



SESSION 6: FIELD SAFETY AND INFECTION CONTROL

INTRODUCTION

In this 2³/₄-hour session, participants will learn more about the possible personal safety risks they face while conducting fieldwork and will explore ways to minimize these risks. The trainer will lead a discussion on how *Mycobacterium tuberculosis* is transmitted and how DOT workers can reduce their exposure in various situations. Finally, a review of personal respiratory protection will be presented, with a hands-on demonstration of how to fit-test an N-95 mask.

LEARNING OBJECTIVES

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

1. List five ways to reduce personal safety hazards in the field
2. Name two factors that affect the risk of *M. tb* transmission
3. Describe three ways TB control staff can protect themselves and others from exposure to active, infectious TB
4. State three requirements for using respirators (masks) properly

Material in this session is adapted from:

- *Exposure Control Plan for Tuberculosis Control*: Division of Communicable Disease Control, California Department of Health Services.
- *Tuberculosis Outreach Worker's Course*. Presented by the Francis J. Curry National Tuberculosis Center on July 20 – 21, 2000, in San Francisco, California.
- *What are the Main Factors that affect TB Transmission?* (FAQ sheet). Institutional Consultation Services, Francis J. Curry National Tuberculosis Center; 2000.
- *What Precautions Should be Taken When Transporting a TB Patient?* (FAQ sheet) Institutional Consultation Services, Francis J. Curry National Tuberculosis Center; 2000.

I. PERSONAL RISKS

▶ ACTIVITY

Risks to DOT Workers

A. What personal risks do DOT workers face while doing fieldwork?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

B. What are ways to reduce these risks?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

► **ACTIVITY**

Guest Speaker: Personal Safety Tips

Notes:

► **ACTIVITY**

Personal Safety Situations*

1. You are assigned to visit a new DOT patient in an unfamiliar neighborhood. What would you do to prepare?

2. Your DOT patient lives alone with a physically abusive spouse. Their home is located on an isolated rural road. What do you do to prepare for this visit?

3. You go to the door of your patient's home. A child answers the door. There does not appear to be any adult around. What do you do?

4. You have a DOT appointment with a young woman in a housing project. There are six young men standing at the entrance making harassing comments toward you. What do you do?

5. You have just completed your DOT visit. As you approach your car, you notice someone leaning against it. What do you do?

6. You arrive at your patient's home. As you reach the door, you hear loud arguing inside. What do you do?

7. You arrive at your patient's home. The door is opened by someone who says: "John [your patient] just stepped out. I'm a friend of his. Come on in – he'll be back soon." What do you do?

*Adapted from the *CHA Trainers Handbook*, Tucson: University of Arizona Rural Health Office; 1994.

II. INFECTION CONTROL FOR HEALTH CARE WORKERS

A. What are the main factors that affect transmission of *M. tuberculosis*?

1. TB is transmitted through the air by a person with TB disease of the lungs or larynx
2. Droplets (droplet nuclei) containing *Mycobacterium tuberculosis* (*M. tb*) are released into the air by coughing, sneezing, talking, or breathing. These droplet nuclei can cause *M. tb* infection if inhaled by anyone who shares air with the person who has infectious TB
3. For TB transmission to occur, three things are required: a TB patient, an air path, and a susceptible person
4. Characteristics of TB transmission include the following:
 - A single TB droplet may be able to cause infection. Therefore, there is no safe exposure level to TB
 - It is relatively difficult to become infected with TB compared to most diseases transmitted through the air, such as measles
 - The source of TB infection may not be identified. Most TB transmission is probably from undiagnosed TB patients

B. The chances of TB transmission occurring depend on three factors:

1. *Source patient*
 - a. Patients are not equally infectious. Factors related to degree of infectiousness include: the strength of the patient's cough; how watery his/her mucus is; and perhaps the particular strain of TB with which the person is infected
 - b. The most important patient factor is whether or not the patient is on effective treatment (which dramatically reduces the number of infectious droplets released by a patient)
2. *Exposure time*
 - a. Probability of infection is directly related (proportional) to the amount of time spent in the high-risk setting
 - b. Usually, but not always, a person must spend a long time in the company of a TB patient before becoming infected
 - c. For people working in high-risk institutions, the risk is cumulative over time. That is, the more years you work, the more likely you are to become infected

3. *Environment*
 - a. The environment determines the path that TB droplet nuclei take after they have become aerosolized. This determines whether or not a susceptible individual can inhale these particles and possibly become infected with TB
 - b. Characteristics of the environment include the size of the space and the ventilation. The smaller the space and the poorer the ventilation, the higher the risk
 - c. Engineering controls, such as HEPA filters and negative air pressure, try to change the environment in order to reduce the risk of TB transmission

C. What are ways to protect yourself and others from exposure to infectious TB?

1. Engineering controls

2. Work practice controls

- a. When transporting patients:
 - provide and instruct the patient to wear a surgical mask over his or her mouth and nose. The patient should not wear a respirator. A respirator has the opposite function to a surgical mask. A respirator is worn by staff to remove particles from the air that they inhale
 - make sure that enough surgical masks are available for the entire journey. These masks should be changed when they become wet or torn
 - let the facility or department where you are going know in advance that the patient is arriving. Advise the facility or department in advance of the appropriate precautions and treatment needs of the patient. (To reduce the number of people that could be exposed to *M. tb*, schedule procedures for TB patients at times when they can be performed rapidly and when waiting areas are less crowded.)
 - the DOT worker should wear a respirator during the entire journey. At a minimum, the respirator should be an N-95 filter respirator approved by the National Institutes for Occupational Safety and Health
 - drive additional passengers and staff members in a separate vehicle. This will reduce the number of people that could be exposed and also the number of people who are required to use respirators

- set ventilation controls to the fresh air or vent setting, rather than the recirculation setting
 - set any fan(s) to high setting
 - open as many windows as possible
 - leave the vehicle unoccupied with the windows open for at least an hour after the end of the journey. A sign should be placed on the vehicle indicating when the car can be used again
- b. When working in institutions at high risk for TB transmission, such as correctional facilities, homeless shelters, drug treatment centers, and nursing homes:
- do as much work as possible in non-patient/resident care areas
 - keep doors and windows open as much as possible
 - give several tissues to a possibly infectious person and instruct him/her to cover his/her nose and mouth when coughing or sneezing
- c. When conducting home visits with a suspected or confirmed infectious patient:
- explain the precautions taken to prevent transmission of TB and ask for the patient's cooperation
 - when appropriate, conduct the visit outdoors
 - give the patient several tissues and instruct him/her to cover his/her nose and mouth when coughing or sneezing
 - open a window and sit near it if indoors
 - conduct the visit as efficiently as possible in order to reduce exposure time
- d. When assisting patient in the collection of sputum specimens in the field:
- if possible, avoid being present during sputum induction or explain the precautions to be taken and ask for cooperation. Sputum induction should only be done by a registered nurse or respiratory therapist, as it can precipitate a medical emergency if a patient has heart or respiratory problems
 - take patient outside or to sputum induction room, when available
 - wear a powered air-purifying respirator, if available

3. Personal respiratory protection
 - a. Advantages of 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
 - b. Disadvantages of wearing personal respiratory protection:
 - a. can make a patient feel bad about his/her condition
 - b. if worn in public, can jeopardize a patient's confidentiality
 - c. can make communication between a worker and a patient difficult

► **ACTIVITY**

Wearing and fit testing N-95 masks

Notes:

REVIEW QUESTIONS

1) What are five ways to reduce personal safety hazards in the field?

a. _____

b. _____

c. _____

d. _____

e. _____

2) What are two factors that affect the risk of *M. tb* transmission?

a. _____

b. _____

3) What are three ways TB control staff can protect themselves and others from exposure to active, infectious TB?

a. _____

b. _____

c. _____

4) What are three requirements for using respirators (masks) properly?

a. _____

b. _____

c. _____

ADDITIONAL RESOURCES

- *Core Curriculum on Tuberculosis*, 4th ed. Atlanta: Centers for Disease Control and Prevention; 2000.
- Francis J. Curry National Tuberculosis Center: <http://www.nationaltbcenter.edu>
Workplace Tools, a selection of publications and video about institutional controls
- *Guide to Respiratory Protection at Work*, Cal/OSHA, State of California, Department of Industrial Relations, Division of Occupational Safety and Health; 1993.
- *Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Facilities*, Atlanta: Centers for Disease Control and Prevention; 1994. MMWR 1994; 43, RR-13:33–58.
- New York State Department of Health, Bureau of TB Control: (518) 474-4845; videos and publications
- *Self-Study Modules on Tuberculosis: 1 – 5*. Atlanta: Centers for Disease Control and Prevention; 1995.
- *Self-Study Modules on Tuberculosis: 6 – 9*. Atlanta: Centers for Disease Control and Prevention; 1999.
- <http://www.thoracic.org>
American Thoracic Society
- http://www.dir.ca.gov/occupational_safety.html
(please note underline between “occupational” and “safety”)
California Occupational Safety and Health Association (Cal OSHA)
- <http://www.harlemtbcenter.org>
Charles P. Felton National Tuberculosis Center at Harlem Hospital
- <http://www.cdc.gov/nchstp/tb>
Division of TB Elimination, Centers for Disease Control and Prevention
- <http://www.umdnj.edu/ntbcweb>
New Jersey Medical School National TB Center

SESSION EVALUATION FORM

Your feedback about this training session is important. Please read each statement and circle one number to indicate the level of your agreement/disagreement. Include any comments on the lines provided below.

Name _____ Session # _____

Topic _____ Instructor _____

1 = Strongly disagree 2 = Disagree 3 = Neither agree nor disagree 4 = Agree 5 = Strongly agree

1. The topics are covered comprehensively 1 2 3 4 5

2. The session meets its objectives 1 2 3 4 5

3. The session length is appropriate 1 2 3 4 5

4. The information is well organized 1 2 3 4 5

5. The session maintained my interest 1 2 3 4 5

6. The level of the material is appropriate 1 2 3 4 5

7. The printed materials are useful 1 2 3 4 5

8. The delivery of the material was effective 1 2 3 4 5

9. I now feel more prepared to perform my DOT duties 1 2 3 4 5

10. Overall, the session was excellent 1 2 3 4 5

What do you recommend to improve this session? _____

What additional tuberculosis training do you need? _____

Other comments: _____

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 filter (HEPAs) 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, s/he 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

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FAQ

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, s/he 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, s/he 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 s/he can detect a sweet taste (if using saccharine) or a bitter taste (if using Bitrex).
If the subject can taste the substance, note that it was tasted after 10 squeezes, and proceed to the fit test.
7. If the subject did not taste the solution, repeat an additional 10 full squeezes into the hood.
If the subject can taste the substance, note that it was tasted after 20 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.
If the subject can taste the substance, note that it was tasted after 30 squeezes, and proceed to the fit test.
9. If, after 30 squeezes, the subject cannot taste the sensitivity solution, you must use a different substance.
For example, if the subject did not taste the saccharine, you must re-do the taste threshold testing using Bitrex.
10. 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 ° 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, or ask them to tell you a story, etc.)
 - 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.

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, ellas actúan como un prisma y forman un arco iris. El arco iris es la división de luz blanca en muchos hermosos colores. Éstos toman la forma de un largo arco, con una trayectoria que es alta en el medio, y sus dos extremos aparentemente más allá del horizonte. Existe, de acuerdo a una leyenda, una vasija llena de oro en uno de sus extremos. Todo el mundo la 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.