Learning Objectives

• Understand Tuberculosis basics and identify methods for detecting *M. tuberculosis* infections

• Understand the considerations to take into account when selecting between a TST and IGRA to test for TB infection

• Understand TB related guidelines in Indiana for the long-term care setting for both residents and staff
TB Background
Tuberculosis

- Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis*
- Usually affects the lungs, but can attack any part of the body
- Divides at a slow rate
TB Basics

• How is it spread?
  • Person-to-person through the air
  • The bacteria is expelled via coughing, speaking, or singing

• Signs and symptoms?
  • Cough greater than three weeks
  • Illustration to the right shows other symptoms
# LTBI Compared to TB Disease

<table>
<thead>
<tr>
<th>Person with LTBI</th>
<th>Person with TB Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has a small amount of TB bacteria in their body that are alive but <strong>inactive</strong></td>
<td>Has TB bacteria that are <strong>active</strong> in their body</td>
</tr>
<tr>
<td>Cannot spread TB bacteria to others</td>
<td>May spread TB bacteria to others</td>
</tr>
<tr>
<td><strong>Does not</strong> feel sick</td>
<td>May feel sick and may have symptoms such as a cough, fever, and/or weight loss</td>
</tr>
<tr>
<td>Usually has a <strong>positive</strong> TB skin test or TB blood test result indicating TB infection</td>
<td>Usually has a <strong>positive</strong> TB skin test or TB blood test result indicating TB infection</td>
</tr>
<tr>
<td>Chest radiograph is typically <strong>normal</strong></td>
<td>Chest radiograph may be <strong>abnormal</strong></td>
</tr>
<tr>
<td>Sputum smears and cultures are <strong>negative</strong></td>
<td>Sputum smears and cultures may be <strong>positive</strong></td>
</tr>
<tr>
<td>Should consider treatment for LTBI to prevent TB disease</td>
<td>Needs treatment for TB disease</td>
</tr>
<tr>
<td><strong>Does not</strong> require respiratory isolation</td>
<td>May require respiratory isolation</td>
</tr>
</tbody>
</table>
Diagnostic Tests for *M. tuberculosis* Infection

Currently there are two methods of testing for *M. tuberculosis* (*M. tb*) infection in the United States.

- Mantoux tuberculin skin test (TST)
- Interferon-gamma release assays (IGRAs)
TST Summary

• If a person is infected, a delayed type of hypersensitivity reaction is detectable two to eight weeks after infection.

• The TST is performed by injecting 0.1 ml of tuberculin purified protein derivative (PPD) between the layers of the skin (intradermally), usually on the forearm.

• The reaction to this test, the induration (the palpable hardened area), is measured 48 to 72 hours after the injection.

• Classification as positive or negative depends on the size of the induration and the patient’s risk factors for TB.

• If the test is not read within 72 hours, the test will need to be redone.
Advantages and Disadvantages of TSTs

<table>
<thead>
<tr>
<th>Advantages of TSTs</th>
<th>Disadvantages of TSTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple to perform (e.g., no laboratory equipment required)</td>
<td>Requires trained personnel to administer and interpret</td>
</tr>
<tr>
<td>Low cost</td>
<td>Requires two or more patient visits</td>
</tr>
<tr>
<td>No need for phlebotomy</td>
<td>False-positive results can occur due to previous BCG vaccination</td>
</tr>
<tr>
<td>Well-established definitions of TST conversions</td>
<td>False-positive results can occur due to nontuberculous mycobacteria</td>
</tr>
<tr>
<td></td>
<td>False-negative results can occur due to concurrent infections</td>
</tr>
<tr>
<td></td>
<td>Rare adverse effects</td>
</tr>
<tr>
<td></td>
<td>Can cause the booster phenomenon</td>
</tr>
<tr>
<td></td>
<td>May be subject to biases and errors with TST placement and reading</td>
</tr>
</tbody>
</table>
Special Considerations When Using TSTs

Booster phenomenon:

• Some people infected with *M. tb* may have a negative TST reaction when tested years after they were infected (e.g., older adults).

• Initial skin test may stimulate (boost) ability to react to PPD.

• Subsequent positive boosted reaction may be misinterpreted as a new infection.

• May still be considered for treatment if currently at high risk for TB disease or if other vulnerable persons would be put at risk
IGRA Summary

• IGRAs are blood tests.

• They measure a person’s immune reactivity to *M. tb*.

• Blood samples are mixed with antigens (protein substances that can produce an immune response) and incubated.

• If the person is infected with *M. tb*, blood cells will recognize antigens and release interferon gamma (IFN-γ) in response.
IGRA Test Types and Referrals

• Currently, two IGRAs are approved by the Food and Drug Administration and available in the United States:
  • QuantiFERON®-TB Gold Plus (QFT)
  • T-Spot®.TB test (T-Spot)

• Patients can be referred to hospitals or local health departments to have an IGRA test.†
  • A health care provider will draw a patient’s blood and send it to a laboratory for analysis and results.

†Please note that not all hospitals and local health departments perform IGRAs. Please check before providing a referral to a specific site.
Advantages and Disadvantages of IGRAs

<table>
<thead>
<tr>
<th>Advantages of IGRAs</th>
<th>Disadvantages of IGRAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires only a single patient visit to conduct the test</td>
<td>Blood samples must be processed within eight to 32 hours of collection</td>
</tr>
<tr>
<td>Results can be available within 24 hours</td>
<td>Errors in collecting or transporting blood specimens or in running and interpreting the test can decrease accuracy of the test</td>
</tr>
<tr>
<td>Does not cause the booster phenomenon</td>
<td>Tests may be expensive</td>
</tr>
<tr>
<td>BCG vaccination does not cause a false-positive result</td>
<td></td>
</tr>
<tr>
<td>Not subject to the biases and errors associated with TST placement and reading</td>
<td></td>
</tr>
</tbody>
</table>
Selecting Which Test to Use
CDC Risk and Testing Strategy

### CDC Recommendations: Which Test to Use

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Preferred Test</th>
<th>Acceptable Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely to be Infected</td>
<td>Children ≤ 5: TST</td>
<td>IGRA or TST</td>
</tr>
<tr>
<td>High Risk of Progression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TST positive at ≥ 5mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely to be Infected</td>
<td>IGRA</td>
<td>IGRA or TST</td>
</tr>
<tr>
<td>Low to Intermediate Risk of Progression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TST positive at ≥ 10mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlikely to be Infected*</td>
<td>IGRA</td>
<td>IGRA or TST</td>
</tr>
<tr>
<td>TST positive at &gt; 15mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Testing for LTBI is not recommended in this group

#### Considerations when choosing a test:
- Prevalence of BCG vaccination
- Expertise of staff and/or laboratory
- Test availability
- Patient and staff perceptions
- Programmatic concerns
## Testing for Certain Populations

<table>
<thead>
<tr>
<th>Population</th>
<th>TST</th>
<th>IGRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlikely to return for TST reading</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>History of BCG vaccine</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Pregnant</td>
<td></td>
<td>Both are safe to use</td>
</tr>
<tr>
<td>Children &lt; 2 years</td>
<td>Recommended</td>
<td>Not Recommended</td>
</tr>
</tbody>
</table>
Case Scenario One

- 75-year-old female
- Diabetes
- Resident of an assisted living facility

TST or IGRA?

IGRA is preferred; however, either test is acceptable.
Case Scenario Two

- 65-year-old female
- Living with HIV
- Resident of long-term care facility

TST or IGRA?

- Either is acceptable
- Consider dual testing where a positive result from either result would be considered positive
Case Scenario Three

- Employee in a long-term care facility
- No other risk factors

TST or IGRA?

An IGRA is preferred; however, either test is acceptable.
Indiana LTC Rules – Overview & Updates

- Indiana LTC division has TB specific guidelines for both staff and residents
- TB guidelines regarding staff in LTC settings was updated in late 2019
- Guidance regarding residents was updated August of 2021
Indiana LTC Rules – Staff Screening

• **Program advisory letters** were issued by IDOH’s Long-Term care division in late 2019 updating expectations for Indiana licensed residential care and comprehensive care nursing facilities for preventing the transmission of *M. tb*.

• The updated guidelines indicate facilities may adopt a nationally recognized standard for TB screening for healthcare personnel and implement and follow the standard as written.

  • The nationally recognized program for employees is located on the Centers for Disease Control and Prevention’s website at the following link: [https://www.cdc.gov/tb/topic/testing/healthcareworkers.htm](https://www.cdc.gov/tb/topic/testing/healthcareworkers.htm)
TB Screening and Testing of Health Care Personnel (HCP)

- All HCP should receive baseline screening upon hire that includes:
  - A baseline individual TB risk assessment
  - TB symptom evaluation
  - A TB test (Either IGRA or TST; according to risk)
  - Additional evaluation for TB disease as Needed

- Annual TB testing of health care personnel is not recommended unless there is a known exposure or ongoing transmission at a healthcare facility.
  - Indiana does not currently have ongoing transmission at any healthcare facility
Annual TB Education for Health Care Personnel (HCP)

- All HCP should receive TB education annually
- TB education should include:
  - TB risk factors
  - Signs & symptoms of TB disease
  - TB infection control policies and procedures
- Please reach out to IDOH TB Prevention & Care Program if you need resources for this annual education
  - Kathy Chapuran, TB Health Educator
  - Kchapuran@isdh.in.gov
Post-Exposure Screening & Testing

• All HCP with a known exposure to TB should receive a TB symptom screen and timely testing
  • IDOH and/or the local health department would already be involved at this point in the process and would provide additional guidance
• Any HCP diagnosed with Latent TB infection (during pre-employment testing or post-exposure screening) should be encouraged to take treatment
  • Several short-course regimens available
  • Free through any Indiana local health department!
# Summary of Major Changes to TB HCP Screening Guidelines

<table>
<thead>
<tr>
<th></th>
<th>2005 Recommendations</th>
<th>2019 Recommendations — Key Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Screening</strong></td>
<td>Recommended for all health care personnel pre-placement/upon hire’</td>
<td>Individual baseline TB risk assessment added</td>
</tr>
<tr>
<td></td>
<td>Annual screening may be recommended based on risk assessment of healthcare facility and setting</td>
<td>Annual TB screening no longer routinely recommended for most health care personnel unless occupational risk or ongoing exposure</td>
</tr>
<tr>
<td><strong>Post-exposure testing</strong></td>
<td>Recommended IGRA or TST test for all health care personnel when an exposure is recognized’</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>If that test is negative, do another test 8–10 weeks after the last exposure’</td>
<td></td>
</tr>
<tr>
<td><strong>Treatment of positive TB test</strong></td>
<td>Referral to determine whether latent TB infection (LTBI) treatment is indicated</td>
<td>Treatment is encouraged for all health care personnel with untreated LTBI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shorter course (3 to 4 month) treatments encouraged over the longer (6 or 9 month) regimens because they are easier to complete</td>
</tr>
<tr>
<td><strong>TB education</strong></td>
<td>Recommended annually for all health care personnel’</td>
<td>Annual education should include information about TB risk factors, the signs and symptoms of TB disease, and TB infection control policies and procedures</td>
</tr>
</tbody>
</table>

*No change in the 2019 recommendations*
Resident TB Screening

- Each resident must have a health screening upon admission, including signs and symptoms of TB disease.
- A TB test must be completed within three months prior to admission or upon admission unless there is documentation of a previous positive TB test.
- Testing can be by TST or an IGRA blood test.
- Two-step testing should be utilized if doing TST testing.
- The TST must be administered and read by persons having documentation of training from a department-approved course of instruction in intradermal tuberculin skin testing, reading, and recording.
- Routine or baseline chest X-rays are not required or recommended prior to or at the time of admission.
Resident TB Screening – Prior Positives

- Residents with a documented previous positive TST or IGRA should not undergo repeat testing

- The prior positive test should have been followed by a clinical evaluation for TB that included a chest radiograph (X-ray). Results of that evaluation should be acquired by the facility and be in the patient’s record.
  - There is no time limit on this evaluation.

- If documentation of this evaluation cannot be obtained, a clinical evaluation with a chest radiograph should be performed.
  - In the absence of symptoms, this can be delayed up to one week following admission
Resident TB Screening – New Positives

• Any asymptomatic resident with a new positive TST or IGRA must have a medical evaluation and chest X-ray **within one week**.

• Once TB disease is ruled out, the resident should be considered and evaluated for treatment
  • Latent TB infection (LTBI) treatment is available for free from your LHD

• Residents with LTBI should be screened for HIV infection

• LTBI is reportable to IDOH
  • Case reporting forms are available at the IDOH website
Resident TB Screening – Additional Info

• Residents with symptoms of pulmonary TB and an abnormal chest X-ray consistent with TB disease should have an evaluation done as soon as possible in airborne transmission-based precautions
  • Referral to hospital is likely required
  • Medical evaluation will need to include three sputum specimens for acid fast smear and culture
  • Please notify your LHD – suspected or confirmed TB disease is reportable!

• Periodic chest X-rays of residents with a history of positive TST or IGRA are not advised and are not necessary unless the individual develops signs and symptoms of TB disease
Summary

• National TB recommendations should be considered when selecting which test to use for TB testing
• Indiana LTC rules have recently been updated to match national TB guidance
  • Staff screening should mirror national health care worker guidance
  • TB testing can be completed via either an IGRA or TST
  • Removal of requirement for baseline chest x-ray on residents
Questions
Contact Information

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TB Prevention & Care
317-233-7548
Kewhite@isdh.in.gov