Tuberculosis
Understanding, Investigating, Eliminating

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Objectives
At the conclusion of this presentation, you will be able to:
1. Describe how Tuberculosis is spread.
2. List the common signs and symptoms of Tuberculosis.
3. Understand how to test for Tuberculosis.
4. Explain how to best serve clients with Tuberculosis.

What is Tuberculosis?
Tuberculosis (TB) is caused by a bacteria called Mycobacterium tuberculosis.

Tuberculosis usually affects the lungs but can present in other parts of the body. Extrapulmonary TB is not infectious.

Some common extrapulmonary sites are: lymph nodes, abdominal fluid, brain, kidneys and bones.

Source: Centers for Disease Control, 2017
In the past, TB was known as Consumption and the Great White Plague due to the weight loss and pale appearance common in TB disease.

Urban legends of the late 1800s led to the belief that TB was linked to vampirism. The weight loss and fatigue of TB sufferers was attributed to a recently deceased person feeding off the life force of the living.

During the late 1800s and early 1900s, sufferers of TB Disease were often sent to isolated medical facilities called sanatoriums. Sunlight and fresh air were commonly prescribed treatments.
TB History

Throughout World War I, Tuberculosis was the leading cause of discharge for disability, accounting for 13.5 percent of all discharges (Long, 1958).

TB Today
Although TB is preventable and now treatable with antibiotics, it is still one of the deadliest diseases in the world.
It is estimated that 1/3 of the world's population is infected with Tuberculosis bacteria.
Over a million people will die of TB disease worldwide each year.

Source: Centers for Disease Control, 2017
Tuberculosis Transmission

TB bacteria are spread through the air from one person to another when a person with TB disease of the lungs:

• Coughs
• Sneezes
• Laughs
• Sings

People nearby may breathe in these bacteria and become infected.

TB is NOT spread by:

• shaking someone's hand
• sharing food or drink
• touching bed linens or toilet seats
• sharing toothbrushes
• kissing

Source: Centers for Disease Control, 2017
What happens when TB infects the body?

In most cases, infection by TB bacteria will not cause sickness and disease. The immune system is usually able to contain the bacteria and can do so for long periods of time.

This is known as TB Infection.

When the immune system is not successful in containing the TB bacteria, an individual will get sick and potentially infectious.

This is known as TB Disease.

Personal Protective Equipment

Medical masks will prevent the spread of TB germs

- N95 for staff
- Surgical mask for client

Tuberculosis Transmission

Environmental Factors that Enhance the Probability that M. tuberculosis Will Be Transmitted

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
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<tbody>
<tr>
<td>Concentration of</td>
<td>The more low in the air, the more likely that M. tuberculosis will be transmitted</td>
</tr>
<tr>
<td>infectious particulates</td>
<td></td>
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<tr>
<td>Spores</td>
<td>Exposure to very small infectious particles</td>
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<tr>
<td>Ventilation</td>
<td>Reduces local or general ventilation that results in healthier work or removal of infectious droplet nuclei</td>
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<tr>
<td>Air circulation</td>
<td>Recirculation of air containing infectious droplet nuclei</td>
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<tr>
<td>Specimen handling</td>
<td>Improper specimen handling procedures that provide infectious droplet nuclei</td>
</tr>
<tr>
<td>Aerosolization</td>
<td>Exhalation of infectious particles on fine droplet nuclei</td>
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</tbody>
</table>

Source: Centers for Disease Control, 2017
TB Risk Factors

- Immigrants and refugees from countries with high rates of TB
- Children less than 5 years of age who have a positive TB test
- Homeless persons
- Injection drug users
- Persons who work or reside at homeless shelters, correctional facilities and nursing homes
- Those with certain medical conditions:
  - HIV
  - Diabetes
  - Any condition or treatment that weakens the immune system

Source: Kansas Department of Health, 2017

TB and HIV

Among people with latent TB infection, HIV infection is the strongest known risk factor for progressing to TB Disease.

TB Disease can develop quickly in people living with HIV since the immune system is already weakened. And without treatment, TB Disease can progress from sickness to death.

Worldwide, TB is one of the leading causes of death among people living with HIV.

Source: Centers for Disease Control, 2017

TB Assessment

A medical assessment for TB may include:

- TB skin test
- TB blood test
- Medical/Social history
- Symptom assessment
- Chest x-ray
- Sputum specimen samples
  - Acid fast bacilli smear
  - Mycobacterium culture
Assessment: TB Skin Test

Intradermal injection that is read at 48-72 hours.

Measure induration NOT redness.

Assessment: TB Blood Test

Interferon-gamma release assays (IGRAs) are blood tests that measure a person’s immune reactivity to TB bacteria.

There are 2 different IGRA test available in the US: QuantiFERON-TB Gold In-Tube and T-SPOT.

They do NOT help differentiate TB Infection from TB disease.

Assessment: Symptoms of Pulmonary TB Disease

- Cough
- Coughing up blood
- Chest pain
- Fever
- Pains in the chest
- Night sweats
- Weight loss
Assessment: Chest X-ray

A chest x-ray is indicated any time a patient has a positive IGRA or TST or exhibits signs and symptoms of TB Disease.

The chest x-ray will usually appear abnormal when a patient has TB Disease in the lungs. Infiltrates and cavities are common in TB Disease.

A chest x-ray cannot confirm that a person has TB Disease.

Assessment: Sputum Specimens

Sputum will be sent to a laboratory where several different tests will be performed:

1. Microscopic examination will be performed on a smear looking for acid-fast bacilli (AFB). AFBs observed would indicate that some type of mycobacterium is present.
2. If AFBs are seen on smear then specific DNA testing will be done to confirm TB.
3. Specimens are then cultured for 6-8 weeks in order to identify TB. All specimens should be cultured regardless of AFB smear or DNA test results.
4. Any cultures that grow TB will also be tested for drug sensitivity.

To prevent the spread of TB bacteria, sputum should be collected in an isolated, well ventilated area or special collection booth.
TB Infection or TB Disease?

**TB Infection**
- Positive skin test or blood test indicating TB
- Normal chest x-ray and/or negative sputum tests
- Do NOT feel sick and no TB signs/symptoms
- CANNOT spread TB bacteria to others

**TB Disease**
- Positive skin test or blood test indicating TB
- May have an abnormal chest x-ray and/or positive sputum results
- May feel sick and have signs/symptoms of TB
- May be able to spread TB bacteria to others

Before starting treatment for TB Infection make certain that TB Disease has been ruled out.

90% of individuals with TB Infection will never convert to TB Disease.

**BUT**
Treatment of latent TB infection is essential to controlling and eliminating TB.

**BUT**
Before starting treatment for TB infection make certain that TB Disease has been ruled out.

TB Infection: Treatment
TB infection is treated to prevent progression to TB disease.

**Standard Treatment Regimens**
- Isoniazid (INH) - daily for 6-9 months.
- 3HP - combination regimen of isoniazid (INH) and rifapentine (RPT) given in 12 once-weekly doses under observation by medical staff.
- Rifampin (RIF) - given daily for 4 months.

Source: Centers for Disease Control, 2017
TB Infection: Addressing Barriers to Compliance

- Length of treatment
- Side effects
- Language
- Transportation
- Hours available

TB Disease

Requires immediate intervention to stop the spread of disease and prevent further individuals from being exposed.

A contact investigation may be indicated to assess for individuals exposed that could have TB Infection and/or be high risk for rapid progression to TB Disease.

Case management for a TB Disease case is much more involved than with TB Infection.

TB Disease: First-Line TB Medications

- Isoniazid (INH)
- Rifampin
- Pyrazinamide (PZA)
- Ethambutol
- Vitamin B6
The most effective strategy to ensure adherence to TB Disease treatment is through directly observed therapy (DOT). With DOT, a health care worker observes the patient take the TB medication. The health care worker also asks the patient about any problems or side effects with the medication.

When an individual has TB Disease and is deemed infectious they are placed in isolation. Usually at their residence. Only allowed to be outside place of isolation in very specific circumstances. Not allowed to go to work or school and cannot be around others without wearing a mask until the health department assesses that there is no risk to the public.

Fear of discrimination can mean people with TB symptoms delay seeking help, making it much more likely that they will become seriously ill and infect others (TB Alert, 2017). In areas of high HIV occurrence, where HIV and TB co-infection is common, the link between the two diseases has contributed to the stigmatization of TB (Courtwright, 2010).
References


