Tuberculosis (TB)

Mary Torrieri, MSN, RN
Public Health Nurse Manager
Rappahannock Area Health District
Agenda

• Overview of TB
  • Facts
  • Epidemiology
  • How TB is spread
  • TB screening and testing
  • Interpretation of TB test results
  • TB treatment
• Questions
Famous People with Tuberculosis

Eleanor Roosevelt
Wife of Franklin D. Roosevelt, 32nd President of the U.S.

Vivien Leigh
Scarlett O’Hara, Gone with the Wind in 1939

John Henry ‘Doc’ Holliday
American gambler, gunfighter, dentist and good friend of Wyatt Earp

Val Kilmer as Doc Holliday in Tombstone
Tuberculosis Facts

• In 2017, about 10 million people were diagnosed with active TB
• 1 person dies from TB every 21 seconds (1.8 million/year)
• Each year an estimated 1 million children have TB and 170,000 of them die from it.
• TB is the leading killer from a single infectious disease (9th leading cause of death worldwide overall)
• TB is a leading killer of people who are HIV infected (35% of deaths of people infected with HIV)
Estimated TB Incidence Rates, 2017
### High Burden TB Country List 2019

*Countries with TB incidence rates of ≥ 100/100,000 population*

Data obtained from 2018 WHO Global Tuberculosis Report and reflects 2017 data.

<table>
<thead>
<tr>
<th>Country</th>
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<tbody>
<tr>
<td>Afghanistan</td>
<td>Djibouti</td>
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<tr>
<td>Algeria</td>
<td>Dominican Republic</td>
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<td>Angola</td>
<td>Ecuador</td>
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<td>Benin</td>
<td>Botswana</td>
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<td>Bhutan</td>
<td>Burundi</td>
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<td>Bolivia</td>
<td>Brazil</td>
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<td>Cambodia</td>
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<td>Canada</td>
<td>Central African Republic</td>
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<td>Chad</td>
<td>China</td>
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<td>China, Hong Kong SAR</td>
<td>China, Macao SAR</td>
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<td>Colombia</td>
<td>Costa Rica</td>
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<tr>
<td>Côte d’Ivoire</td>
<td>Democratic Republic of the Congo</td>
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<tr>
<td>Djibouti</td>
<td>Democratic People’s Republic of Korea</td>
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<tr>
<td>Equatorial Guinea</td>
<td>Eritrea</td>
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<tr>
<td>Eswatini (formerly Swaziland)</td>
<td>Estonia</td>
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<tr>
<td>Ethiopia</td>
<td>Falkland Islands</td>
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<td>Fiji</td>
<td>Faroe Islands</td>
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<td>France</td>
<td>French Polynesia</td>
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<td>Germany</td>
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<td>Ghana</td>
<td>Greece</td>
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<td>Israel</td>
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<td>Japan</td>
<td>Jordan</td>
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<td>Jordan (continued)</td>
<td>Kazakhstan</td>
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<tr>
<td>Korea, Democratic People’s Republic</td>
<td>Korea, Republic of</td>
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<td>Korea, Republic of (continued)</td>
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<tr>
<td>Mauritius</td>
<td>Mauritius (continued)</td>
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<td>Mexico</td>
<td>Micronesia (Federated States of)</td>
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<td>Moldova (Republic of)</td>
<td>Mongolia</td>
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<td>Morocco</td>
<td>Mozambique</td>
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<tr>
<td>Namibia</td>
<td>Nepal</td>
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</tbody>
</table>
| Nepal (continued) | Netherlands (

Persons from these countries should be screened for TB and TB infection. Persons from countries not found on this list should only be tested if symptomatic or if they have risk factors.

*Updated 12/28/2018 VDH TB Program*
Reported Tuberculosis Cases, United States, 1982-2017

9,093 Cases
Rate 2.8/100,000
Tuberculosis in Virginia, 2007 - 2017

Number of Cases

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
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<tr>
<td>2007</td>
<td>309</td>
</tr>
<tr>
<td>2008</td>
<td>292</td>
</tr>
<tr>
<td>2009</td>
<td>273</td>
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<td>2010</td>
<td>268</td>
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<td>2011</td>
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<td>2012</td>
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<td>2013</td>
<td>180</td>
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<td>2014</td>
<td>198</td>
</tr>
<tr>
<td>2015</td>
<td>212</td>
</tr>
<tr>
<td>2016</td>
<td>203</td>
</tr>
<tr>
<td>2017</td>
<td>205</td>
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</table>

205 Cases
Rate 2.4/100,000
Basic Tuberculosis (TB) Facts

- TB is caused by a bacterium called *Mycobacterium tuberculosis* (*MTB*).
- TB is spread from person-to-person through the air when someone with the active disease in their lung coughs, sneezes, shouts or sings.
Basic Tuberculosis (TB) Facts

• “Vampire Panics”
• Dr. Robert Koch announced the discovery of M. Tuberculosis on March 24, 1882.
• During that time, TB killed 1 out of every 7 people living in the U.S. and Europe.

Dr. Robert Koch
Sites of TB Disease

Pulmonary 80%

Extrapulmonary

Laryngeal TB is VERY contagious

Symptoms will vary dependent on site
Basic Tuberculosis (TB) Facts

- Not everyone infected with TB bacteria becomes sick
- It is estimated that 10% of those infected with TB will progress to active TB disease
- As a result, two TB-related conditions exist:

  90% Latent TB Infection
  10% TB Disease
Transmission

TB is spread when a person with active TB disease coughs, sings, speaks and you breathe the air contaminated with the TB germs.
Transmission

Person with active pulmonary TB

TB bacteria becomes airborne

Person breathing TB bacteria
TB is **NOT** spread by

- Quick, casual contact, like passing someone on the street
- Sharing cigarettes or drinking containers
- Exchanging saliva or other body fluids
- Sharing utensils or food
- Shaking hands
- Kissing
- Using public telephones
PREVENT DISEASE

CARELESS
Spitting, Coughing, Sneezing,
Spread INFLUENZA
and TUBERCULOSIS

TUBERCULOSIS

DON'T KISS ME!

YOUR KISS OF AFFECTION
THE GERM OF INFECTION

Rensselaer County Tuberculosis Association, Troy, N.Y.

c. 1925

c. 1936
Hundreds Die of Consumption
BECAUSE
SPITTING SPREADS DISEASE
Do not spit yourself--Ask others to stop

ISSUED BY THE
VIRGINIA ANTI-TUBERCULOSIS ASSOCIATION
1110 Capitol Street, Richmond, Va.
WRITE FOR INFORMATION ON CONSUMPTION

C. 1920s
“Shared air” is a concept used in TB investigations. It means a person must share air with an active TB case to be exposed to the TB germ.

You can’t “take TB home” to your family just by being exposed.
• TB germs are breathed in and reach your lungs
• From the lungs, TB germs may spread through the bloodstream to other parts of your body
• The immune system begins to recognize and fight TB germs
• If your immune system is working well, it eventually surrounds the TB germs, keeping you well
Latent Tuberculosis Infection (LTBI)

- Most people infected with the Tuberculosis bacteria have Latent Tuberculosis Infection
- Only about 10% of people infected with the Tuberculosis bacteria will progress to Active Tuberculosis
Difference Between LTBI and TB Disease

A Person with LTBI
- Does not feel sick
- Cannot spread TB germs to others
- Has a normal chest x-ray
- Needs treatment for LTBI to prevent active TB disease

A Person with Active TB
- Usually feels sick
- May spread TB germs to others
- May have abnormal chest x-ray
- Needs treatment to treat active TB disease
Difference Between LTBI and TB Disease

A Person with LTBI
- No symptoms

A Person with Active TB
- Symptoms may include
  - Persistent cough (>3 weeks)
  - Fatigue
  - Weight loss
  - Fever
  - Chills
  - Night sweats
  - Chest pain
  - Blood in sputum
TUBERCULOSIS also known as TB

https://youtu.be/9112brXCOVc
TB Screening vs TB Testing

Screening is an interview to evaluate for

- Symptoms of TB
- Risk for exposure
- Risk for progression to disease AND then......
- A decision is made regarding the need for testing
TB Screening

Reviews Risk

- TB symptom review
- Risk for TB Infection
- Risk for progression to TB disease

VDH TB Risk Assessment Form (TB 512)
Risk Factors for Acquiring LTBI

- Contact to person with active TB disease
- Lived in or visited high burden TB country ≥ 3 months
- Resident/employee of high TB risk congregate setting, correctional facilities, nursing homes, homeless shelters.
- Healthcare worker serving high-risk clients
- Medically underserved
- Homeless in the past two years
- Infant, child, adolescent exposed to adults in high-risk categories
- Injects illegal drugs
Risk Factors for Developing TB Disease if Infected

- HIV positive
- Risk for HIV infection, but HIV status unknown
- Recently infected with Mycobacterium tuberculosis
- Certain medical conditions
  - including substance abuse, chest x-ray findings that suggest previous TB, diabetes mellitus, silicosis, prolonged corticosteroid therapy, cancer of the head and neck, leukemia, lymphoma, hematologic and reticuloendothelial diseases, end stage renal disease, intestinal bypass or gastrectomy, and chronic malabsorption syndromes.
- >10% below ideal body weight
- Immunosuppressive therapy
  - TNF-a antagonist (Remicaid, Humira, etc.), prednisone \( \geq 1 \) month \( \geq 15 \text{ mg/day} \)
If the patient has any risk factors, then...

What do we do?
TB Testing

A TB Skin Test (TST) or blood test is the only way you can tell if you have *TB infection*

- **TST**: An antigen (protein) is injected just under the skin and forms a wheel or bubble beneath the skin.
- **Blood test**: Blood is drawn from the arm and sent to a lab
## TST and IGRA - a comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>TST</th>
<th>IGRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires a functioning immune system</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Identify TB infection</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Diagnose LTBI (with further evaluation)</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Boosting</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Cross reacts with BCG</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Single visit</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Reader bias</td>
<td>Possible</td>
<td>NO</td>
</tr>
<tr>
<td>Data on use</td>
<td>Plenty</td>
<td>Limited</td>
</tr>
<tr>
<td>Use with children &lt;2</td>
<td>Preferred</td>
<td>Caution</td>
</tr>
</tbody>
</table>

Routine testing with both is **not** recommended.
What happens if there is a positive TST or blood test?

TB or Not TB...

Chest x-ray to help determine if you have TB infection (also called Latent TB Infection or LTBI) or TB disease
LTBI vs Active Tuberculosis

**LTBI**
- No symptoms
- Normal chest x-ray

**Active Tuberculosis**
- May have symptoms
- Abnormal chest x-ray
- ...then...
- Collect sputum specimens
- Isolate
Tuberculosis (TB) Disease: Only the Tip of the Iceberg

There are two types of TB conditions: TB disease and latent TB infection.

People with TB disease are sick from active TB germs. They usually have symptoms and may spread TB germs to others.

People with latent TB infection do not feel sick, do not have symptoms, and cannot spread TB germs to others.

But, if their TB germs become active, they can develop TB disease.

Millions of people in the U.S. have latent TB infection. Without treatment, they are at risk for developing TB disease.

To learn more about TB, visit www.cdc.gov/tb
Remember....

- If you have TB infection, you cannot spread TB germs to others
- If you have a positive TST or blood test, it does not mean you have active TB disease
• There are medications to treat LTBI and active TB disease
• Taking TB medications as prescribed is very important to help the patient get better and to prevent the spread of TB germs to others
• Completing treatment for LTBI lowers the likelihood of progression to active TB disease from about 10% to about 1-2%
# LTBI Treatments

- Positive TST or IGRA
- Asymptomatic
- Negative chest x-ray

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Length of treatment</th>
<th># of Doses</th>
<th>Approval</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifapentine/Isoniazid</td>
<td>900 mgs 900 mgs</td>
<td>Once weekly by DOT</td>
<td>3 months</td>
<td>12</td>
<td>2010</td>
</tr>
<tr>
<td>Rifampin</td>
<td>600 mgs/daily</td>
<td>4 months</td>
<td>120</td>
<td>2000</td>
<td>Any</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>300 mgs/daily</td>
<td>9 months (6 mths)</td>
<td>270 (180)</td>
<td>1965</td>
<td>Any</td>
</tr>
</tbody>
</table>

To test is to treat!
Directly Observed Therapy or DOT

Most effective strategy to ensure adherence to treatment. Patient meets with a health care worker every time they need to take their medications. Patient takes their TB medications while the health care worker watches. Health care worker asks the patient about any problems or side effects with the medication. DOT should be done at a time and place that is convenient for the patient. DOT should be used for all patients with TB disease.
Promoting treatment - Messaging

“Latent TB infection is an infection with a germ that needs treatment with antibiotics to cure”

“Treatment reduces the risk of the germ growing and then making you feel sick”

“No one truly knows who will begin to get sick.

“You feel okay now because the TB bacteria in your body are numbered in the thousands, not the millions.

“TB destroys the organ it grows in; You will not get back what you lose”

“When TB wakes up makes you sick you can infect other people and will need to stay away from your friends and family”
Potential Reasons for Not Wanting Tx

☑ Does not believe in antibiotics
☑ Want to drink alcohol
☑ Has difficulty remembering to take medication
☑ Does not think TB infection is a “big deal”
☑ Drug interactions
☑ “Feel fine”
☑ Has heard that INH can kill your liver
☑ Is pregnant or breastfeeding
☑ “My doctor said I don’t have to”
☑ Transportation
☑ Clinic hours
☑ Work
☑ Family commitments
☑ School
☑ Family/friend advice
☑ Religious beliefs
☑ Does not believe the test is positive
TB Personal Story

How did you find out you had TB?

<table>
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<th>LTBI</th>
<th>Active Tuberculosis</th>
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<tr>
<td>• Does not feel sick</td>
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<td>• Has a normal chest x-ray</td>
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<tr>
<td>• Needs treatment for LTBI to prevent active TB disease</td>
<td>• Needs treatment to treat active TB disease</td>
</tr>
</tbody>
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Resources

- Centers for Disease Control and Prevention (CDC): http://www.cdc.gov/tb/topic/basics/default.htm
- Virginia Department of Health: http://www.vdh.virginia.gov/
- Wikipedia: https://www.wikipedia.org/
Thank you!

Questions?

Recognize possible signs and symptoms of Tuberculosis. Early diagnosis and treatment reduces spread. Contact your Health Department or physician for more information.