Session #1 Introduction to TB and TB Control – Part 1

INTRODUCTION

In this session, answers to basic questions about tuberculosis (TB) will be addressed, including: How is TB spread (transmission)? How does TB develop in the body (pathogenesis)? What is the current scope of TB in the U.S., California, and in local jurisdictions? Participants will also learn the difference between active TB disease and latent TB infection (LTBI), risk factors, and how TB disease and LTBI are diagnosed and treated.

MATERIALS SUPPLIED FOR THIS SESSION

- Outline for trainers
- Participant workbook (1 reproducible master copy)
- Masters for overhead transparencies and PowerPoint slides:
  - *What is TB?*
  - *Transmission of TB*
  - *Pathogenesis*
  - *Worldwide TB Statistics*
  - *U.S. TB Statistics*
  - *California TB Statistics*
  - *Persons at High Risk*
  - *TB Disease*
  - *LTBI*
  - *Review Questions*

MATERIALS YOU NEED TO SUPPLY

- Duplicate participant workbooks
- Poster paper, chalkboard, or dry-erase board
- Poster pens, chalk, or dry-erase markers
- Overhead projector or laptop and LCD projector
- PowerPoint slide or overhead transparency: *Your local jurisdiction's most recent TB statistics*

Material in this session is adapted from:

- *Core Curriculum on Tuberculosis, 4th ed*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2000.
- *DOT Essentials: A Training Curriculum for TB Control Programs.* San Francisco, CA: Francis J. Curry National Tuberculosis Center; 2003.
- *Reported Tuberculosis in the United States, 2002*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; September 2003.
- *Self-Study Modules on Tuberculosis: Module 1, Transmission and Pathogenesis of Tuberculosis.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 1995.
- *Tuberculin Skin Testing: A Model for Trainers.* San Francisco, CA: Francis J. Curry National Tuberculosis Center; 2001.

Session Outline for Trainers

25 min **Opening activities**

Session agenda

Review with participants. Your agenda may be customized with other items or additional details. Consider presenting the agenda on poster paper or displaying it on a chalk- or dry-erase board as a visual reference throughout the session.

- Pre-test
- Review of agenda and learning objectives
- Overview of TST training and certification for TST technicians
- Introduction to TB – Part 1
  - What is TB?
  - How is TB Spread (Transmitted)?
  - How Does TB Develop (Pathogenesis)?
  - TB Classification System
  - Epidemiology
- Activity: What's your TB I.Q.?
- Introduction to TB – Part 2
  - Diagnosis and Treatment of Active TB Disease
  - Diagnosis and Treatment of Latent TB Infection
- Review questions or post-test

Pre-test

Ask participants to complete the session pre-test on page 2 of their workbooks.

Learning objectives

Review with participants. Refer participants to page 1 of their workbooks.

Upon completion of this training session, participants will be able to:

1. Describe how tuberculosis (TB) is transmitted.
2. Explain how TB disease develops in the body.
3. Name at least five populations at risk for TB in the U.S., California, and in their own jurisdictions.
4. Explain the difference between active TB disease and latent TB infection (LTBI).
5. List three steps to diagnosing active TB disease.
6. Describe current approaches to treating active TB.
7. Explain how LTBI is treated.

15 min **Overview of TST training and certification for TST technicians**

Refer participants to page 3 of their workbooks. Review with participants.

I. Background

In 2002 the California State Legislature passed into law the *Omnibus Tuberculosis Control and Prevention Act* (Senate Bill 843). One of the Act's provisions amended the California Health and Safety Code to allow for any city or county health department to certify unlicensed health workers to perform tuberculin skin testing (TST). Prior to this Act being passed, the only persons authorized to perform TST were certain licensed health professionals. SB 843 was designed to enhance the capacity of local health departments to find and test individuals who have either been recently exposed to cases of active TB disease or who already have latent TB infection (LTBI). Finding, testing, and treating individuals with LTBI will help to break the cycle of transmission and reduce the incidence of new cases of TB in California.

II. Requirements: State of California Health and Safety Code 121360.5

A. Any city or county health department may provide for one-year certification of TST technicians by local health officers.

B. A "certified TST technician" is an unlicensed public health TB worker employed by, or under contract with, a local public health department, and who is certified by a local health officer to place and measure skin tests in the local health department's jurisdiction.

C. A certified TST technician must meet all of the following requirements:

1. Must be working under the direction of the local health officer or the tuberculosis controller.

2. Must be working under the supervision of a licensed health professional.

3. May perform intradermal injections only for the purpose of placing a TST and measuring the test result.

4. May not interpret the results of a TST.

5. To be certified as a TST technician by a local health officer:
   a. The person must have a high school diploma, or its equivalent.
   b. The person must complete a standardized course, approved by the California Tuberculosis Controllers Association (CTCA), including at least 24 hours of instruction.
   c. The person must complete practical instruction, including placing at least 30 successful intradermal TSTs, supervised by a licensed physician or registered nurse at the local health department, and 30 correct

measurements of intradermal TSTs, at least 15 of which are deemed positive by the licensed physician or registered nurse supervising the practical instruction.

d. The one-year certification may be renewed if the certificate holder has completed in-service training, including at least 3 hours of training and the successful placement and correct measurement of 10 tuberculin skin tests, at least 5 of which are deemed positive by the licensed physician or registered nurse supervising the practical instruction.

III. Program for TST training and certification in _____
(your jurisdiction)

Provide participants with a brief description of your process/program for training and certifying unlicensed health workers to place and measure TSTs.

90 min Introduction to TB – Part 1

I. What is tuberculosis (TB)?
Review with participants, using overhead/PowerPoint: What is TB?

A. Tuberculosis (TB) is an airborne infectious (or communicable) disease caused by a type of bacteria called *Mycobacterium tuberculosis (M. tb),* also known as the tubercle bacillus.
B. The TB germ is different from other bacteria in that it grows very slowly.
C. TB has caused millions of deaths over the centuries. Effective drugs to fight TB have only emerged in the last 50 years.

II. How is TB spread (transmitted)?
Review with participants, using overheads/PowerPoints: Transmission of TB.

A. TB is spread from person to person through the air. When a person with infectious active TB in the upper respiratory tract (pulmonary TB) exhales forcefully, droplets of infected material become airborne. This can happen through talking, laughing, coughing, sneezing, and singing. These tiny particles (less than 1/5000 of an inch) can remain in the air for several hours, depending on the environment. If someone inhales these droplets, he/she can become infected by the TB germ.

B. Not everyone who is exposed to a person with infectious TB disease will become infected. The likelihood that active TB disease will be spread depends on:

1. The nature of the patient's TB disease
   a. TB can grow in almost any organ of the body, but the most common and infectious site is the lungs. Patients who show cavitary disease on the chest radiograph are more likely to be infectious.

b. Amount of bacteria – persons with untreated and smear-positive TB who are symptomatic (coughing) are more infectious.
c. Before treatment, a person with pulmonary TB typically generates 75,000 droplets per day; within 2 weeks of effective treatment, this drops to 25 infectious droplets per day.

2. The environment in which the exposure occurred
   a. Volume of air – the greater the amount of air in a room, the lower the concentration of bacilli in the air. Active TB disease is more likely to be spread in small, poorly ventilated spaces than in large, airy rooms.
   b. Re-circulation of air – when air is re-circulated into a room, the bacilli are re-introduced into that room. Bacilli can be filtered from the air using high-efficiency particulate air (HEPA) filters.
   c. Ultraviolet light – UV light kills mycobacteria and can be used along with ventilation or HEPA filtration to "clear" the air.

3. Factors about the contact (the person who is exposed)
   a. Closeness and length of exposure – people who are physically close to, and spend the most time with, the person with active TB disease (the "source case") are at highest risk for becoming infected.
   b. Vulnerability of the contact – young children and people with compromised immune systems are more likely to develop active TB disease themselves when exposed to TB.
   c. Prior TB infection – someone who has been previously infected by *M. tb* is less likely to become ill from a new exposure. (However, this is not always true, especially for AIDS patients.)

4. TB germs are ***not*** spread by:
   a. Sharing dishes and utensils
   b. Using towels and linens
   c. Handling food
   d. Toilet seats

5. Ways to reduce the spread of TB
   a. Early diagnosis, initial isolation, and complete treatment of patients with active TB disease
   b. Keeping rooms well-ventilated
   c. Asking patients to cover their noses and mouths when they cough or sneeze

III. How does TB develop (pathogenesis)?
Review with participants, using overheads/PowerPoints: Pathogenesis.

A. When TB droplets are "aerosolized" (made airborne) by a person with infectious TB, a contact can inhale the droplets. The large droplets often stay in the nose and throat where infection is unlikely to develop. The **smaller droplets can**

make their way to the air sacs (alveoli) of the lung, and this is where infection takes place. Once the droplet-containing tubercle bacillus reaches the air sacs, it may start to **multiply**. A small number will enter the circulatory system and **spread throughout the body**. In addition to the upper lungs, areas where TB is most likely to develop are the kidneys, brain, and bone. **Extrapulmonary TB** is TB located in a place other than the lungs.

B. Within 2 to 10 weeks, in **contacts with healthy immune systems**, further spread of the bacilli is stopped. In most cases, the immune system creates special cells that surround tubercle bacilli and form a hard shell that keeps the bacilli contained. In this situation the person has **latent TB infection (LTBI)**, but not active TB disease. The infection can usually be detected by a tuberculin skin test (TST). Persons with LTBI do **not** have TB symptoms and are **not infectious to others**.

C. **Most healthy adults who are infected** with *M. tb* (90%) will **never develop active TB disease**. Approximately 5% of infected persons will develop active TB disease in the first 1-2 years after infection. Another 5% will develop active TB disease within their lifetime, maybe many years later.

D. If the body's immune system is weakened, the bacilli begin to reproduce quickly and break free from the hard shell; this is when **active TB disease** develops. Symptoms such as coughing, fever, and weight loss develop. Until proper treatment is underway, persons with active TB disease can be highly infectious to others.

E. Persons with **weak immune systems and certain other conditions** have a much **greater risk of developing active TB disease** once infected with tubercle bacillus. Conditions that increase the risk of advancing from infection to active TB disease include:
   1. HIV infection (100 times greater risk)
   2. Substance abuse (especially injection drugs)
   3. Recent infection with *M. tb* (within the last two years)
   4. Chest radiograph findings suggestive of previous extensive TB (in a person who received inadequate or no treatment)
   5. Diabetes mellitus
   6. Silicosis
   7. Severe kidney disease
   8. Certain intestinal conditions
   9. Prolonged use of corticosteroids
   10. Immunosuppressive therapy
   11. Certain types of cancer
   12. Low body weight (10% or more below ideal)

IV. TB Classification System

Review with participants. Refer participants to page 7 of their workbooks.

Many health departments use the following classification system to describe their patients:

Class	Type	Description
0	No exposure to TB; not infected	No history of exposure; negative reaction to TST
1	Exposure to TB; no evidence of infection	History of exposure; negative reaction to TST given at least 10 weeks after exposure
2	TB infection; no TB disease	Positive reaction to TST; negative smears and cultures (if done); no clinical or x-ray evidence of TB disease
3	Current TB disease	Positive culture for *M. tb* (if done) **or** a positive reaction to TST and clinical or x-ray evidence of current TB disease
4	Previous TB disease (not current)	Medical history of TB disease **or** abnormal but stable x-ray findings for person with positive TST; negative smears and cultures (if done); and no clinical or x-ray evidence of current TB disease
5	TB suspected	Signs and symptoms of TB disease, but evaluation not complete

V. Where and how often does TB occur? Who is most affected? (Epidemiology)

A. Worldwide

Review with participants, using overhead/PowerPoint: Worldwide TB Statistics.

1. World Health Organization (WHO) estimates 8 million new cases of active TB disease each year.
2. 2-3 million deaths from TB annually; every 10 seconds someone dies of TB.
3. One in every three persons is infected with *Mycobacterium tuberculosis (M. tb).*

B. United States

Review with participants, using overheads/PowerPoints: U.S. TB Statistics.

1. Historically, the U.S. TB epidemic peaked in the late 1800s, followed by a steady decline until 1985.

2. Between 1985 and 1992, the incidence of TB increased by 20% nationwide.

   a. Factors contributing to resurgence included:
      - Increased immigration from countries with high incidence of TB
      - HIV infection
      - Increasing numbers of people living in homeless shelters and correctional institutions, facilitating transmission of *M. tb*
      - Decreased funding of TB control programs

b. Characteristics of resurgence
   - 92% of nation's total increase occurred in five states: New York, California, New Jersey, Florida, and Texas
   - Urban case rates rose 10%; non-urban rates fell from 54% to 46%
   - African-American case rates increased 38%; Caucasian case rates decreased 11%
   - Increased foreign-born cases
   - Younger age group (25-45 years)
   - Multidrug-resistant TB (MDR-TB) emerged

3. TB control from 1992 to the present
   Note: For updated national TB statistics, go to: http://www.cdc.gov/nchstp/tb/surv/surv.htm

   a. Between 1992 and 2003, cases decreased by 44.2%, the eleventh straight year of declining numbers of cases and the lowest case rate ever recorded since 1953 when national surveillance began.

   b. 2003: 14,874 cases reported (5.1 per 100,000)
      Factors contributing to decline:
      - More federal and state resources made available for TB control
      - Improved laboratory methods for prompt identification of *M. tb*
      - Infection control in institutions led to decreased transmission
      - Expanded treatment of LTBI in high-risk groups
      - Stronger efforts to ensure completion of therapy, including extensive use of directly observed therapy (DOT)

   c. Drug resistance in reported TB cases with no previous TB (primary TB)
      - Multidrug-resistant TB (MDR-TB) is TB that is resistant to at least isoniazid (INH) **and** rifampin (RIF)
      - MDR-TB remains uncommon in U.S. (approximately 1% of all TB cases in 2003)
      - INH resistance is between 7% and 8% of cases nationwide

   d. Race/ethnicity and U.S.-born vs. foreign-born
      - In 2003, 82% of all reported TB cases occurred in racial and ethnic minorities (28% African-Americans and 28% Hispanics).
      - Between 1992 and 2003, there was a sharp increase in the percentage of cases occurring in foreign-born persons. The number of cases in foreign-born persons remained stable (at approximately 7,000 to 8,000 per year), whereas the number of cases in U.S.-born persons decreased from more than 19,000 in 1992 to less than 7,000 in 2003.
      - 2003: U.S.-born = 46% of cases (2.7 per 100,000); foreign-born = 53% (23.6 per 100,000); 0.5% of cases are unknown.
      - In 2003, more than one-fourth of the foreign-born TB cases came from Mexico, followed by the Philippines, Vietnam, India, China, Haiti, and South Korea.

- Almost half (49%) of all foreign-born TB cases occur within 5 years after arrival in the U.S.

e. Other high-risk groups (2002)
   - Substance use: 14.5% of cases use alcohol to excess; 2.2% injection drugs; 7% non-injection drugs
   - Homeless: 6%
   - Occupation: 56.1% of cases were unemployed

C. California: 2003
Review with participants, using overheads/PowerPoints: California TB Statistics.

1. Total number of new TB cases = 3,227, representing an increase of 1.8% from 2002.
2. Age: Almost one-third of CA cases (991) were age 25-44; over half (1,656) were 45 years and over.
3. Race/ethnicity: Nearly 90% of CA cases (2,888) occurred in racial and ethnic minorities; of these, 44% were Hispanic and 46% were Asian.
4. Foreign- vs. U.S.-born: 75% of CA cases were foreign-born
5. Drug resistance (2002): MDR-TB (resistance to at least INH **and** RIF) = 40 cases (1.8% of cases); INH resistance = 241 cases (10.6% of cases).
6. Substance use (2002): 10.5% of cases used alcohol to excess; 2.3% injection drugs; 5.5% non-injection drugs.
7. Employment (2002): 61.4% were unemployed.
8. Homeless (2002): 6.5%.

D. Your local jurisdiction
Review with participants, using overheads or PowerPoint slides that you have created that highlight your jurisdiction's most recent TB statistics. You may provide a handout summarizing this information, and/or participants may write notes on page 10 of their workbooks.

Provide your jurisdiction's information to participants for the following:

1. Total number of new TB cases (Rate = # per 100,000)
   Represents a(n) [decrease/increase] of #% from previous year
2. By age group
3. By race/ethnicity
4. Foreign-born vs. U.S.-born; breakdown by country of birth
5. Percentage of MDR-TB and/or INH-only resistant cases
6. Substance use; employment; homelessness

E. Persons at higher risk for **exposure to** or **infection with** *M. tb:*
Review with participants, using overheads/PowerPoints: Persons at High Risk.

1. Close contacts of persons known or suspected to have TB
2. Foreign-born persons from areas that have high rates of TB
3. Residents and employees of high-risk settings (correctional facilities, nursing homes, mental institutions, homeless shelters, etc.)
4. Health care workers who serve high-risk clients
5. Some medically underserved, low-income populations
6. High-risk racial or ethnic minority populations, defined locally as having higher rates of TB
7. Infants, children, and adolescents exposed to adults in high-risk categories
8. Users of high-risk substances

F. Persons at higher risk of **developing TB** once infected with *M. tb:*
1. Persons with HIV infection
2. Persons infected with *M. tb* within the last 2 years, especially infants and children
3. Persons with certain medical conditions (such as diabetes)
4. Users of high-risk substances
5. Persons with a history of inadequately treated TB

20 min

Activity: *What's your TB I.Q.?*

Refer participants to page 12 of their workbooks. Divide participants evenly into two teams. Pose the first question to the first person of "Team #1"; if the person answers correctly, Team #1 receives one point; proceed by asking the second question to the first person in Team #2. (Team members can help one another with the answers.) If the person answers incorrectly, the opposing team gets one chance to answer the question and receive the point. Proceed until all the questions are presented. The team with the highest number of points "wins." Consider providing a choice of two simple prizes to the winning team (i.e., hard candies, TB program key chains or pencils, etc.); give the non-chosen prize to the "second place" team.

1. Complete this sentence: TB is spread through _____ .

   [Correct answers could include: the air; from one person to another by sharing airspace; by an infectious person talking, singing, coughing, or laughing in the same airspace as someone else.]

2. If a person is exposed to someone with active TB, name one thing that could increase the risk that he or she will become infected with *M. tb*.

   [Correct answers could include: the person with active TB has not begun treatment; the space where the exposure occurred is small and poorly ventilated; the person exposed spends a lot of time in close proximity to the person with active TB.]

3. What proportion of the world's population is infected with *Mycobacterium tuberculosis*?

   a. 1 of 20
   b. 1 of 10
   c. 1 of 5
   d. 1 of 3 *[answer]*

4. After decades of steady decline, when did TB begin to peak again in the U.S.?

   a. 1945-1950
   b. 1960-1967
   c. 1985-1992 *[answer]*
   d. 1993-1998

5. Name one factor that led to the resurgence of TB in the U.S.

   [Correct answers could include: HIV infection; increased immigration from countries with high TB prevalence; increased numbers of people living in homeless shelters and correctional institutions; decreased funding of TB control programs.]

6. Name one factor that led to the **decrease** of TB case rates since 1993.

   [Correct answers could include: improved laboratory methods for prompt identification of M. tb*; infection control in institutions; expanded treatment of LTBI in high-risk groups; increased funding of TB control programs.]*

7. Which of the following is ***not*** true?

   a. In the U.S., 1 of every 3 TB patients is African-American.
   b. In 2000, 20% of TB cases in the U.S. occurred in the foreign-born. *[answer]*
   c. Almost half of all foreign-born TB cases occur within 5 years of arrival in the U.S.
   d. The HIV epidemic contributed to the rise in TB cases during the late 1980s.

8. Name a group at high risk for TB in the U.S.

   [Correct answers could include: immigrants from countries with high TB prevalence; HIV-infected individuals; substance users; homeless; the elderly; persons who work or live in correctional institutions.]

9. Name a high-risk population for TB in your local jurisdiction.

10. What does LTBI stand for?

    [Latent tuberculosis infection.]

11. If a person is infected with *M. tb*, what is one thing that could increase the risk of him or her developing active TB?

    [Correct answers could include: HIV infection; recent infection with M. tb *(within the last 2 years); having certain medical conditions (such as diabetes); being a high-risk substance user; having a history of inadequately treated TB.]*

12. What is "extrapulmonary TB"?

    [Correct answer: TB that occurs outside of the lungs. Common sites include the kidneys, brain, and bone.]

60 min **Introduction to TB – Part 2**

I. Diagnosis and Treatment of Active TB Disease
Review with participants, using overheads/PowerPoints: TB Disease.

A. Active TB disease is different from latent TB infection:
   1. In TB disease, the germs awaken, multiply, and cause damage.
   2. The person may feel sick and be infectious.
   3. The TB skin test usually shows a reaction.
   4. The chest radiograph is often abnormal (in pulmonary TB)
   5. The laboratory test on the person's sputum grows TB germs (in pulmonary TB)

B. The first step to diagnosing TB is to *suspect* it.
   1. Person has been exposed to an active case of TB, or comes from a part of the world where TB is very common.
   2. Person has had TB infection or TB disease before.
   3. A complete medical evaluation should be conducted to assess clinical symptoms.
      a. Cough lasting more than 3 weeks
      b. Weight loss, loss of appetite
      c. Fever, chills
      d. Night sweats
      e. Production of sputum, bloody sputum
      f. Fatigue, feels bad
      g. Chest pain
      h. Swollen lymph nodes or pus/blood in urine (extrapulmonary TB, in the bones, lymph nodes, or kidneys)

C. The second step to diagnosing TB is to *test* for it.
   1. The tuberculin skin test (TST)
      a. Most people who have active TB will have a reaction to the TST, but some will not.
      b. The TST does not distinguish between TB disease and TB infection.
      [Note: The TST will be covered in much greater detail in Sessions 3-6.]
   2. The chest radiograph
      a. Certain patterns on the chest radiograph are suggestive of active pulmonary TB disease, including upper lung disease, cavities, and/or fluid on the lung or at the margins.
      b. A normal chest radiograph *usually* rules out infectious TB pulmonary disease (with some exceptions).

D. The third and final step to diagnosing pulmonary TB is to *confirm* it.
   1. Sputum specimens are collected and essential to confirm active TB disease
      a. Sputum is fluid from within the lung (not saliva).
      b. 3 sputum specimens are collected on 3 different days.

c. The best time to collect sputum is in the early morning. If the patient cannot cough up enough sputum (a minimum of ½ teaspoon), a "sputum induction" may be ordered.

2. The AFB (acid-fast bacilli) smear, a rapid first test to detect *M. tb*
   a. Sputum is smeared on a glass slide.
   b. The slide is stained and washed with acid.
   c. TB bacilli (and other mycobacteria) are acid-fast.
   d. Slide is examined under the microscope.
   e. In about half of all pulmonary TB cases, the smear results are "positive":
      - There were at least 10,000 bacilli per ml
      - Results signal a very infectious person
   f. If the smear results are negative, it means that there were too few bacilli to be seen directly under the microscope; there is some reassurance that the patient is less infectious to others.
   g. In a few rare cases, the smear results are positive with nontuberculous mycobacteria (a germ that does not cause tuberculosis). The culture test confirms whether the mycobacteria is *M. tb* or not.

3. Direct confirmatory tests – nucleic acid amplification (NAA); e.g., polymerase chain reaction (PCR), *Mycobacterium Tuberculosis* Direct (MTD)
   a. Available in many labs
   b. Can confirm *M. tb* within 2 days
   c. More accurate when AFB smear is positive

4. Culture for *M. tb* – a second test that takes longer, but definitely confirms presence of *M. tb.* If the culture is "positive for TB," it means *M. tb* organisms are present
   a. Conventional method (solid medium): sputum or other body specimen is placed on a medium that favors growth
      1. *M. tb* grows slowly; plate or tube is incubated at body temperature for 3 to 6 weeks.
      2. At 3 weeks, the culture is examined for colonies that look like TB. The number of colonies found tell the stage and degree of TB disease.
   b. Alternative method: BACTEC (liquid medium) confirms TB growth faster – 1-3 weeks

5. Susceptibility testing – positive TB culture must be tested to see if the specific bacilli can be killed by the first-choice anti-TB drugs

E. Treating TB Disease – General Principles
   1. Always treat with multiple drugs.
   2. Never add a single drug to a failing regimen.
   3. Treatment course depends on drugs used.

4. Typical short-course treatment (6-9 months) with:
   a. Isoniazid (INH)
   b. Rifampin (RIF)
   c. Pyrazinamide (PZA) (first two months)
   d. Ethambutol (EMB) (first two months)
5. Drug-resistant TB, or slow response to treatment, may require medication for 18-24 months.
6. We know treatment is effective when:
   a. Symptoms improve
   b. Sputum smears become negative
   c. Sputum cultures become negative (within 2-3 months)
   d. Chest radiograph improves
7. Non-adherence to treatment (failing to take all the medications for the entire time prescribed) is the single most important reason for TB treatment to fail.
   a. Patient may continue to spread TB infection to others.
   b. Patient may develop drug-resistant TB.
   c. Patient may become more disabled or die.
   [Note: Adherence to treatment will be covered in detail in Session 2.]
8. Directly observed therapy (DOT) is an important tool to help patients complete their treatment.
   [Note: DOT will be covered in detail in Session 2.]

II. Diagnosis and Treatment of Latent TB Infection
Review with participants, using overheads/PowerPoint slides: LTBI

A. Latent TB infection (LTBI) is different from active TB disease
   1. TB germs are sleeping (but still alive) and the body's defenses are keeping them from growing.
   2. The person is not ill and is not infectious.
   3. There is usually a reaction to the tuberculin skin test (TST).
   4. The chest radiograph is often normal.
   5. The sputum culture is negative.

B. Diagnosis of latent TB infection (LTBI)
   1. LTBI is diagnosed through the tuberculin skin test (TST) or a blood test called Quantiferon-TB.
   [Note: TST will be covered in detail in Sessions 3-6.]
   2. Who should be tested?
      a. No more "universal screening." TST should be *targeted* to groups at high risk for TB infection and for progression to active disease once infected.
      [Note: Targeted testing will be covered in detail in Session 2.]
      b. CDC 2000 recommendation: "A decision to test is a decision to treat."

C. Treatment of LTBI
   1. Before anyone is considered for treatment of LTBI, active TB must first be ruled out through a medical evaluation. This is extremely important because

if someone with active TB disease receives treatment for LTBI, drug resistance may develop. The evaluation will also reveal if the person has previously been treated for TB or LTBI.

2. Persons with a TST reaction result should be considered for treatment of LTBI if it is determined from the medical evaluation and the test result that the TST is "positive."
3. Treatment of LTBI with isoniazid (INH) greatly reduces the risk of developing active TB in persons infected with TB bacilli.
   a. In the past, clinicians were hesitant to give INH to persons over age 35 because of possible liver toxicity; this restriction is no longer in place.
4. Current CDC recommendations
   i. 6-9 months of daily INH; twice-weekly OK if directly observed by health care staff. 9 months of INH is preferred for children, and patients with HIV infection and certain other conditions.
   b. If person with LTBI is a contact to an INH-resistant TB case, the alternative regimen is rifampin alone for 4-6 months.
   c. In addition to the LTBI medication, pyridoxine (vitamin B-6) is also recommended for persons with risk factors for peripheral neuropathy (numbness or tingling in the hands or feet). Risk factors include pregnancy, seizure disorders, diabetes mellitus, alcoholism, HIV infection, malnutrition, and advanced age.

D. Monitoring for adverse side effects
   1. Although rare, a side effect of INH is hepatitis (inflammation of the liver).
   2. Patients receiving treatment for LTBI should be educated about the signs and symptoms of side effects of the medication(s).
   3. Patients receiving LTBI treatment should be medically evaluated *in person* at least monthly by a health care professional for:
      a. Nausea
      b. Abdominal pain
      c. Vomiting
      d. Fatigue
      e. Dark urine
   4. Medications for LTBI (when taken by the patient through self-administered therapy and not DOT) should only be dispensed in one-month supplies.
   5. Persons at greatest risk for hepatitis should have baseline liver function tests (LFTs) while being treated for LTBI.
      a. HIV-infected persons
      b. Pregnant and post-partum women
      c. Persons with excessive alcohol intake or prior liver disease
   6. Anyone who develops symptoms of toxicity while taking INH should have a prompt medical evaluation, including LFTs. The INH medication should be stopped pending this evaluation.

30 min **Closing activities**

Review questions or post-test

The following questions can be used for a group discussion to review the session's main points (use overheads/PowerPoint slides, Review Questions), *or they can be utilized as a post-test for participants (see page 18 in* Participant's Workbook.)

1. Please complete the following sentence: TB is spread by…
2. Once infected, how does a person develop active TB disease?
3. Name five populations at risk for TB in the U.S., California, and/or your jurisdiction.
4. Please complete the following sentence: *Latent TB infection is different from TB disease because…*
5. Name three techniques used by clinicians to diagnose TB when a case of TB is suspected.
6. Describe a current approach to treat active TB.
7. What is the main drug used to treat LTBI?

Participant evaluation

Ask participants to share their feedback about this training session on the evaluation form (see page 19 in Participant's Workbook).