHO and partner recommended strategy for TB control. The strategy, which was developed in the early 1990s, is based on five key principles that are needed for successful treatment. These principles emerged from many years of research and have proven to be the world's most successful strategy in TB control.

These ingredients are:

- a. Political commitment and resources
- b. Microscopy
- c. Treatment
- d. Medicines
- e. Monitoring

a. Political commitment and resources

The World Health Organization has declared that this is the most important component of DOTS. By political commitment, we mean that the country's government is willing to provide both the support and the resources needed to combat TB.

For example, let's imagine that you, as the clinic's only doctor, decided that you would need more medicine to treat the husband and wife who asked for your help. How would you finance the additional medicine? It is more than likely that, without the aid of international organizations, you would need the support of your government to be able to purchase new medicines.

b. Microscopy

As we learned in session three, accurate diagnosis is essential for ensuring effective treatment. Sputum microscopy remains the most accurate method for diagnosis, and is thus a cornerstone of DOTS.

c. Treatment

All patients with active TB require at least six to eight months' treatment, of which at least the first two months must be directly observed. This is because if a patient stops taking drugs too early, before the drug has had a chance to kill all the bacteria, the patient can become sick again.

d. Medicines

For treatment to be successful, patients must have access to an uninterrupted supply of high quality medicines for the duration of the treatment.

e. Monitoring

Monitoring, or keeping track of how patients respond to treatment, is very important in ensuring that a patient is making progress. Monitoring of a program can also help identify possible future problems.

The defining aspect of DOTS is the human element having health-care workers or volunteers form a close bond with their patients to help them successfully complete treatment. Under DOTS, healthcare workers actually watch as the patient takes the medicine he or she needs. This can be done at a clinic, or even at the patient's home. With encouragement and support, the patient usually finishes the course of treatment correctly and is cured of TB.

DOTS program	Non-DOTS program
Program and clinic have the support of the government	Program and clinic do not have support from the government
Program and clinic uses sputum microscopy to diagnose TB	Program and clinic uses X-rays, or some other non-recommended method, to diagnose TB
Requirement that all patients follow a 6-8 month treatment, and that all patients are observed while taking drugs for the first two months	Patients are not observed while taking medicine
Program and the clinic have ample supply of the most effective anti TB drugs	Program and clinic run out of medicine and offers expired anti TB drugs
Program has a good reporting and recording system, which tracks each patient through the course of their treatment	Program and clinic do not have a reporting or recording system

The Benefits of DOTS

Simply stated, DOTS is an effective public health strategy for treating active TB.

DOTS...

a. Saves lives

DOTS programs cure more than 85% of patients

In China alone, DOTS has prevented 46% of deaths in the provinces in which the program has been adopted.

b. Stops the chain reaction of transmission

Curing people with TB halts the rate of transmission . For example, in Peru, DOTS has accelerated the decline in notified TB incidence to about 7 percent per year.

c. Prevents treatment failure and the emergence of even more deadly strains of drug-resistant TB

Following the introduction of DOTS in certain provinces in China, the failure rate for treatment fell from 17.6% to 6.2%.

d. Reduces TB recurrence rate

For example, in Texas, USA, TB recurrence rates fell from 20.9 percent to 5.5. percent within six years after a DOTS-based TB control strategy was introduced.

e. Indirectly alleviates poverty

By saving lives, reducing the period of illness, and preventing new infections, DOTS ensures that fewer years of productive work are lost.

f. Overcomes TB's stigma

Effective treatment, combined with a positive approach, reduces the fear of death and disability that has fuelled the profound stigma often associated with TB. In Nepal, for example, the introduction of DOTS has led to a general awareness that TB is curable. As a result, TB is now a less feared disease. .

g. Provides a model for strengthening health services

DOTS can serve as a model for expanded use of HIV antiretrovirals, which, if successful, could lead to networks linking DOTS TB -treatment programs to HIV-treatment programs.

h. Saves money

The World Bank has hailed DOTS as "one of the most cost-effective interventions available." By reducing the cost of drug packages, DOTS can lessen the burden of disease.

While DOTS has thus proven to be a low-cost strategy that offers many benefits, these benefits are enjoyed by a limited number of people. In the next session, we will look at the challenges ahead and map out what the individual can do to help stop the spread of TB.

■ Which one of the following statements most accurately describes the five components needed for successful treatment, as defined by DOTS?

- a. Political commitment, sputum microscopy, treatment, medicines, and good doctors
- b. Political commitment, sputum microscopy, treatment, public awareness, monitoring
- c. X-rays, discussion with patient, sputum microscopy, culture, and funding
- d. Political commitment, sputum microscopy, treatment, medicines, and monitoring



Which one of the following statements most accurately accounts for the effectiveness of DOTS in controlling TB?

- a. DOTS uses small, round pills that patients only need to take once a week
- b. DOTS promotes patient independence, because patients are expected to take their medicine without relying on doctors or nurses at all
- c. DOTS is based on direct observation, which ensures that patients take their medicine at the right time, in the right amount, for the whole duration of treatment
- d. DOTS promotes research for vaccines to prevent TB



Which one of the following statements distinguishes DOTS from previous strategies?

- a. Adequate government financing for TB research– having governments devote significant funds to developing TB vaccines
- b. Independence of patient – having patients take their medicine in the privacy of their homes, without anyone watching
- c. Human element – having health care workers or volunteers form a close bond with their patients to help them successfully complete treatment
- d. Round pills – encouraging patients to take little pills called “dots” which can easily cure TB



Which two of the following characteristics a clinic that is part of a DOTS program would have?

- a. Support from the government
- b. Uses sputum microscopy to diagnose TB
- c. Does not need any monitoring or reporting system
- d. A and B



Which three of the following statements are considered to be a consequence of DOTS?

- a. Stops the chain reaction of transmission
- b. Prevents treatment failure
- c. Reduces TB recurrence rate
- d. Promotes TB vaccine research

Go to page 58
to check your answers

session 2

Overcoming the Challenges Ahead

The vast majority of
TB patients are either
receiving sub-standard
treatment or none at all

The Need for Global DOTS Expansion

Since 1993, when the World Health Organization declared TB to be a global emergency, DOTS programs have appeared throughout the globe. Less than a decade after the declaration, some 148 countries have adopted DOTS - including the 22 high burden countries, or those with high incidence of disease. 95% of these countries have implemented this strategy for over 90% of the population.

However, much work still remains before TB can be eliminated as a public health concern. In 2001, only 32% of TB patients worldwide were treated in DOTS programs.

The vast majority of TB patients are either receiving sub-standard treatment or none at all. This lack of treatment poses a serious threat to the global community, as it allows for both the rapid transmission of disease and the development of drug resistant strains.

Obstacles to DOTS Expansion

DOTS expansion has remained limited in part because of entrenched obstacles - ranging from the political and managerial to the geographic and social.

Political obstacles

As we saw in the previous session, political commitment is key to establishing a successful DOTS program. However, often, it is this commitment that is lacking. Without political commitment, it is difficult to mobilize the necessary financial resources and provide the public with basic information about TB.

Managerial obstacles

Managerial obstacles

Weak health-care infrastructure, including weak laboratory conditions, can stymie efforts to expand DOTS, as can a lack of human resources and inadequate supplies of high-quality, anti-TB drugs.

Geographic obstacles

Remote, rural areas can pose an obstacle to DOTS expansion, because diagnosis and treatment is difficult in regions without access to health facilities.

Access can also be a problem in urban areas. Challenges for TB control in these areas include:

- a. Higher rates of TB infection
- b. Prevalence of drug-resistant strains
- c. Growing risk of HIV co-infection
- d. Difficulties providing continuity of care to mobile populations and social disadvantaged groups

Social obstacles

As we saw in Unit Three, stigma associated with TB can prevent patients from seeking treatment. Even those patients who do seek treatment often encounter social prejudices within the health system itself. For example, women who seek treatment may be denied adequate treatment solely on the basis of their gender.

Without political
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and provide the public
with basic information
about TB

Weak healthcare
infrastructure can stymie
efforts to expand DOTS

Diagnosis and treatment
is difficult in regions
without access to
health facilities

Stigma associated with
TB can prevent patients
from seeking treatment

The Next Steps for Controlling TB

In recognition of these obstacles, the WHO has outlined a three pronged approach for accelerating DOTS expansion.

Over the next five years, the WHO has made it its goal to:

1. Increase access to diagnosis, drug treatment and care. To achieve this goal, the WHO has identified the following priorities:

- a.** Secure sustainable supplies of quality TB drugs
- b.** Involve health service providers, including the private sector
- c.** Expand DOTS through public health services
- d.** Improve lab conditions to ensure proper diagnosis
- e.** Improve monitoring and supervision of health services to ensure proper implementation of DOTS strategy

2. Mobilize society, and develop national strategies to educate communities and better national and regional NGO networks working to reduce TB

3. Build institutional capacity, namely, by strengthening health services, in order to accommodate increased demand for TB treatment and increases in drug supply

The WHO has outlined a three pronged approach for accelerating DOTS expansion

The Individual's Role in the fight against TB

A Few Ideas for Practical Solutions

So, you might wonder, what can I do to help?

- As an individual, you have an important role to play in the global effort to control TB.
- You can help others to identify the symptoms of TB and seek diagnosis and treatment when needed.
- With this knowledge, you can also advocate on behalf of your community - within your school, your workplace, your town - and demand access to the type of life-saving drugs that already exist.

- **Explain to your family, friends, and other members of the community how TB is caused and transmitted.**

This can be done casually, through conversation, or through a more formal setting, such as a presentation to your class or work colleagues. You may choose to use some of the material presented in this course, which can help dispel common myths about TB.

- **Explain to your family, friends and other members of the community on how TB symptoms can be identified.**

If you choose to discuss TB symptoms with someone, be sure and point out that these symptoms can be cured with anti TB drugs, provided that treatment is started early enough. It is also a good idea to emphasize that a primary TB infection usually has no symptoms at all.

- **Encourage persons with these symptoms to be tested for TB.**

Because a person with TB symptoms may be reluctant to be tested, it may help to explain the benefits of early detection: access to life-saving drugs and a lower risk that others will be infected. It may also help to explain what the person can expect when they go to be tested, so as to lessen any fears they may have. If you choose to approach someone with TB symptoms, it may be a good idea to reassure the person that you do not judge them and that there is nothing of which to be ashamed. If you have been exposed to someone with TB, it is essential that you go to a health facility to be tested.

- **Support persons who are currently taking anti TB drugs, and explain why it is necessary for them to continue the treatment for at least 6 months.**

Persons who are taking anti TB drugs often benefit from support and encouragement. If you choose to help someone with their treatment regimen, it may be a good idea to keep a calendar of the prescribed drug schedule, so that the patient takes their drugs when needed. If it would be helpful, you could also work with the patient to devise some sort of reward for when he or she finishes the entire course of treatment. Working towards this type of goal can help the patient stay on track. If you yourself are on an anti-TB drug regimen, you might choose to ask a family member, a friend, or a community health worker, for help in remembering to take the medicine at the right time.

- **Write letters to your government, petitioning for commitment to TB and DOTS expansion. You could also choose to participate in many of the Stop TB awareness events, which you can learn about from the Stop TB website.**

- **Stay informed about the latest events in the fight against TB, through websites such as: www.stoptb.org.**

Taking action today and sharing your knowledge with others may not eliminate TB, but it may just help someone breathe a little easier

■ Which three of the following are considered to be obstacles to DOTS expansion?

- a. Lack of political commitment
- b. Weak health care infrastructure
- c. Lack of prejudice associated with the disease
- d. Outdated drugs

■ ■ Which one of the following statement best describes the current status of DOTS programs worldwide?

- a. 95% of all countries have DOTS programs
- b. 95% of all countries lack DOTS programs
- c. The majority of developing countries lack DOTS programs
- d. The majority of developing countries have DOTS programs

■ ■ Which one of the following best describes the WHO approach to increase DOTS expansion?

- a. Increase access to drug treatment and care, mobilize society, and build institutional capacity
- b. Increase funding for vaccine research, mobilize society, and build institutional capacity
- c. Increase access to drug treatment and care, reduce funding for drug research, and build institutional capacity
- d. Increase funding for vaccine research, reduce public awareness, and build institutional capacity



You are interested in joining the fight against TB, which one of the following statements best describes your role in halting the spread of TB?

- a. You should encourage people with TB to isolate themselves and stop all communications with all members of the community
- b. You should go to medical school, because the only way to help prevent TB is to obtain highly technical training about the disease
- c. You should not be too optimistic, because there is nothing the individual can do to help
- d. You should learn as much as you can about the disease and share this information with others



Which one statement below best describes the role of public awareness about the disease in eliminating TB as a health concern?

- a. Promoting public awareness about the disease is the only way to eliminate TB as a health concern
- b. Promoting public awareness about the disease is one way to help eliminate TB as a public health concern
- c. Promoting public awareness about the disease is a waste of time and energy, because of entrenched stigma surrounding TB
- d. Promoting public awareness about the disease is only the responsibility of the government, and individuals should not be allowed to be involved

Go to page 58
to check your answers

■ Approximately what percentage of all TB patients worldwide receive care in accordance with the international guidelines for diagnosis, treatment, monitoring?

- a. 25%
- b. 50%
- c. 75%
- d. 100%

■ ■ Which one of the following statements distinguishes DOTS from previous strategies?

- a. DOTS uses single doses of pills that resemble dots
- b. DOTS promotes fundraising for TB vaccine research
- c. DOTS incorporates a human element in treatment regimens
- d. DOTS is currently in place in every country

■ ■ Which one of the following statements best describes the extent to which lack of political commitment to fighting TB can prevent access to TB treatment?

- a. A lack of political commitment is the only obstacle to accessing TB treatment
- b. A lack of political commitment is only an obstacle to accessing TB treatment in developing countries, not in developed countries
- c. A lack of political commitment has not yet posed a major problem in accessing TB treatment
- d. A lack of political commitment is one of several obstacles to accessing TB treatment, in both developing and developed countries

■ ■ In what decade did DOTS emerge as a public health strategy?

- a. 1850s
- b. 1910s
- c. 1950s
- d. 1990s

■ ■ ■ You are interested in participating in the fight against TB. Which one of the following actions would you take?

- a. Petition your government to build special hospitals for TB patients
- b. Sell anti-TB drugs in the market
- c. Encourage persons with these symptoms to be tested for TB
- d. Raise awareness among the community to avoid contact with people who have ever had TB

Go to page 58 to check your answers



Unit One

Session 1. Quiz (p.11) B, B ,B and C, C, C

Session 2. Quiz (p.13) D, D, C, B, A, C

Unit One Self-assessment (p.14) C, C, A, D, B



Unit Three

Session 1. Quiz (p.40)

D, A, B, and D, D, B, D

Session 2. Quiz (p.45)

D, C, D, B, A and B

Unit Three Self-assessment (p.46) C, B, D, C, B



Unit Two

Session 1. Activity (p.16)

A, A, D

Session 1. Quiz (p.21)

D, D, A, C, B

Session 2. Quiz (p.24)

C, C, C, B, A

Session 3. Quiz (p.28)

D, B, B, C, B

Session 4. Quiz (p.32)

C, B, C, D, C

Unit Two Self-assessment (p.33) D, B, B, D, B



Unit Four

Session 1. Quiz (p.51)

D, C, D, D, D

Session 2. Quiz (p.56)

A & B & D, C, A, D, B

Unit Four Self-assessment (p.57) A, C, D, D, C

glossary

Alveoli - tiny sacs of tissue found in the lung that play an important role in the respiratory system. In cases of pulmonary TB, alveoli are the most common site of primary infection.

Antibiotic - one of a class of substances produced by living organisms and capable of destroying or inhibiting the growth of micro-organisms; many of which it can now be produced chemically.

BCG - a vaccine that can be used to prevent some extreme forms of TB, named after the French scientists Calmette and Guérin who discovered it in 1921.

Bacteria - tiny living organisms that are only visible under a microscope; many, including M. tuberculosis, can cause disease.

Cell - In biology, the cell is the basic structural and functional unit of all living organisms.

Cell wall - a layer that surrounds some cells, including M. tuberculosis, and provides protection and rigidity.

Chest x-ray - a picture of the inside of the chest that can be used to help diagnose some cases of TB.

Co-infection - a term given to describe a condition in which a person has been infected by more than one pathogen.

Consumption - another name for tuberculosis. Consumption was commonly used prior to the 20th century. A person who had consumption was referred to as a consumptive.

Culture - a test to see whether there are TB bacteria in the sputum or other body fluids.

DOTS - WHO international recommended strategy for TB control that is based on five principles: political commitment, microscopy, treatment, medicines, and monitoring.

Directly Observed Therapy (DOT) - a method of treating persons with TB which requires that the patient is observed while taking every dose of his or her medicine.

Dormant - an inactive state, or "sleeping." Bacteria can remain dormant for many years.

Droplet - an airborne particle that can carry M. tuberculosis. Droplets can be generated when a person with active pulmonary TB laughs, coughs, speaks, or sneezes.

Extrapulmonary TB - TB disease in any part of the body other than the lungs (for example, the kidney or lymph nodes).

HIV (Human Immunodeficiency Virus) infection - a viral infection that causes AIDS (acquired immunodeficiency syndrome). A person with both TB infection and HIV infection is at high risk for developing TB disease.

Immune system - a system that protects the body against foreign substances and pathogens, including virus and bacteria.

Incidence - the number of new cases of a disease reported over a given period of time, i.e. over the course of the year.

Infectious TB - TB disease of the lungs or throat, which can be spread to other people.

Infectious person - a person with active TB disease who can transmit TB to others.

Lymph Gland - a small clump of tissue within the body that assists the immune system in trapping and killing bacteria.

Macrophage - A type of defense cell that assists the immune system. It functions by engulfing, or eating, bacteria.

Miliary TB - a form of TB that has spread to the whole body through the bloodstream. Usually found in young children and persons with weak immune systems.

Multidrug-resistant TB (MDR TB) - a form of TB disease caused by bacteria that are resistant to more than one anti TB drug.

M. tuberculosis - a bacteria that cause TB infection and TB disease.

Night sweats - profuse sweating at night, occurring in pulmonary tuberculosis and other chronic debilitating affections with low-grade fever.

Pathogen - any disease-causing agent, including viruses and bacteria.

Pathology - the branch of medical science that studies the nature, cause, and effects of disease.

Pulmonary TB (active) - TB disease that occurs in the lungs, usually producing a cough that lasts longer than 2 weeks. Most TB disease is pulmonary.

Prevalence - the number of new and old cases of disease that exist at a certain point of time.

Primary TB infection - the first instance of TB infection, during which M. tuberculosis enter the body. There are usually no serious symptoms during a primary TB infection, which usually resembles a flu-like illness.

Resistant bacteria - bacteria that have become immune to antibiotics.

Secondary TB infection - the second instance of TB infection, during which dormant M. tuberculosis re-emerge from an inactive state to cause disease. Persons with secondary TB infection can transmit the disease to others and experience symptoms.

Skin test - a test to see whether an immune reaction is elicited when a substance is applied to or injected into the skin.

Sputum microscopy - a test to see whether there are TB bacteria in the sputum. To do this test, lab workers smear the sputum on a glass slide, stain the slide with a special stain, and look for any TB bacteria on the slide. This test usually takes 1 day.

Sputum - phlegm coughed up from deep inside the lungs. Sputum is examined for TB bacteria using a smear; part of the sputum can also be used to do a culture.

Sputum smear positive - a term given to describe a person who has undergone a sputum microscopy test and whose results showed TB bacteria present in the sputum. A sputum smear positive person is said to have active pulmonary TB.

Sputum smear negative - a term given to describe a person who has undergone a sputum microscopy test and whose results did not show TB bacteria present in the sputum.

Stigma - a derogatory social label that changes the way individuals view themselves and are perceived by others. People who are stigmatized are usually considered deviant or shameful, and as a result are shunned and discriminated against.

TB infection - a condition in which TB bacteria are alive but inactive in the body. People with TB infection have no symptoms, don't feel sick and are not infectious.

TB disease - an infectious, curable disease caused by the bacteria M. tuberculosis. The most common form of TB disease is pulmonary. Symptoms include weakness, weight loss, fever, no appetite, chills, and sweating at night.

Tubercles - clumps of defense cells that grow in response to the presence of TB bacteria. Tubercles assist the immune system by walling in the infection and attempting to destroy TB bacteria.

Vaccine - a preparation of the causative organism or substance of a disease (or its products) that has been specially treated for use in vaccination to promote antibodies to the disease.