

Session #2 Introduction to TB and TB Control – Part 2

INTRODUCTION This session continues participants' introduction to TB and TB control by exploring infectiousness and infection control, case management and surveillance, targeted testing, and risk assessment. The basics of contact investigation, patient adherence, and directly observed therapy (DOT) will also be covered.

MATERIALS SUPPLIED FOR THIS SESSION

- Outline for trainers
- Participant workbook (1 reproducible master copy)
- Masters for overhead transparencies and PowerPoint slides:
 - *Infectiousness*
 - *Infection Control*
 - *Surveillance*
 - *Case Management*
 - *Risk Assessment*
 - *Contact Investigation*
 - *Adherence*
 - *DOT*
 - *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

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.
- *Self-Study Modules on Tuberculosis: Module 6: Contact Investigations for Tuberculosis,* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 1999.
- *Self-Study Modules on Tuberculosis: Module 8: Tuberculosis Surveillance and Case Management in Hospitals and Institutions,* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 1999.
- *Self-Study Modules on Tuberculosis: Module 9: Patient Adherence to Tuberculosis Treatment,* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 1999.
- *Tuberculin Skin Testing: A Model for Trainers.* San Francisco, CA: Francis J. Curry National Tuberculosis Center; 2001.

Session Outline for Trainers

30 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
- Review of key concepts from Session 1
- Infectiousness and basic infection control
- Case management and surveillance
- Targeted testing, risk assessment
- Contact investigation basics
- Patient adherence and DOT
- Review questions or post-test
- Participant evaluation

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. Name at least three factors that can determine the infectiousness of a TB patient.
2. List and describe the three main types of infection control.
3. Describe the major steps involved in TB case management.
4. Name at least three groups that should receive high priority for targeted testing.
5. Explain the purpose of a contact investigation, and list at least three steps in a CI.
6. Name at least four reasons for non-adherence to TB treatment.
7. Define DOT.
8. List three groups of TB patients that are the highest priority to receive DOT.

Review of key concepts from Session 1

Review with participants the key concepts from the topics covered in Session 1. Consider organizing the discussion around the following questions:

1. How does TB spread?
2. How does TB develop in the body?
3. What populations are at risk for TB (in the U.S., California, and local jurisdiction)?
4. How is latent TB infection different from TB disease?
5. How do clinicians diagnose TB when a case of TB is suspected?
6. How is active TB treated?
7. How is LTBI treated?

40 min **Infectiousness and basic infection control**

I. Infectiousness

Review with participants, using overheads/PowerPoints: Infectiousness.

- A. The number of tubercle bacilli expelled into the air by a TB patient directly determines his/her infectiousness. Factors include:
1. Site of disease (pulmonary or laryngeal TB is infectious; extrapulmonary usually is not)
 2. Severity of disease, such as the presence of cavities on the chest radiograph
 3. If the patient is coughing often, or undergoing a cough-inducing procedure
 4. Presence of acid-fast bacilli (AFB) on the sputum smear
 5. Status of treatment (infectiousness is likely when the patient is not being treated or has just started treatment)
 6. Age: young children are less likely to be infectious than adults
 7. Drug resistance: patients with drug-resistant TB may not respond to the initial drug regimen; thus, TB germs are not being adequately treated
- B. Patients are considered non-infectious when *all* of the following are true:
1. Adequate therapy has been underway for at least 2 weeks.
 2. Therapy has achieved a significant clinical improvement.
 3. 3 consecutive sputum smears collected on different days are negative.
- C. Monitoring patients during treatment is important.
1. Many patients become non-infectious within 2-4 weeks of starting treatment, but patients respond at different rates.
 2. A patient who is not clinically improving may not be taking all the drugs prescribed or may have a drug-resistant strain of TB.

II. Infection control

Review with participants, using overheads/PowerPoints: Infection Control.

- A. TB can be spread in homes, worksites, group living facilities (such as homeless shelters and prisons), and health care facilities. High-risk environments for TB transmission include small or crowded rooms and poorly ventilated areas. **Infection control** refers to the procedures and policies in place for monitoring and trying to control the spread of communicable diseases like TB. Early detection, isolation, and treatment of persons with infectious TB are important goals of an infection control program. **Isolation** refers to the physical separation of infectious patients from others to prevent or limit the transmission of disease. An isolation room is a special room designed and equipped to prevent the spread of droplet nuclei expelled by a TB patient.

Describe the patient measures for infection control practiced by your program, such as having patients wear masks, covering their coughs, isolation policies, etc.

B. Three types of infection control

1. **Administrative controls** are measures intended to reduce the risk of exposing uninfected persons to persons with infectious TB
 - a. Written policies and guidelines should be in place to detect, evaluate, and isolate suspected TB cases.
 - b. Health care workers (HCWs) should be educated about TB and trained to follow work practices that prevent the spread of TB.
 - c. Regular screening and skin testing of HCWs who are at risk for exposure to TB should be conducted (usually once upon employment and at repeated intervals, depending on the level of risk).
2. **Engineering controls** seek to prevent the spread and reduce the number of infectious droplet nuclei
 - a. Ventilation systems help to maintain negative pressure in isolation and sputum induction rooms and exhaust air safely.
 - b. High-efficiency particulate air (HEPA) filters are used in ventilation systems to remove droplet nuclei from the air.
 - c. Ultraviolet irradiation (special lamps that emit UV light) can kill tubercle bacilli, but must be specially placed so they do not harm skin or eyes.

Discuss the administrative and engineering controls in place at your agency.

3. **Personal respiratory protection**

Discuss with participants and review your program's policies and procedures for the use of personal respiratory protection.

- a. Personal respirators are special masks designed to be worn by health care workers to filter out droplet nuclei. They provide extra protection in settings where administrative and environmental controls may not be sufficient, including:
 - TB isolation rooms
 - Vehicles transporting infectious TB patients
 - Homes of infectious TB patients
 - Rooms where sputum induction is performed
- b. Advantages to wearing personal respiratory protection
 - Can greatly reduce workers and others to exposure to TB bacteria
 - Can help a patient understand the seriousness of his/her infectiousness
- c. Disadvantages to wearing personal respiratory protection
 - Can make a patient feel stigmatized by his/her condition
 - If worn in public, can jeopardize a patient's confidentiality
 - Can make communication between a worker and a patient difficult

40 min **ACTIVITY: Wearing and fit-testing personal respirators**

Invite an appropriately trained health department staff person (likely to be found in your health department's occupational health program) to demonstrate how to wear and fit-test an N-95 mask. The four main components to the presentation might be: (1) Choosing a Respirator; (2) Fit Checking; (3) Taste Threshold (Sensitivity) Screening; and (4) Fit Testing. See "How Do I Perform a Respirator Fit Test?" (pages 15-19 in this guide) for more details about fit-testing. Practice the techniques with the course participants.

20 min **Surveillance and case management**

Review with participants, using overheads/PowerPoints: Surveillance. Customize this information to reflect the specific surveillance procedures of your TB program.

- I. Surveillance: the ongoing collection and analysis of health data needed by public health programs and staff. The first step in surveillance is to identify suspected or confirmed TB cases.
 - A. Routine case reporting: whenever a health care provider or institution encounters a suspected or confirmed case of TB, a report to a public health authority (often the local TB program) is required.
 - B. Active case finding: Contact investigation is an important activity for finding TB cases that have not yet been reported. TB program staff also actively search for cases by reviewing records in laboratories and pharmacies. The active search for cases may involve regular networking with staff in other settings serving clients at high risk for TB, such as homeless shelters or agencies that provide care to patients with HIV/AIDS.
 - C. Surveillance data is used by TB programs to keep track of the places and groups that are affected by TB so that appropriate interventions (like targeted testing) can be planned and conducted.

II. Case management

Review with participants, using overheads/PowerPoints: Case Management. Customize this information to reflect the specific case management procedures of your TB program.

- A. Definition of case management
 1. Primary responsibility for the coordination of patient care to ensure that patient's medical, psychological, and social needs are met.
 2. The assignment of an individual or team to be primarily responsible for care of patients with TB disease.
- B. Goals of a TB case management program
 1. To make the patient non-infectious
 2. To ensure that effective treatment is promptly started

3. To prevent the disease from getting worse (including drug resistance)
 4. To identify and remove barriers to adherence
 5. To provide the patient with information on TB and its treatment
 6. To identify those individuals who may have been exposed to the case and are at risk for TB infection
 7. To identify and address other health and/or related needs
- C. The role and primary responsibility of the case manager or team is to assure that:
1. Each newly diagnosed patient is educated about TB and its treatment.
 2. Therapy is appropriate, continuous, and completed.
 3. The patient's ongoing status and response to therapy is monitored until treatment is complete.
 4. Contacts are identified, evaluated, referred, and monitored.
 5. Other urgent health and social needs of the patient are addressed.
 6. All staff involved with the patient have adequate knowledge and skills, and a professional, caring attitude.
 7. Communication is maintained among all health and social service providers.
- D. Steps in case management (including preferred timelines)
1. Receive case report (standard: review and decide on urgency within 1 working day of receipt of report)
 2. Contact care provider (standard: within 1-3 working days of receipt of report)
 3. Initial contact with patient by home visit, or in hospital (standard: within 3-7 days of receipt of report, depending on risk of transmission)
 4. Ongoing visits during patient's treatment (standard: assess TB patient and review cases with other involved health workers at least monthly)
 5. Follow-up on completion of treatment activities (standard: chest x-ray, sputum, evaluate if adequate course of treatment by dose and duration)
 6. Conduct contact investigation to prevent the spread of TB disease (contact investigation will be covered in greater detail later in this session)

20 min Targeted testing and risk assessment

I. Targeted testing

Discuss with participants. Refer participants to page 8 of their workbooks.

- A. Universal screening and skin testing of the general population for TB infection or disease is not practical, effective, or possible for most TB control programs. Current CDC recommendations call for targeted testing of the groups most at risk for TB infection or disease. Using this approach, a decision to test is a decision to treat.
- B. Session 1 covered the groups most at risk for being exposed to or infected by *M. tb*. What groups do you remember?

Brainstorm answers to this question and record the answers on a chalkboard, poster sheet, or overhead transparency. Participants can record responses on page 8 of their workbooks. When participants have no more ideas, fill in missing items as needed.

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

- C. Also discussed in Session 1 were the persons at higher risk of **developing TB** once infected with *M. tb*. What groups do you remember?

Brainstorm answers to this question and record the answers on a chalkboard, poster sheet, or overhead transparency. Participants can record responses on page 9 of their workbooks. When participants have no more ideas, fill in missing items as needed.

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

Discuss specifically how testing is targeted in your jurisdiction.

II. Risk Assessment

Review with participants, using overheads/PowerPoints: Risk Assessment.

As discussed in Session 1, three main factors affect the risk of TB transmission. TB control staff must weigh these factors when deciding which contacts should be given high priority for testing and evaluation.

A. Infectiousness of the TB patient

Ask participants: What influences the infectiousness of a patient?

*Correct responses include: laryngeal or pulmonary TB; sputum smear-positive; cavitory disease on chest radiograph; cough; positive culture for *M. tb*.*

B. Environmental characteristics

Ask participants: What environments are high-risk for TB transmission?

Correct responses include: small or crowded rooms; poorly ventilated areas; areas without air-cleaning systems. High-risk sites include correctional facilities, shelters, nursing homes, and hospitals.

C. Characteristics of the contact's exposure

Ask participants: What type of exposure increases a contact's risk for TB

transmission? Correct responses include: frequent time spent with the patient during the infectious period, and close physical proximity to the patient during the infectious period.

30 min Contact investigation

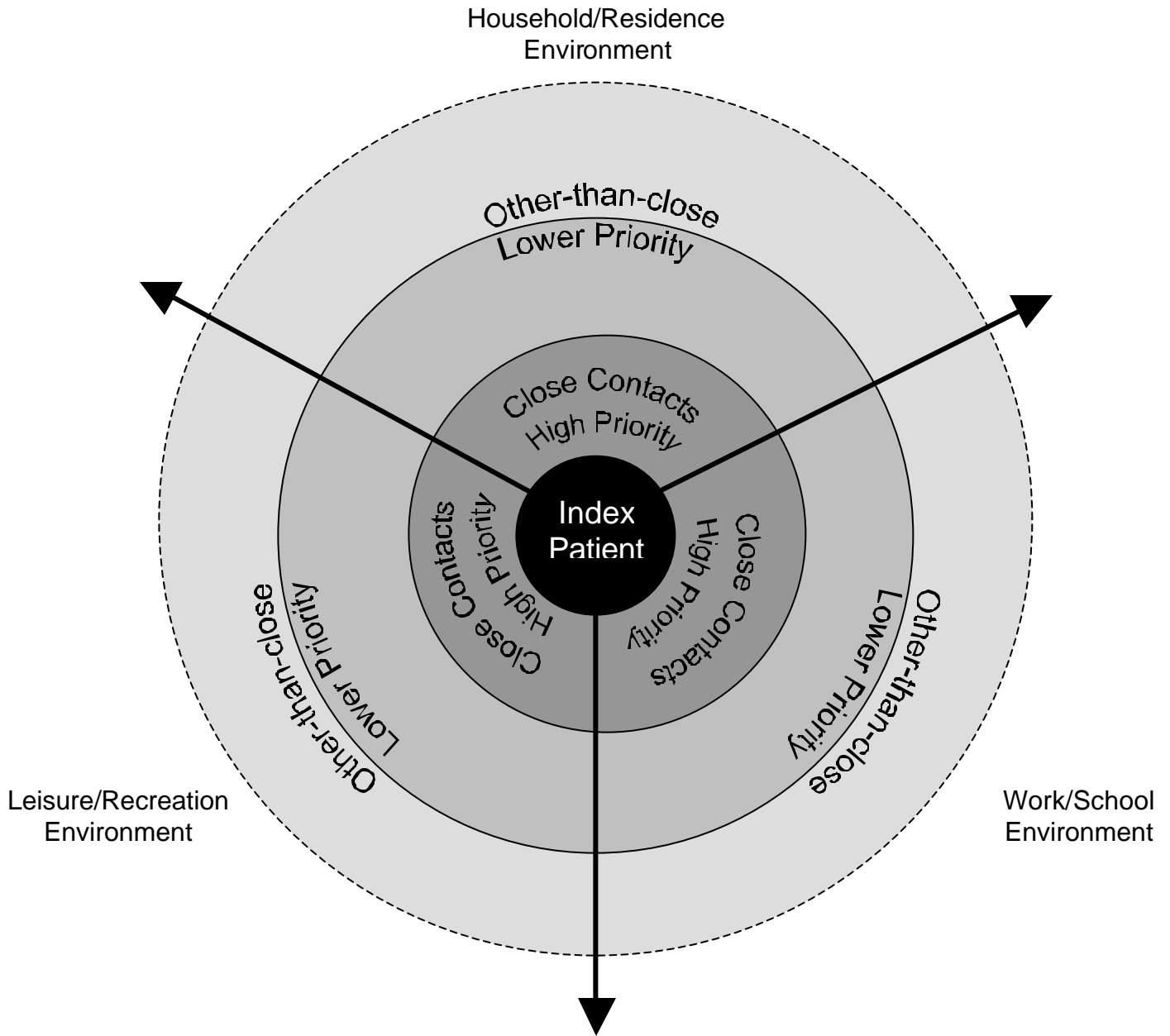
Review with participants, using overheads/PowerPoints: Contact Investigation.

I. What is a contact investigation?

- A. A contact investigation is a procedure for identifying people who were exposed ("contacts") to someone with infectious TB disease. Once contacts are identified, they are evaluated for LTBI and TB disease, and given treatment, if needed. Contact investigations are very important for stopping the transmission of TB infection and disease.
- B. The person who is the initial case reported to the health department with suspected or confirmed TB is called the "index patient" or "index case."
- C. Situations in which a contact investigation is *not* performed:
 1. Extrapulmonary TB, which is not infectious.
 2. The index patient is a young child (young children are rarely infectious).
 3. However, when a young child has TB infection or disease, it means that transmission was recent. In this case, a *source case investigation* is done to find the source of the transmission.
- D. Contact investigations generally involve 3 types of places where patients spend their time:
 1. Household or residence
 2. Work or school
 3. Leisure or recreational environments
- E. Contacts in each of the three types of places should be identified and evaluated in order of priority, using the **concentric circle approach**.

Refer participants to diagram on page 11 of their workbooks. Review how the circle provides direction and priorities for the contact investigation.

Concentric Circle Approach



- Close contacts (high risk)
- Other-than-close contacts (medium risk)
- Other-than-close contacts (low risk)

F. Social networking

1. If using the concentric circle approach is not adequate for identifying contacts, another strategy is called **social networking**. This approach focuses on any group with connections in the patient's life that promote disease transmission. These connections could include:
 - a. Drug use
 - b. Common sex partners
 - c. Common gathering places like bars, beauty salons, churches, or clubs
2. Another effective technique in identifying contacts is the **cluster interview**, a planned interview with someone knowledgeable about the index patient's activities (e.g., a close friend or relative). This person may reveal other possible places of transmission that the patient is reluctant to disclose. The cluster interview may widen or narrow the investigation and help to confirm or disprove statements made by the patient. **Confidentiality** is an important element in the interview process. Only the Health Officer or his/her designee is entitled to breach a patient's confidentiality. The cluster interview should only be conducted with **explicit approval** from the index patient to breach his/her confidentiality.

II. Nine steps in contact investigation

- A. A review of the patient's medical record to **determine the period of infectiousness**.
Explain how your program calculates a patient's period of infectiousness.
- B. **Interviewing the patient** to gather important information about symptoms, places, and contacts. Multiple interviews and good communication skills are needed to build trust and rapport with patients so that all appropriate contacts are identified.
- C. A **field investigation**: visiting the patient's home, work, or other places where he/she spent time while infectious to identify contacts and evaluate the environmental characteristics in which exposure occurred.
- D. **Risk assessment** for TB transmission. Analyze information about patient's period of infectiousness, environmental characteristics, and how (and when) the contacts were exposed to determine who is most at risk for TB transmission.
- E. **Decision about priority of contacts**. Close contacts are at higher risk for TB infection than other-than-close contacts, and should be prioritized for testing.
Explain how your program defines a "close" vs. "other-than-close" contact. Contacts at higher risk of developing TB disease once infected (children < 4 years of age, immunocompromised persons, and contacts with certain medical conditions) should also be prioritized for testing.

F. Evaluation of contacts for LTBI and TB disease

1. Minimally, TST and medical histories should be taken from high priority contacts.
2. Immunocompromised persons and children under 4 years of age should also receive a chest radiograph, regardless of TST results.
3. Anyone with symptoms and/or a TST reaction classified as "positive" should receive both a chest radiograph and sputum exam.
4. Contacts who have no TST reaction should be re-tested 10-12 weeks after their exposure to the infectious TB patient was broken. Generally, it takes a "window period" of 10-12 weeks after exposure for the infection to "show up" on the TST.

G. Treatment and follow-up for contacts

1. When a contact has a TST reaction classified as "positive" and no evidence of TB disease, treatment for LTBI is usually indicated. (Note: For specific information about how LTBI is treated, see Session 1; for information about TST classification, see Session 3.)
2. When high-risk contacts (immunocompromised persons and young children) initially have no TST reaction, treatment for LTBI should begin until the second TST is taken 10-12 weeks after the break in exposure. If the second TST still shows no reaction, LTBI treatment can be stopped. In some cases, LTBI treatment may continue.
3. When a contact has positive sputum or chest radiograph suggesting active TB, treatment for TB disease should begin immediately.

H. Decision about whether to discontinue or to expand testing

1. Contacts should be tested and evaluated in order of priority, using the concentric circle approach.
2. The next group of contacts should be screened when there is **evidence of recent transmission** among the first group of contacts tested.
 - a. High infection rate (compared to the infection rate of the community)
 - b. TB infection in a young child
 - c. A documented skin test conversion (increasing ≥ 10 mm within the previous 2 years)
 - d. A secondary case of TB disease

- I. Evaluation of contact investigation activities.** TB control staff should analyze the results of the contact investigation to determine if appropriate contacts were identified, located, evaluated, and treated.

30 min **Patient adherence and DOT**

Review with participants, using overheads/PowerPoints: Adherence.

I. Patient adherence

A. Definition: Adherence to treatment means following the recommended course of treatment by taking all the prescribed medications for the entire length of time necessary.

B. The consequences of TB patients not adhering to treatment can be severe:

1. Increases the development of drug-resistant TB.
2. Contributes to ongoing transmission of TB infection.
3. Leads to prolonged illness, disability, and possibly, death from TB.

C. Why is adherence so challenging?

Brainstorm answers to this question and record the answers on a chalkboard, poster sheet, or overhead transparency. Participants can record responses on page 14 of their workbooks. When participants have no more ideas, fill in missing items as needed.

1. Patient no longer feels sick, but must continue medication for many months
2. Lack of knowledge about TB
3. Personal or cultural beliefs about TB
4. Forgetfulness
5. Lack of access to health care, including lack of transportation and childcare or inconvenient clinic hours
6. Language barriers
7. Poor relationship(s) with health care worker(s)
8. Cultural barriers between patient and health care worker(s)
9. Lack of motivation
10. Medication side effects
11. Complex regimen
12. Competing priorities (i.e., need to find housing, access drugs, etc.)
13. Conflicts with work and school schedules
14. Other medical conditions and medications
15. _____

II. Directly Observed Therapy (DOT)

Review with participants, using overheads/PowerPoints: DOT.

A. Definition of DOT

DOT means that a health care worker or other designated individual watches the patient swallow every dose of the prescribed TB drugs ("supervised swallowing"). The American Thoracic Society and the Centers for Disease Control and Prevention recommend that every TB patient be considered for DOT.

- B. DOT tasks:
1. Check for side effects
 2. Verify medication
 3. Watch patient take pills
 4. Document the visit
- C. Who can deliver DOT?
1. Usually delivered by TB program personnel, such as a nurse or other health care worker
 2. Staff at other health care settings, such as outpatient treatment centers
 3. Other responsible persons (school personnel, employer, clergy)
 4. Family members should not be used for DOT
- D. Where is DOT delivered?
1. Clinic or other health care facility
 2. Patient's home
 3. Patient's workplace
 4. A school
 5. Public park, restaurant, or other agreed-upon public location
- E. Can we reliably predict who will be non-adherent to their treatment?
No! Anyone can be non-adherent, regardless of social class, educational background, age group, gender, or ethnicity.
- F. Which patients are the highest priority for DOT?
Explain that while all patients should be considered for DOT, there are some groups who face extremely high barriers for adherence. Brainstorm examples of these groups and record the answers on a chalkboard, poster sheet, or overhead transparency. Participants can record responses on page 15 of their workbooks. When participants have no more ideas, fill in missing items as needed.
1. Drug-resistant TB
 2. Prior treatment failure
 3. HIV-positive
 4. Homeless
 5. Substance users
 6. Children/adolescents
 7. Foreign-born, recent arrivals, or anyone with language barriers
 8. Persons with mental or physical disabilities
 9. Patients who are failing on therapy (slow sputum conversion)
 10. Patients who give us a reason to doubt their adherence
 11. Patients on intermittent therapy (2-3 times per week)

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 17 in Participant's Workbook.)

1. What are three factors that can determine the infectiousness of a TB patient?
2. Describe each of the following types of infection control:
 - a. Administrative controls
 - b. Engineering controls
 - c. Personal respiratory protection
3. Which of the following is NOT a major step involved in TB case management?
 - a. Contact patient's care provider
 - b. Train staff about infection control
 - c. Home or hospital visit with patient
 - d. Contact investigation
4. Which of the following groups should receive high priority for targeted testing?
 - a. Close contacts of persons known or suspected to have TB
 - b. Foreign-born persons from areas that have high rates of TB
 - c. Residents and employees of high-risk settings (correctional facilities, nursing homes, mental institutions, homeless shelters, etc.)
 - d. All of the above
5. Name three of the nine steps involved in a contact investigation.
6. What are four reasons a patient might be non-adherent to his/her TB treatment?
7. Explain the role of DOT in patient adherence.
8. List three groups of TB patients who are the highest priority to receive DOT.

Participant evaluation

Ask participants to share their feedback about this training session on the evaluation form (see page 18 in Participant's Workbook).

How do I perform a respirator fit test?

A procedure for qualitatively fit testing respirators used to protect employees from exposure to Mycobacterium tuberculosis (M. tb).

N-95 respirators are the minimum level respirator to be used for protection against *M. tb*. Higher level respirators such as high-efficiency particulate air (HEPA) filters may also be used. The following procedure can be used with N-95 or higher level respirators.

There are 4 steps in the fit testing process:

1. Choosing the respirator
2. Fit checking
3. Taste threshold (sensitivity) screening
4. Fit test

Choosing a respirator

Each employee should have the opportunity to select a respirator that is comfortable on his/her face. This means that there must be a selection of respirators to choose from. At a minimum, several sizes of one type of respirator must be available, but it is preferable to have two or three different brands of respirators in multiple sizes available. The employee should be taught to put the respirator on and place the straps correctly, before deciding if the respirator is comfortable. This includes positioning the facepiece on the chin and the bridge of the nose. Employees who wear glasses should put them on to determine if the respirator interferes with the placement of the glasses. Once the employee has selected a comfortable respirator, he/she should be taught to perform both positive and negative fit checks.

Fit checking

This assures the employee that the respirator is sealing against the face. It should be done each time the respirator is worn. There are two types of fit check: positive pressure and negative pressure. Positive pressure refers to the user breathing out, exerting a positive pressure on the respirator. Negative pressure refers to the user breathing in, exerting a negative pressure on the respirator.

To perform the fit check, the employee should put on the respirator correctly. The entire surface of the respirator must be covered completely. This is because the entire surface acts as the filter. Although some people can cover the surface with their hands, the easiest way is to use a piece of plastic, such as household plastic film, to completely cover the respirator. This way, it is not difficult to do.

Positive pressure fit check

Once the surface of the respirator is covered, the wearer should breathe out gently and feel if air is escaping around the face, rather than through the respirator. If air is felt escaping around the facepiece, the respirator should be repositioned and re-fit checked. If the wearer does not feel air escaping around the facepiece, he/she has passed the positive fit check.

Negative pressure fit check

To perform the negative fit check, the respirator should again be covered. The wearer should gently inhale. This should create a vacuum, causing the respirator to be drawn in slightly toward the face. If the respirator is not drawn in toward the face, it should be removed and examined for any defect such as a small hole or distorted sealing edge. If none is found, the respirator should be repositioned and a second attempt at negative pressure fit testing should be made. If the respirator draws in toward the face while the wearer covers the surface and inhales, he/she has passed the negative pressure fit check.

Both the positive pressure and the negative pressure fit check must be passed before the respirator can be used or fit tested.

Taste threshold screening

This can be done once the wearer has passed both positive and negative fit checks. Fit testing kits can be purchased from various sources and contain all the supplies needed to perform taste threshold screening and fit testing.

A dilute solution of the testing substance is used to determine that the wearer can detect the substance that will be used for fit testing. There are two substances that can be used to fit test N-95 respirators:

- Saccharine, sweet taste
- Bitrex,™ bitter taste

Note: Irritant smoke or "banana oil" fit testing cannot be used for fit testing N-95 respirators because the filter material in these respirators is not impervious to either irritant smoke or oil. These methods may be used with other respirator types, but are not described in this FAQ.

Both saccharine and Bitrex™ require a nebulizer, which is included in the fit-testing kit. Fit testing kits also include two bottles of solution, and a hood and collar. One bottle of solution is the sensitivity test solution; the other is the fit test solution.

To conduct the taste threshold screening

Make sure that the test subject has not eaten, chewed gum, or had anything except water to drink for at least 15 minutes.

1. If the subject has a respirator on, it should be removed.
2. Assemble and place the collar and hood over the test subject's head.
3. Position the hood so that it sits forward on the subject's shoulders, allowing about six inches of space between the face and the hood window.
4. Tell the subject to breathe with his/her mouth open and tongue extended.
5. Place the nebulizer with the sensitivity solution through the hole in the window of the hood and fully squeeze the bulb 10 times.
6. After the 10 squeezes, ask the test subject if he/she can detect a sweet taste (if using saccharine) or a bitter taste (if using Bitrex).
7. If the subject can taste the substance, note that it was tasted after 10 squeezes, and proceed to the fit test.
8. If the subject did not taste the solution, repeat an additional 10 full squeezes into the hood.
9. If the subject can taste the substance, note that it was tasted after 20 squeezes, and proceed to the fit test.
10. If the subject did not taste the solution, repeat an additional 10 full squeezes into the hood.
11. If the subject can taste the substance, note that it was tasted after 30 squeezes, and proceed to the fit test.
12. If, after 30 squeezes, the subject cannot taste the sensitivity solution, you must use a different substance.
13. For example, if the subject did not taste the saccharine, you must re-do the taste threshold testing using Bitrex.
14. Remove the hood and collar, and give the subject a brief period of time to clear the taste.

The fit test

Fit testing can be performed after a successful taste threshold screening. Make sure the test subject has not eaten, chewed gum, or had anything except water to drink for at least 15 minutes.

1. Have the test subject put on the respirator and perform both positive and negative fit checks.
2. The subject should wear the respirator for at least five minutes before the fit test.
3. Place the collar and hood over the test subject's head.
4. Position the hood so that it sits forward on the subject's shoulders, allowing about six inches of space between the face and the hood window.
5. Tell the subject to breathe with his/her mouth open and tongue extended, with the respirator on, as in the sensitivity testing.
6. Place the nebulizer with the fit testing solution into the hole in the window of the hood and fully squeeze the bulb the same number of times needed in the taste threshold screening, either 10, 20, or 30 times.
7. Continue to inject $\frac{1}{2}$ of the original number of squeezes (5, 10, or 15) every thirty seconds.
8. The test subject should perform the following exercises for at least 30 seconds each, while the tester continues to squeeze the correct amount every thirty seconds:
 - Normal breathing
 - Deep breathing
 - Turning head from side to side, inhaling at both sides
 - Nodding head up and down, inhaling in both up and down positions
 - Bending forward to touch toes, inhaling when head is down
 - Talking (Ask the subject to read a paragraph aloud, such as *The Rainbow Passage*, to tell you a story, or to count backward from 100.)
 - End by resuming normal breathing
9. The fit test should be ended anytime the subject reports tasting the fit test aerosol.
10. The fit test is successful if the subject does not taste the fit test aerosol during the entire test.

Included on the next page is a copy of *The Rainbow Passage* in both English and Spanish.

This information is available at our website: www.nationaltbcenter.edu

The Rainbow Passage

Leyenda del Arco Iris

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Cuando los rayos del sol chocan contra las gotas de lluvia suspendidas en el aire, éstas actúan como un prisma y forman un arco iris. El arco iris es la división de luz blanca en muchos bellos colores. Éstos toman la forma de un largo arco, con una trayectoria que es muy alta, y sus dos extremos aparentemente más allá del horizonte. Existe, de acuerdo a la leyenda, una vasija llena de oro en uno de sus extremos. La gente la busca, pero nadie la encuentra. Cuando el hombre busca algo que está más allá de su alcance, sus amigos dicen que está buscando la vasija llena de oro que está al final del arco iris.