TB PREVENTION AND CONTROL

The New Challenges

Self-Learning Packet
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# TB PREVENTION AND CONTROL

*The New Challenges*

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I. **INTRODUCTION**

Tuberculosis is a disease that has plagued mankind for thousands of years. In the last century, modern medicine made significant strides, and TB was thought to be nearing elimination in the United States. Then, in the late 1980’s and early 1990’s, outbreaks and cases of TB were once again on the rise.

This rise was due to many contributing factors: the HIV epidemic, an increase in drug-resistant TB strains, lack of treatment for infected individuals, inadequate isolation of patients with TB, and healthcare facilities letting their guard down when they should have remained suspicious for TB symptoms.

Since then, health care providers have responded with an increase in TB control and prevention activities, and as a result, the numbers of reported TB cases have once again decreased. Even so, it is estimated that 18 million people in the US alone are infected with TB, and without intervention, five to ten percent of these people will develop TB disease some time in their lives.

**Now** is the time to take an active role in TB prevention. We must maintain a high level of suspicion and continue monitoring for TB. When the number of reported TB cases decreases we typically let our guard down. But we cannot afford to do this, especially knowing that TB is a major health concern worldwide.

**NOW is the time to take an active role in TB prevention!**

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Our challenge is to learn from the past, and adhere to prevention measures and infection control procedures that will prevent the further spread of this disease.
II. Objectives

Staying on top of TB will require that you, the health care provider, develop a high index of suspicion with every symptomatic patient you see. You need to know how important your role is in preventing the spread of this disease.

<table>
<thead>
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<th>After viewing this program you will be able to:</th>
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<tr>
<td>• Explain how TB is transmitted</td>
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III. UNDERSTANDING TB TRANSMISSION

The first step toward containing TB is to understand how it is transmitted. TB is a communicable disease caused by *Mycobacterium tuberculosis*, a type of bacteria that is carried through the air in tiny infectious droplet nuclei. These droplets are expelled when a person with TB disease coughs, sneezes, sings or exhales forcefully. Evaporated droplets containing these microorganisms can remain suspended in the air for prolonged periods of time. When a susceptible person inhales these droplet nuclei, infection may occur. The mycobacteria in these droplets may become established in the lungs, resulting in pulmonary TB, and in some cases spread throughout the entire body, affecting virtually any organ or tissue. This type of TB, known as extra pulmonary TB or EPTB, is most commonly found in lymph nodes, pleura, bones and joints, the genitourinary tract and the meninges.

With a normal, healthy immune system, these bacilli will usually be eliminated or controlled, and there may be no clinical symptoms or active disease. These individuals are infected and this stage is referred to as Latent TB Infection, or LTBI. In five to ten percent of cases the infection will progress into tuberculosis disease after an interval of months, years, or even decades. Persons who are severely immunocompromised have a higher likelihood of progression and may develop symptoms more rapidly. (See Table 1, Page 24.)
IV. IDENTIFYING HIGH-RISK FACTORS

Individuals who have a high risk of TB exposure and infection include:

- Those who have close contact with persons who have active TB
- Foreign-born individuals from high-prevalence countries such as Asia, Africa, Latin America, Russia and Eastern Europe
- Medically underserved people such as homeless persons and migrant farm workers
- Illicit drug users
- Residents and employees of high-risk institutions such as correctional facilities or shelters for the homeless

Once infected, the risk of progressing from latent TB infections to developing active disease is due in part, to the body's immune status, presence of other underlying diseases, age, and nutritional status.

The following groups are at the highest risk of developing active TB disease once infected:

- HIV infected persons
- Recently infected individuals, particularly infants and young children
- Persons who have received inadequate treatment for TB
- Substance abusers
- People with known medical conditions such as diabetes or end-stage renal disease

The likelihood of progressing to active TB disease can be greatly reduced by treating the infection in the latent phase.

As a health care provider, you should know and understand the likelihood of TB infection and disease in the population served by your facility. Who is at greatest risk of developing TB in your community? Do you serve the homeless, correctional facility inmates, drug abusers, or foreign-born individuals from high-prevalence countries? Are they likely to be HIV infected and/or immunocompromised?

The epidemiology of TB is constantly changing and it's imperative that you determine who is at greatest risk and assess them carefully. (See Table 2, page 25.)

All facility TB infection control programs should periodically re-evaluate the risk of transmission of TB in their facility. Assessments take into consideration the profile of TB in the community, the number of TB patients admitted to the facility, and the likelihood of exposure. The results of the risk assessment will help determine the risk of transmission to workers and appropriate control measures. This will also help establish screening tools for patients, determine the number of isolations rooms that are needed, and the appropriate frequency of health care provider screening (skin testing).
V. Signs and Symptoms of TB

Health care providers must be able to recognize the signs and symptoms of tuberculosis, and remain vigilant to this possibility when evaluating patients.

TB should be suspected in any patient exhibiting the following:

- Productive, persistent cough lasting three weeks or more
- Chest pain
- Bloody sputum
- Unexplained weight loss
- Loss of appetite
- Fever
- Fatigue or weakness
- Night sweats

Extra pulmonary TB can be difficult to diagnose. Patients may exhibit some of the symptoms listed above as well as others, depending on the part of the body that is affected. For example, TB of the spine may cause pain in the back; TB of the kidney may cause blood in the urine.

Also, be aware that symptoms of tuberculosis can be confused with other illnesses. TB is frequently mistaken for other bacterial pneumonias, or cancer of the lungs. HIV-infected patients may display atypical signs and be difficult to diagnose. Any HIV-positive patients with undiagnosed pulmonary disease should be suspected of having TB.
VI. Protocols For Diagnosing

As soon as symptoms suggestive of TB are recognized, and until the patient can be isolated, the patient should be instructed to cover his or her mouth with tissues at every cough and give the patient a surgical mask to wear until they can be placed in an appropriate isolation room. Always err on the side of caution and consider any patient with suspicious symptoms as potentially infectious.

Be sure to document your suspicions in the patient chart, and notify the physician according to your facility's protocol. This will alert the physician and other caregivers to consider TB in conducting the medical exam and arrange for needed tests such as skin tests, x-rays or sputum specimens to verify or rule out the presence of TB.

A medical history consists of asking patients whether they have ever been exposed to a person with TB; if they have had TB infection or TB disease before; whether they suffer from any of the symptoms of the disease; and if they are considered to have other risk factors, such as being a recent immigrant.

A physical examination, with special attention to the chest and lungs will then be performed.

A tuberculin skin test is often performed during the evaluation of patients with TB symptoms. A purified protein derivative called tuberculin is injected into the skin on the forearm and the test site is then examined within 48 to 72 hours for induration. Whether a reaction is classified as positive depends on the size of the reaction (induration, not erythema or redness), and the risk factors for exposure.

If an individual has had a known exposure to a TB case, a low threshold of only 5 millimeters is considered positive. Ten millimeters of induration is considered to be positive if there are risk factors for exposure. Some health care facilities may use a higher threshold of 15mm if the likelihood of exposure is very low in the community.

A negative test does not necessarily rule out the possibility of TB infection, since approximately 20% of active TB cases have a negative skin test. Be aware that false-negative reactions are also common in persons with recent viral infections, individuals who have recently received live virus vaccines, people who have been very recently infected with TB, and especially immunocompromised individuals.

After the clinical evaluation for symptoms, a chest x-ray (CXR) will be performed.
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A CXR is used to view abnormalities in the lungs that may be suggestive of TB. Although radiographs cannot diagnose TB, they can be used to rule out the possibility of active pulmonary TB in a person who has a positive reaction to the tuberculin skin test and no symptoms of disease.

Multiple sputum specimens are obtained and examined under a microscope for the presence of acid-fast bacilli, and then cultured to determine whether *Mycobacterium tuberculosis* is present.

- A positive smear is an indication that the patient may have tuberculosis and is likely to be infectious.
- A negative smear does not rule out TB. Many patients will be smear negative and culture positive. These patients are usually not as likely to be infectious.
- Multiple specimens should be obtained on different days to test for TB.

A biopsy or other specimen tests such as urine, cerebrospinal fluid, pleural fluid, or purulent material (pus) may be used to confirm extra pulmonary TB disease, as it can occur in almost any anatomical site.

NOTE: Although the majority of TB cases are confirmed through positive cultures of sputum, tissue or other samples, there are times when specimens fail to show TB despite the presence of symptoms. At these times, the level of suspicion by the clinician, along with the results of the radiograph and skin test, will play a decisive role in diagnosing the disease. This is especially true for children and cases of EPTB.

After a thorough evaluation, patients with suspected or confirmed TB should start appropriate therapy right away.

(See Table 3, page 26.)
VII. Prevention Measures

A. Isolation Rooms

Since TB infectiousness is directly related to the amount of tubercle bacilli expelled in the air, patients who are suspected of having pulmonary or laryngeal TB disease should be immediately isolated in an appropriate respiratory isolation room.

The respiratory acid-fast bacilli, or AFB, isolation room should be a private room with adequate dilutional ventilation, air exhausted directly to the outside, and negative pressure. Negative air pressure is air that flows from the corridor or other common areas into the patient’s room. The room should have a visible monitor to indicate directional air flow, and the air flow should be verified with smoke tube testing prior to patient placement, and re-tested daily when used for AFB isolation.

Air should be ventilated directly to the outside to prevent infectious particles from disseminating throughout the building. There should be six to twelve air exchanges per hour in the room to dilute the concentration of organisms. If this cannot be achieved, or if there are no negative pressure rooms available, the ventilation system can be supplemented with a high-efficiency particulate air (HEPA) filtration system or ultraviolet germicidal irradiation. This ventilation and filtration should eliminate airborne bacilli from the air and ultraviolet irradiation can kill bacteria.

A sign recognizable to all providers should be displayed outside the AFB isolation room that will warn all persons entering the room to take necessary precautions. As few people as possible should be allowed to enter the room.

Isolation room doors should be kept closed, except when people come into or out of the room. Self-closing doors are helpful.

Educate the patient on the reasons for isolation and the importance of staying in the room. There should be incentives for the patient to remain in the room, such as a television, telephone and bathroom. The patient should remain in the isolation room, unless he or she has to leave for medically essential procedures. In this case, the patient should wear a surgical mask to prevent exposing others. Procedures on these patients should be scheduled for times when waiting areas are less crowded and the procedures can be performed quickly.
B. Operative Procedures

Elective operative procedures should be delayed until the patient is no longer infectious. However, in the event that an active TB patient must undergo an emergency surgical procedure, special precautions may be taken in the operating room. For example:

- Health care providers should wear respiratory protection that protects the provider from infectious droplet nuclei expelled by the patient
- Operative procedures should be done with a minimum amount of personnel
- Operating rooms without anterooms should keep doors closed, and traffic in and out of the room should be kept to the minimum
- Bacterial filters can be placed on the patient’s endotracheal tube, or on the expiratory side of the ventilator or anesthesia machine
- During post-op recovery, the patient should be monitored and placed in an AFB isolation room
- Operating room personnel, as well as the anesthesia department, should follow hospital policies and procedures regarding exposure to TB

C. Infection Control Procedures

Infection control practices are essential in the containment of TB.

Patients who are coughing, undergoing cough-inducing procedures, bronchoscopy, or who have positive AFB sputum smears from respiratory specimens are the most likely to be infectious. Additionally, patients who are not receiving therapy, have just started therapy, or have a previous poor response to therapy should also be considered infectious.

1. Personal Respiratory Protection

In order to prevent exposure, health care providers must wear the appropriate respiratory protection whenever they enter a room with an infectious patient.

There are several devices certified by the National Institute for Occupational Safety and Health (NIOSH) for TB protection. One widely used type of respirator is the N-95 mask. These respirators are designed to provide a tight seal and effectively filter particles the size of mycobacteria or even smaller, reducing exposure to the particulates.

**Do not confuse respirators with surgical masks.** Surgical masks are not designed to prevent exposure to M. tuberculosis. They were designed to prevent respiratory secretions of the person wearing the mask from entering the air.
Respiratory protection for *M. tuberculosis* should be worn during the following times:

- Anytime a health care provider enters a room with an individual that has been diagnosed, or is suspected of having, infectious TB
- When present during the performance of high-risk procedures such as aerosol medication administration, bronchoscopy, sputum collection and suction procedures, and autopsies
- When emergency medical response personnel or others transport an individual with suspected, or confirmed, TB in a closed vehicle

**Donning Respiratory Protection**

All health care providers who are likely to enter an AFB isolation room or other setting with potentially infectious patients need to know the proper way to don respiratory protection and how to fit check to ensure that the mask fits properly.

1) First, when putting on the mask, make sure the bottom elastic strap is placed around your head, just below the ears.

2) Then, pull the top strap up over your head, resting it above the ears. If the straps are adjustable, adjust the strap tension by pulling the straps evenly on both sides.

3) Once the elastic bands are adjusted, place your fingertips at the top of the nose piece. Using both hands, mold the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece. Be sure to use both hands at the same time, as an improper fit could result in a respirator that is not working at maximum efficiency.

4) You’ll have a perfect fit when there is a seal that fits tightly against the skin so that no air can get in or out. Facial hair can affect the seal. You can check the fit by covering the front of the respirator completely with both hands and inhaling sharply. You should be able to feel suction being created as the mask pulls tightly against your face.

The respirator should be fit checked in this manner every time it is to be worn. If you cannot achieve a proper fit, do not enter a potentially contaminated area. Disposable respirators can be reused unless they become contaminated, bent out of shape, or have lost their protective seal.
If your job requires that you enter an isolation room, your facility is required to conduct fit testing procedures to ensure that it provides an adequate seal. There are several types of fit testing procedures, including the use of a sweetening compound such as saccharin, or a bittering compound such as Bitrex. Computerized testing is also available.

2. Other Infection Control Practices

Although patients with extra pulmonary TB are not usually considered infectious, transmission has occurred when tissue abscesses or wounds were irrigated. The use of established infection control procedures, such as masks, gloves and gowns, and proper hand hygiene are important when dealing with these patients.

D. Treatment

TB disease can almost always be cured with appropriate drugs; however, treatment regimens must be followed vigilantly. A specific treatment and monitoring plan is made for each newly diagnosed patient in collaboration with the local health department. This plan includes the treatment regimen, assessment and monitoring for adherence to the regimen, and checking for adverse reactions. Generally, regimens that are adequate for treating pulmonary TB in adults and children are also effective for treating extra pulmonary disease. TB patients usually respond to treatment within a few weeks; however, patients with drug-resistant TB are likely to remain infectious for several weeks or even months.

If hospitalization is required, infectious patients should remain in isolation until TB has been ruled out or the patient is no longer considered infectious. A TB patient is no longer considered infectious if he or she has been on effective therapy, has shown clinical improvement, and has had three consecutive negative sputum smears collected on three separate days.

Patients with TB disease need to be closely monitored for response to therapy through regular bacteriologic testing. If patients have unresolved symptoms or have cultures that have not become negative after three months, they should be reevaluated for failure to adhere to drug regimens, as well as for potential drug-resistant disease.

Identifying drug resistance as early as possible is crucial in ensuring appropriate treatment. In recent years, strains of *M. Tuberculosis* that are resistant to one or more drugs have become a serious concern. Multi-drug resistant, or MDR-TB has organisms resistant to the two most powerful drugs available for treating the disease, isoniazid and rifampin. Patients with MDR-TB require treatment that is two to four times as long as regular TB treatment, and may experience more severe side effects. Some facilities isolate patients with MDR-TB throughout their hospitalization since they are more likely to suffer from relapse or treatment.
failure. Infectiousness in these patients may last several weeks or even months, and cure rates for patients with MDR-TB are lower.

E. Discharge

1. Determining Close Contacts

Patients who are suspected of having infectious TB may be discharged once they have started therapy. However, before discharge, facility personnel and discharge planners should determine whether there are any close contacts; that is, members of the patient’s household that may have been exposed, or are at very high risk for TB disease if exposed and infected. If there are high risk people in the household, arrangements should be made to prevent their exposure to the TB patient until the patient is no longer considered infectious.

The health department will also investigate contacts and determine if they have been infected. If the contacts are infected, they will be evaluated for treatment of latent TB or active disease as appropriate.

2. Patient Education

Prior to discharge, TB patients must understand why their treatment is important, be able to recognize potential side effects, and know where to seek immediate medical assistance should side effects develop. All patients receiving isoniazid, rifampin, or pyrazinamide should be instructed to stop taking the medications if experiencing any hepatitis-like symptoms such as nausea, yellowish skin, or vomiting and to immediately report these symptoms. Patient education is also crucial in helping patients understand the need for adherence to treatment and acknowledge the consequences for not doing so. Re-emphasize infection control procedures that should be practiced at home to contain the spread of aerosolized infectious droplet nuclei while still infectious.

3. Directly Observed Therapy

All TB patients should be referred for Directly Observed Therapy, or DOT. DOT is considered the standard of care for TB treatment, and involves a trained health care provider monitoring the patient to make sure they take all of their anti-TB medication. This has great benefit to the patient since the patient is more likely to respond to and complete therapy, and has benefit to the community, since rates of drug-resistance in the community decrease. We should not assume that patients will take every dose of their medication on their own.
DOT is essential when:
- Patients are diagnosed with TB disease, as they pose a clear threat to the public health
- Patients are diagnosed with multidrug-resistant TB, as this takes longer to cure than common TB
- Patients are taking methadone or antiretroviral drugs, because certain TB medications can cause potential drug interactions

Since treatment is a lengthy process, monthly clinical evaluations are necessary to determine whether the patient is responding to treatment, and check for adverse drug reactions, which can be severe.

F. Reporting

All health care facilities should work closely with the appropriate public health authorities by promptly reporting suspected cases of TB – with or without positive smears or cultures. Immediate reporting is important to assist discharge and placement planning, initiate community contact investigations, and make provisions for continued treatment monitoring.
VIII. WORK PRACTICE CONTROLS FOR THE HEALTH CARE PROVIDER

As a health care provider, it is crucial that you understand your role in the control of TB.

Prevention of TB applies not only to your patients, but to yourself as well. There are certain work practices that, when implemented effectively, will reduce your risk of exposure. These include: pre-employment evaluation for TB infection and disease; familiarizing yourself with your facility’s policies and protocols that reduce the risk of exposure; being familiar with the type and proper use of personal protective equipment; conducting periodic skin testing for evidence of exposure; and reporting symptoms suggestive of TB.

A. Employment Screening

Each facility conducts a risk assessment to determine which health care providers have the potential to be exposed to TB, and the frequency with which this exposure may occur. With this information, the facility will determine which providers to include in a skin testing program and how often they should be tested while employed.

Health care providers who may be at high risk of exposure on the job may include part-time, full-time, and casual employees who:

- Are in contact with or provide care for persons with known or suspected TB disease
- Work with or handle laboratory specimens that may contain *Mycobacterium tuberculosis* or perform autopsies
- Work in homeless shelters, correctional facilities, or other high-risk settings defined locally

A pre-employment evaluation is used to rule out active TB, identify individuals who have been previously infected and may benefit from treatment of latent TB infection, and serves as a baseline if exposure should take place. (See Table 4, Page 27)

Periodic skin testing is used to promptly identify health care providers who may have been exposed to TB on the job. Any provider who develops symptoms of TB disease or who has a skin test convert to positive should be evaluated as soon as possible.

If active pulmonary or laryngeal disease is suspected in an employee, they must not be allowed to work until active disease has been ruled out, or they have been appropriately treated and determined to be no longer infectious. If no active disease is detected, the provider should be evaluated and considered for treatment of latent TB infection.
B. **BCG Vaccination**

The use of the Bacille Calmette Guerin, or BCG, vaccine is usually not recommended in the US due to the low risk of exposure to TB, poor vaccine efficacy in preventing pulmonary TB, and potential interference with tuberculin skin test results. Some countries and settings may consider BCG for health care providers if the risk of exposure to drug resistant strains of TB is high, and infection control precautions are not adequate. There are additional precautions to consider: HIV- infected persons should not receive this vaccine because of potential adverse effects.

C. **Policies and Procedures**

As a health care provider, it is critically important that you familiarize yourself upon employment with specific policies and procedures in your facility that are designed to prevent the spread of TB.

- **Know the signs and symptoms of TB.** If you suspect a patient has TB, isolate them away from others until the diagnosis can be determined, preferably in an AFB isolation room.

- **Learn how to recognize AFB isolation rooms.** Proper signage will tell you where to isolate patients and will warn you not to enter rooms without proper respiratory protection.

- **Know what to do before entering an AFB isolation room.** Do you know where to find the appropriate respiratory protection? Workers who enter AFB isolation rooms are assigned N95 respirators as part of their personal protective equipment. The respirator will be fit tested to ensure that it provides an adequate seal.

- **Know how and when to use respiratory protection.** All health care providers, who are likely to enter an AFB isolation room or other setting with potentially infectious patients, need to know the proper way to don respiratory protection and to ensure that it fits properly.

- **Know how to protect your own health.** If you are considered at risk for exposure and previously tested negative, you should take part in tuberculin skin testing regularly according to your level of risk. If you tested positive, you should be routinely reminded of the signs and symptoms of active TB disease, and if you experience any symptoms, you must report them promptly to your supervisor or employee health service.
IX. **Summary**

In our efforts to keep TB numbers down, we must keep our level of suspicion up.

As health care providers, we must continue our vigilance, maintain a high index of suspicion and understand the importance of our role in controlling TB. Our goal is to reduce the likelihood of exposure to active TB, and our role as health care providers is critical to keeping our patients, and ourselves, safe from this disease.

By understanding how TB is transmitted; identifying risk factors for infection and disease; recognizing the signs and symptoms of TB; learning how to identify infectious patients early; ensuring that patients are appropriately treated and isolated until no longer infectious; and instituting appropriate control measures such as the use of AFB isolation rooms and respiratory protection equipment, we can continue to add to our success in the decline of this disease.
X. Post-Test

1. T / F. TB exposure occurs when a susceptible person inhales M. tuberculosis bacteria carried through the air in small droplet nuclei.

2. Persons who have a high risk of TB exposure and infection include:
   A. Those who have close contact with persons who have active TB
   B. High-risk, medically underserved people such as homeless persons and migrant farm workers
   C. Illicit drug users
   D. All of the above

3. TB should be suspected in any patient exhibiting all of the following except:
   A. Productive, persistent cough lasting three weeks or more
   B. Chest pain
   C. Unexplained weight gain
   D. Fatigue or weakness

4. As soon as symptoms are suspected, and until the patient can be isolated, the patient should:
   A. Be instructed to cover his or her mouth with tissues at every cough
   B. Be asked to remain in the bathroom until placed in an isolation room
   C. Be given a respirator to wear until placed in an appropriate isolation room
   D. All of the above

5. T /F. The majority of TB cases fail to show positive cultures of sputum, tissue or other samples, despite the presence of symptoms.

6. The following patients should be considered potentially infectious:
   A. Patients who are coughing
   B. Patients who have positive AFB sputum smears
   C. Patients who have just started therapy
   D. All of the above

7. The respiratory AFB, or acid-fast bacilli, isolation room should be a private room with all of the following except:
   A. Air exhausted directly to the outside
   B. Positive pressure
   C. Adequate ventilation
   D. Visible monitor

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8. All health care providers who are likely to enter an AFB isolation room or other setting with potentially infectious patients need to:
   A. Wear the proper respiratory protection
   B. Know the proper way to don respiratory protection
   C. Fit check to ensure that the mask fits properly every time it is worn
   D. All of the above

9. A TB patient is no longer considered infectious if:
   A. He or she has been on effective therapy
   B. Has shown clinical improvement
   C. Has had three consecutive negative sputum smears collected on three separate days
   D. All of the above

10. T / F. Facilities conduct TB risk assessments to determine which workers to include in skin testing programs and how often they should be tested.
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Updated guidelines for the use of rifabutin or rifampin for the treatment and prevention of tuberculosis among HIV-infected patients taking protease inhibitors or nonnucleoside reverse transcriptase inhibitors; MMWR Weekly, March, 2000, CDC, www.cdc.gov/epo/mmwr/preview/mmwrhtml/mm4909a4.htm


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XII. Tools

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Table 1
TB Infection vs. TB Disease

<table>
<thead>
<tr>
<th>TB Infection</th>
<th>TB Disease (in the lungs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubercle bacilli in the body</td>
<td></td>
</tr>
<tr>
<td>Tuberculin skin test reaction usually positive</td>
<td></td>
</tr>
<tr>
<td>Chest x-ray usually <strong>normal</strong></td>
<td>Chest x-ray usually <strong>abnormal</strong></td>
</tr>
<tr>
<td>Sputum smears and cultures <strong>negative</strong></td>
<td>Sputum smears and cultures <strong>positive</strong></td>
</tr>
<tr>
<td><strong>No symptoms</strong></td>
<td><strong>Symptoms</strong> such as cough, fever, weight loss</td>
</tr>
<tr>
<td><strong>Not infectious</strong></td>
<td><strong>Often infectious</strong> before treatment</td>
</tr>
<tr>
<td><strong>Not a case of TB</strong></td>
<td><strong>A case of TB</strong></td>
</tr>
</tbody>
</table>

http://www.phppo.cdc.gov/phln/tbmodules/modules1-5/m1/con6a1.htm
Table 2  
Groups at High Risk for TB

<table>
<thead>
<tr>
<th>People at Higher Risk for Exposure or Infection</th>
<th>People at Higher Risk for TB Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Close contacts of people with infectious TB</td>
<td>• People with HIV infection</td>
</tr>
<tr>
<td>• People born in areas of the world where TB is common (for example, Asia, Africa, or Latin America)</td>
<td>• People with other medical conditions that appear to increase the risk for TB</td>
</tr>
<tr>
<td>• Elderly people</td>
<td>• People recently infected with <em>M. tuberculosis</em> (within the past 2 years)</td>
</tr>
<tr>
<td>• Low-income groups with poor access to health care, including homeless people</td>
<td>• People with chest x-ray findings suggestive of previous TB disease</td>
</tr>
<tr>
<td>• People who inject illicit drugs</td>
<td>• People who inject illicit drugs</td>
</tr>
<tr>
<td>• People who live or work in residential facilities (for example, nursing homes or correctional facilities)</td>
<td></td>
</tr>
<tr>
<td>• Other people who may be exposed to TB on the job (for example, some health care workers)</td>
<td></td>
</tr>
<tr>
<td>• People in other groups as identified by local public health officials</td>
<td></td>
</tr>
</tbody>
</table>

http://www.phppo.cdc.gov/phtn/tbmodules/modules1-5/m2/2-m-02.htm
Table 3
Protocol for conducting a TB risk assessment in a health care facility

Review community TB profile and review number of TB patients examined as in patients or out patients at the facility.

- No TB patients in facility or community: Minimal risk
- TB patients in facility or community: Analyze (by area and occupational group) purified protein derivative (PPD) test data, number of TB patients, and other risk factors.

<table>
<thead>
<tr>
<th>HCW PPD conversion rate in area or group significantly higher than rates for areas or groups in which occupational exposure to Mycobacterium tuberculosis is unlikely, or than previous rate in same area or group?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster of HCW PPD conversions?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Evidence of person-to-person transmission?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

No TB patients admitted as inpatients to facility during preceding year and plan to refer patients with confirmed or suspected TB to a collaborating facility if inpatient care is required: Very low risk

Fewer than six TB patients admitted to area during preceding year: Low risk

Six or more TB patients admitted to area during preceding year: Intermediate risk

Evaluate cause(s) of transmission.

- Yes: Repeat PPDs and risk assessment at 3 mos.
- No: Reassess interventions.

PPD conversions or other evidence of transmission?

- Yes: Obtain consultation
- No: Resume appropriate lower-risk protocol.

http://wonder.cdc.gov/wonder/prevguid/m0035909/m0035909.asp
Table 4
Two-step testing

Baseline skin test

Reaction

Positive

Person probably has TB infection

Retesting not necessary

Negative

Retest 1-3 weeks later

Person probably does NOT have TB infection

Retest at regular intervals, a positive reaction will probably be due to recent TB infection

Negative

Reaction

Positive

The reaction is considered a boosted reaction (due to TB infection that occurred a long time ago)

Retesting not necessary

http://www.phppo.cdc.gov/phn/tb/modules/modules1-5/m3/3-m-05.htm
Respirator Program Evaluation Checklist

In general, the respiratory protection program should be evaluated for each job or at least annually, with program adjustments, as appropriate, made to reflect the evaluation results. Program function can be separated into administration and operation.

A. Program Administration
___ (1) Is there a written policy which acknowledges employer responsibility for providing a safe and healthful workplace, and assigns program responsibility, accountability, and authority?
___ (2) Is program responsibility vested in one individual who is knowledgeable and who can coordinate all aspects of the program at the healthcare facility?
___ (3) Can administrative and engineering controls eliminate the need for respirators?
___ (4) Are there written procedures/statements covering the various aspects of the respirator program, including:
   ___ (a) designation of an administrator;
   ___ (b) respirator selection;
   ___ (c) purchase of NIOSH certified respirators;
   ___ (d) medical aspects of respirator usage;
   ___ (e) issuance of equipment;
   ___ (f) fitting;
   ___ (g) training;
   ___ (h) maintenance, storage, and repair;
   ___ (i) inspection;
   ___ (j) use under special conditions; and
   ___ (k) work area surveillance?

B. Program Operation
___ (1) Respiratory protective equipment selection
   ___ (a) Are work area conditions and worker exposures properly surveyed?
   ___ (b) Are respirators selected on the basis of the hazard to which the worker is exposed?
   ___ (c) Are selections made by individuals knowledgeable in proper selection procedures?
___ (2) Are only NIOSH certified respirators purchased and used; do they provide adequate protection for the specific hazard?
___ (3) Has a medical evaluation of the prospective user been made to determine physical and psychological ability to wear the selected respiratory protective equipment?
___ 4) Where practical, have respirators been issued to the users for their exclusive use, and are there records covering issuance?
___ (5) Respiratory protective equipment fitting
   ___ (a) Are the users given the opportunity to try on several respirators to determine whether the respirator they will be subsequently wearing is the best fitting one?
   ___ (b) Is the fit tested at appropriate intervals?
(c) Are those users who require corrective lenses properly fitted?
(d) Is the facepiece-to-faceseal tested in a test atmosphere?
(e) Are workers prohibited from wearing respirators in contaminated work areas when they have facial
hair or other characteristics which may cause face seal leakage?
(6) Respirator use in the work area
(a) Are respirators being worn correctly (i.e., head covering over respirator straps)?
(b) Are workers keeping respirators on all the time while in the designated areas?
(7) Maintenance of respiratory protective equipment
Cleaning and Disinfecting
(a) Are nondisposable respirators cleaned and disinfected after each use when different people use the
same device, or as frequently as necessary for devices issued to individual users?
(b) Are proper methods of cleaning and disinfecting utilized?
Storage
(a) Are respirators stored in a manner so as to protect them from dust, sunlight, heat, damaging
chemicals, or excessive cold or moisture?
(b) Are respirators stored in a storage facility so as to prevent them from deforming?
(c) Is storage in lockers permitted only if the respirator is in a carrying case or carton?
Inspection
(a) Are respirators inspected before and after each use and during cleaning?
(b) Are qualified individuals/users instructed in inspection techniques?
(c) Are records kept of the inspection of respiratory protective equipment?
Repair
(a) Are replacement parts used in repair those of the manufacturer of the respirator?
(b) Are repairs made by trained individuals?
(8) Training and Feedback
(a) Are users trained in proper respirator use, cleaning, and inspection?
(b) Are users trained in the basis for selection of respirators?
(c) Are users evaluated, using competency-based evaluation, before and after training?
(d) Are users periodically consulted about program issues (e.g., discomfort, fatigue, etc.)
Related Health Care Products
Available from 3M

RESPIRATORS AND MASKS

#1860, 3M™ Health Care N95 Particulate Respirator and Surgical Mask, regular size
#1860S, 3M™ Health Care N95 Particulate Respirator and Surgical Mask, small size
#1800+, 3M™ Aseptex™ Molded Surgical Mask
#1800+NL, 3M™ Aseptex™ Molded Surgical Mask (non-latex)
#1816, 3M™ Standard Tie-On Mask
#1818, 3M™ Tie-On Surgical Mask
#1818FS, 3M™ Surgical Mask with Face Shield
#1820, 3M™ Earloop Fluid Resistant Face Mask
#1826, 3M™ Standard Earloop Mask
#1838, 3M™ Filtron™ High Performance Surgical Mask
#1838FS, 3M™ Filtron™ High Performance Surgical Mask with Face Shield
FT-10, 3M™ Qualitative Fit Test Apparatus, Sweet - Includes sensitivity and test solutions, nebulizer and test hood
FT-30, 3M™ Qualitative Fit Test Apparatus, Bitter - Includes sensitivity and test solutions, nebulizer and test hood

HAND ANTISEPTIC / SKIN CARE

#9221, Avagard™ D Instant Hand Antiseptic (Personal Size)
#9222, Avagard™ D Instant Hand Antiseptic (Pump Bottle)
#9200, 3M™ Avagard™ (Chlorhexidine Gluconate 1% Solution and Ethyl Alcohol 61% w/w) Surgical and Healthcare Personnel Hand Antiseptic with Moisturizers
#9205, 3M™ Cavilon™ Moisturizing Lotion - CHG Compatible

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Visit the 3M web site at www.3M.com/healthcare.