Washington State Tuberculosis Services and Standards Manual

Chapter 7:

Diagnosis of LTBI

Washington State Department of HEALTH

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Acknowledgements

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About the Washington State Tuberculosis Program Manual

Purpose

In Washington State, tuberculosis (TB) care and prevention is governed by state law and rule. The purpose of the TB Services and Standards manual is to provide information and guidance to aid local health jurisdictions (LHJs) in fulfilling the requirements detailed in the Revised Code of Washington (RCW) 70.28.005 and the Washington Administrative Code (WAC) 246-170. This manual is designed to assist you in using guidelines and materials provided by the CDC and TB Centers of Excellence, including key steps and information needed to fulfill state required TB care and prevention tasks. This manual contains what WA DOH TB Program considers to be best practices and key policies.

Audience

The most likely readers of this manual are TB providers, primarily those working in Local Health Jurisdictions (LHJs) and Tribal Public Health. As a result, the TB Services and Standards Manual has a special focus on the roles, responsibilities and care given by local public health partners. These TB providers may include, but are not limited to nurses, physicians, Health Officers, Regional Medical Officers, epidemiologists, disease intervention specialists and outreach workers from local and state TB programs, clinics, and hospitals.

Eliminating Stigmatizing Language

Judgmental terms and negative connotations of words such as 'defaulter' and 'suspect' may be perceived to place blame for the disease and responsibility for adverse treatment outcomes on the patient. To assist in implementing a change in the use of stigmatizing language the Heartland TB Center of Excellence, the International Union Against TB and Lung Disease, the National Society of TB Clinicians, the global TB community and the Treatment Action Group developed this reference tool to aid in identifying suggested replacement language as a reminder of how our words may affect others.

Use This….	Not that….	Use This….	Not that….
Adherence / Non-adherence	Compliance / Non-compliance	Undocumented	Illegal; Illegal alien
Person lost to follow up	Defaulter	Person with TB disease	TB case
TB Prevention and Care	TB Control	Treatment failed	Treatment failure
Person to be evaluated for TB	TB Suspect	Missed doses/ Non-adherent	Delinquent
HIV-Positive	HIV-infected	Contact Analysis; Contact Elicitation; Contact Identification	Investigation; Investigate
Immigrant	Alien	Exposed to TB	TB Contact
Lack of housing; Under-housed; People experiencing homelessness	Homeless/ Homelessness	Tuberculosis	Consumption; White Plague

Adapted from https://www.heartlandntbc.org/wp-content/uploads/2021/12/FactSheet_Final_5_19_16.pdf

More information can be found at Case Management Tools/Health Equity in the TB Program SharePoint page which includes additional resources to encourage positive change, sensitize, promote appropriate language, end the stigmatization, and empower people affected by TB.

How to Use This Manual

Icons

Throughout the manual, these icons quickly cue you about important information and other resources:

This warns about high-consequence information you must understand when performing the task.

This signals when you should call to report or to consult on the task.

This highlights special considerations for pediatric patients.

This suggests another relevant area in the manual or another resource that you may want to review.

This alerts you that a form is available for the task.

Chapter 7: Diagnosis of Latent Tuberculosis Infection

Purpose

The purpose of this chapter is to help local health jurisdictions (LHJs) follow national and WA State TB Program guidelines regarding these topics:

- How to identify those who would benefit the most from TB screening by understanding the risks for infection and progression to active TB disease
- Options available for TB testing and how to select the one to use
- How to rule-out active TB disease, diagnose Latent TB Infection (LTBI) and determine next steps in patient management
- Available resources for case management and patient and provider education

According to the CDC and the TB Elimination Alliance, one of the recommended strategies to achieve the goal of reduction of TB morbidity and mortality is the identification of persons with LTBI at risk for progression to TB disease, and treatment of those persons with an effective drug regimen.

Evaluation and follow-up of contacts are covered in more depth in the TB Services and Standards Manual *Chapter 11: Contact Evaluation and Management*. For information on LTBI see *Chapter 8: Treatment of Latent Tuberculosis Infection*.

For detailed information on the diagnosis and treatment of LTBI in children, refer to *Chapter 9: Diagnosis and Treatment of Latent Tuberculosis Infection (LTBI) and Tuberculosis Disease in Children (under 16 years of age*.

Policy

In Washington, TB screening should be provided for:

- Individuals with risk factors for LTBI (See *Table 2. Groups at High Risk for TB Infection and TB Disease)*
- Persons with a greater risk to progress to active TB once infected with MTB (See *Table 2. Groups at High Risk for TB Infection and TB Disease)*
- Persons who are contacts to an active TB case (see *Chapter 11: Contact Investigation*)
- Class B refugees and immigrants (see *Chapter 4: Class B Notifications)*

Health care workers or public health staff who are placing and reading TB skin tests (TSTs) in Washington State should have some practical experience with an experienced mentor prior to placing and reading test on patients independently.

To determine who may administer TB skin tests in Washington State see: Who May Administer, Read and Interpret a Tuberculin Skin Test (TST) in Washington State

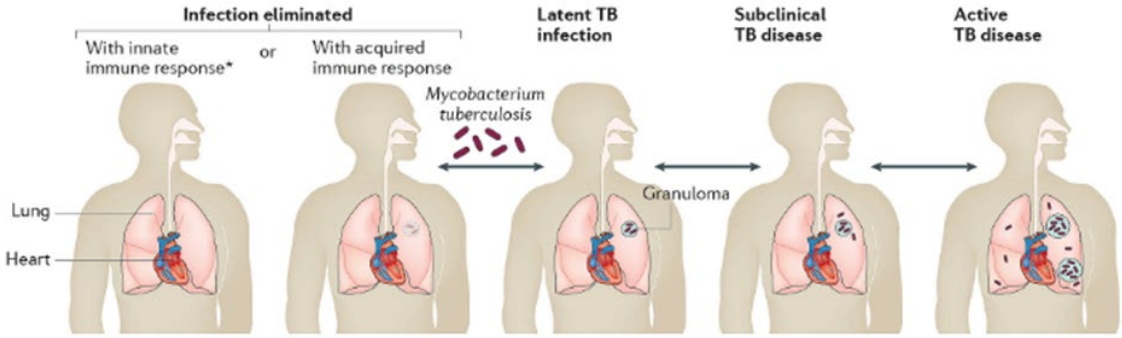
Forms

Recommended forms are available on:

- DOH TB Program SharePoint Case Management section
- DOH TB Program SharePoint Clinical Resources section
- TB Provider Toolkit (WA DOH TB Program Website)

TB Classification System

From a clinical and public health perspective, patients with TB are pragmatically classified as having LTBI, which is an asymptomatic and non-transmissible state, or active TB disease, which is transmissible (in active pulmonary TB) and for which culture-based or molecular diagnostics can be used. Patients with active TB disease experience general symptoms, such as fever, fatigue, lack of appetite and weight loss, and those with pulmonary disease can have persistent cough and hemoptysis in advanced disease. However, some patients with active, culture-positive disease may be asymptomatic and are best described as having subclinical TB. Therefore, TB disease can be viewed as a dynamic continuum from *MTB* infection to active infectious disease. Patients are categorized as having either latent TB infection (LTBI) or active TB disease for simplicity in clinical and public health settings using Table 1 below.



TST	Negative	Positive	Positive	Positive	Usually positive
IGRA	Negative	Positive	Positive	Positive	Usually positive
Culture	Negative	Negative	Negative	Intermittently positive	Positive
Sputum smear	Negative	Negative	Negative	Usually negative	Positive or negative
Infectious	No	No	No	Sporadically	Yes
Symptoms	None	None	None	Mild or none	Mild to severe
Preferred treatment	None	None	Preventive therapy	Multidrug therapy	Multidrug therapy

Pai, M., Behr, M., Dowdy, D. *et al.* **Tuberculosis**. *Nat Rev Dis Primers* **2**, 16076 (2016).https://www.nature.com/articles/nrdp201676

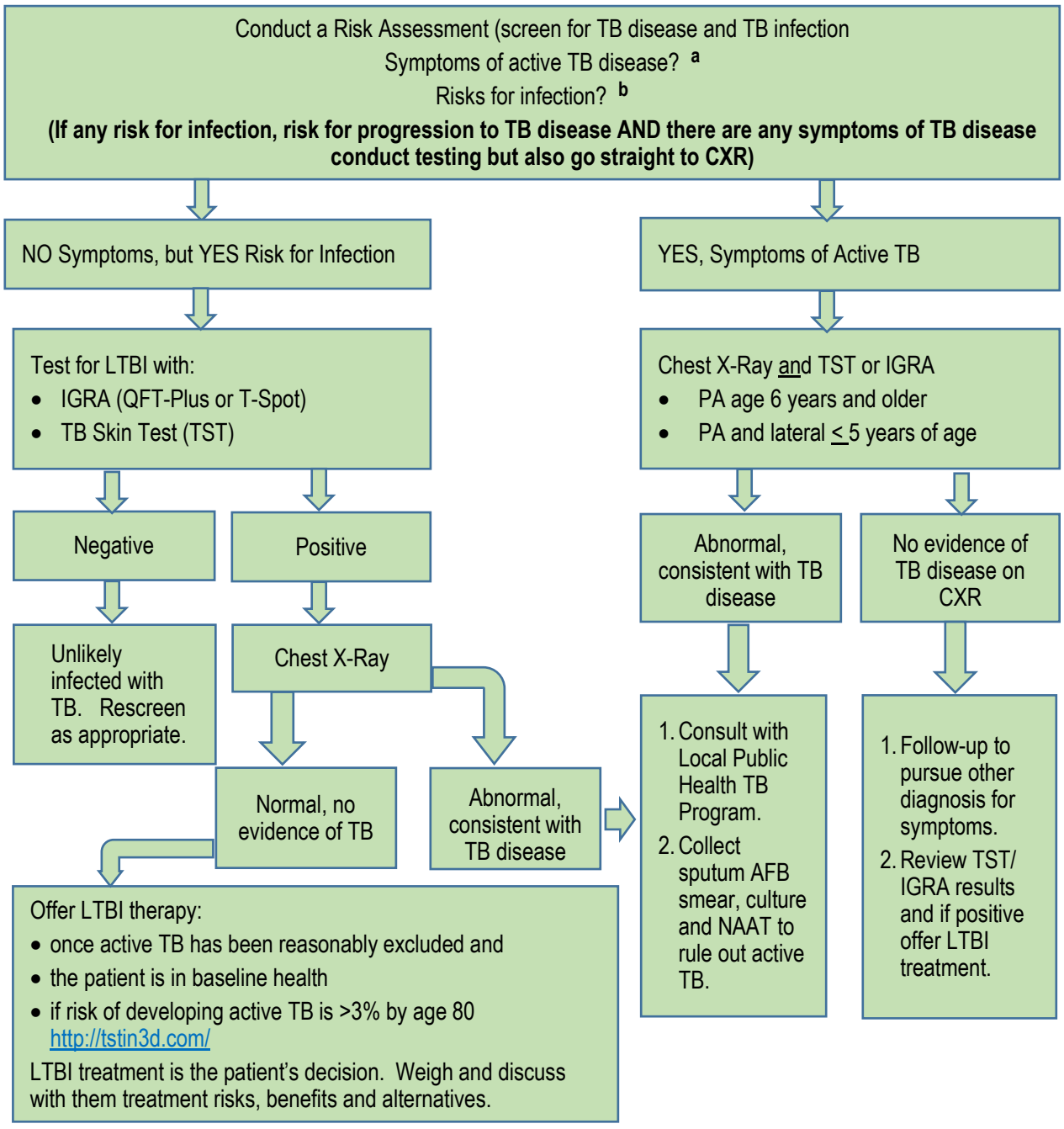
The system for classifying TB is based on how the TB infection and disease develop in the body. Use this classification system to help track the status of TB in your patients and to allow comparison with other reporting areas.

Table 1. TB Classification System

Class	Type	Description
0	No TB exposure Not infected	No history of exposure and no evidence of TB infection or disease Negative reaction to the tuberculin skin test (TST) or interferon gamma release assay (IGRA)
1	TB exposure No evidence of infection	History of exposure Negative reaction to the TST or IGRA (given at least 8-10 weeks after exposure)
2	TB infection No disease	Positive reaction to the TST or IGRA Negative bacteriologic studies (smear and cultures, if done) No clinical, bacteriologic, or radiographic evidence of TB disease
3	TB disease Clinically active	Positive culture for MTB; **OR** Positive reaction to TST or IGRA, plus clinical, bacteriologic, or radiographic evidence of current active TB disease
4	Previous TB disease Not clinically active	History of episode(s) of TB Abnormal but stable radiographic findings Positive reaction to the TST or IGRA Negative bacteriologic studies (smear and culture, if done) No clinical or radiographic evidence of current TB disease
5	TB disease suspected	Signs and symptoms of active TB disease but medical evaluation not complete

Adapted from: CDC. Chapter 1: Transmission and Pathogenesis of Tuberculosis. Core Curriculum on Tuberculosis (2021).

Process for Screening and Testing for LTBI



a Symptoms of TB disease may include persistent cough without improvement for >2-3 weeks, hemoptysis, chest pain, as well as constitutional symptoms such as fevers, night sweats, unintentional weight loss, anorexia. Other symptoms are possible depending on site of disease such as infertility without a known cause, urinary tract infection (UTI) symptoms without a known organism, or lymphadenopathy.

b For a copy of a risk assessment and other screening information see:
https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Tuberculosis/TBProviderToolkit

High-Risk Groups

Targeted testing for TB is a strategy to diagnose and treat LTBI among persons who are at high risk (or increased risk relative to the general U.S. population) for developing TB disease.

Certain factors identify persons at high risk for LTBI and/or for progression to TB disease. Persons in Washington who are in the high-risk groups listed in the table below are candidates for TB testing, either with an Interferon Gamma Release Assay (IGRA) or a tuberculin skin test (TST).

Persons with risk factors from both columns may be at much higher risk than those with risk factors in only one column. For example, an individual born in a high-TB-prevalence country with HIV infection is at much higher risk of having active TB than a US-born individual with HIV infection.

Mathematical modeling for Washington State suggests the most impactful intervention for reducing future TB incidence is screening and treating new arrivers to the U.S. for TB infection.

Table 2. Groups at High Risk for TB Infection and TB Disease

People at High Risk for Exposure to or Infection with MTB	People at High Risk for Developing TB Disease after Infection with MTB
• Contacts of people known or presumed to have infectious TB disease • People who were born in or who frequently travel to countries where TB disease is common, including the Philippines, Mexico, India, Vietnam, Ethiopia or other countries with rates of TB greater than 20/100,000. • People who currently live or used to live in large group settings where TB is more common, such as, homeless shelters, correctional facilities, or nursing homes • Employees of high-risk congregate settings • Health care workers who serve patients with TB disease • Populations defined locally as having an increased incidence of LTBI or TB disease, possibly including medically underserved populations, low income populations, or persons who abuse drugs or alcohol • Infants, children, and adolescents exposed to adults who are at increased risk for LTBI or TB disease	• People living with HIV • Children younger than 5 years of age • People recently infected with M. tuberculosis (within the last 2 years) • People with a history of untreated or inadequately treated TB disease • Persons who are receiving immunosuppressive therapy such as tumor necrosis factor-alpha (TNF) antagonists, systemic corticosteroids equivalent to/greater than 15 mg of prednisone per day, or immunosuppressive drug therapy following organ transplantation • Persons with silicosis; chronic renal failure; leukemia; or cancer of the head, neck, or lung • Persons with diabetes mellitus • Persons who have had a gastrectomy or jejunoileal bypass • Persons with low body weight (<90% of ideal body weight) • People who use substances (such as injection drug use) • Populations defined locally as having an increased incidence of disease due to M. tuberculosis, including medically underserved and low-income populations

Source: CDC Chapter 2: Testing for Tuberculosis Infection. *Core Curriculum on Tuberculosis (2021)*.

For more information see *TB Manual: Chapter 3 Targeted Testing.*

Treating LTBI supports U.S. TB elimination goals through preventing infected persons from developing TB disease, thereby stopping the spread of TB to others. All TB screening activities should be accompanied by a plan for appropriate follow-up medical evaluation and, if appropriate, treatment. Persons with positive

tests (IGRA or TST) for TB infection or signs of disease should be evaluated for TB disease prior to starting any treatment. An evaluation for TB disease should include:

- a medical history to determine whether patients have signs or symptoms consistent with TB disease and obtain information about any previous positive tests for TB infection or previous treatment for LTBI or TB disease.
- chest radiography; and, in certain circumstances
- sputum smear microscopy, culture, and nucleic acid amplification (NAA) testing

For more details see the section below: "*Follow-Up After TB Testing*."

Table 3. Paradigm for Evaluation of Those with Latent TB Infection (LTBI) Based on Risk of Infection, Risk of Progression to TB and Benefit of Therapy

Groups with Increased Likelihood of Infection with Mtb	Benefit of Therapy	LTBI Testing Strategy	
Household contact or recent exposure of an active case	Yes	Likely to be Infected Low to Intermediate Risk of Progression (TST ≥ 10mM)	Likely to be Infected High Risk of Progression (TST ≥ 5mM)
Mycobacteriology laboratory personnel	Not demonstrated		
Immigrants from high burden countries (>20 / 100,000)	Not demonstrated		
Residents and employees of high risk congregate settings	Yes		
None	Not demonstrated	Unlikely to be Infected (TST > 15mM)	

Risk of Infection

Risk of Developing Tuberculosis if Infected

Low	Intermediate (RR 1.3 -3)	High (RR 3-10)
No risk factors	Clinical predisposition Diabetes Chronic renal failure Intravenous drug use	Children age less than 5 HIV infection Immunosuppressive therapy Abnormal CXR consistent with prior TB Silicosis

Benefit of Therapy	
Not demonstrated	Yes

In developing a diagnostic approach for the evaluation of those with suspected LTBI, we recommend the clinician weigh the likelihood of infection, the likelihood of progression to TB if infected, and the benefit of therapy (Horsburgh, C.R., Jr., and E.J. Rubin. 2011. Clinical practice. Latent tuberculosis infection in the United States. The New England journal of medicine 364:1441-1448). Recommendations were formulated for each of the three groups illustrated above. These groups are concordant with current recommendations for the interpretation of the TST (2000. Targeted tuberculin testing and treatment of latent tuberculosis infection. American Thoracic Society. MMWR Recomm Rep 49:1-51).

Source: Official American Thoracic Society/Infectious Diseases Society of America/Centers for Disease Control and Prevention Clinical Practice Guidelines: Figure 1. Diagnosis of Tuberculosis in Adults and Children, Clinical Infectious Diseases, Volume 64, Issue 2, 15 January 2017.

For more information on diagnosis of TB disease see *Chapter 5: Diagnosis of Tuberculosis Disease* of the WA TB Services and Standards Manual.

See the CDC. Chapter 3: Diagnosis of Tuberculosis Disease. Core Curriculum on Tuberculosis (2021).

Testing for Latent Tuberculosis Infection (LTBI)

Selection of a test for detection of MTB infection should be based on the reasons and context for testing, test availability, and overall cost effectiveness of testing. There are currently two methods available in the United States for the detection of MTB infection:

- TB blood tests (interferon-gamma release assays [IGRAs])
  - QuantiFERON®-TB Gold Plus (QFT-Plus)
  - T-SPOT®.TB test (T-Spot)
- Mantoux tuberculin skin test (TST)

These tests help differentiate infected people from uninfected people and while both TB blood tests and TSTs provide evidence for infection with MTB, they cannot distinguish LTBI from TB disease. Patients with a clinical syndrome suggestive of active TB require a medical evaluation to rule-out active TB disease. **A negative result from any of the tests does not exclude the diagnosis of LTBI or TB disease.** Epidemiological, historical, and other clinical information should be included in decisions regarding patient management. A diagnosis of LTBI requires that TB disease be excluded by an appropriate evaluation including at least a TB symptom check, a test for TB infection, and—if test-positive or symptomatic—a chest radiograph.

Advantages /Disadvantages of TST-vs-IGRA in Common Scenarios

	TST	IGRA
Children	Often better for young children in whom phlebotomy for IGRA is more challenging	Good down to age 2, providing phlebotomy is not a barrier
Highly mobile or low reliability patients	Extra visit required for TST reading contributes to losses in care cascade	Generally preferred
BCG vaccinated	Higher false positive rate due to cross reactions to antigens shared between BCG and PPD	Generally preferred as tested antigens are not present in BCG and there is no cross reactivity
Severely immunosuppressed	Consider doing both tests to maximize sensitivity	
Serial screening programs	Generally preferred due to lower rate of false-positive conversions between tests	Test-to-test result variability may encroach on gray zone (TB-Nil 0.35-0.99) with associated greater risk for false-positive conversions in serial screening programs.
Low clinician experience with TST	TST results and interpretation highly dependent on user experience with administration and reading	Generally preferred
Cost	Supplies are lower cost, but labor is higher (two visits)	Laboratory fee is higher than TST supply costs, but lower labor costs (single visit)

Compiled by: Chris Spitters, MD; 02/13/2023

Table 4. Summary of Recommendations for Testing for LTBI

Group	Testing Strategy	Considerations
Likely to be Infected **High** Risk of Progression (TST ≥ 5mM)	**Adults** **Acceptable**: IGRA OR TST Consider dual testing where a positive result from either result would be considered **positive** **Children ≤ 5 years of age** **Preferred**: TST **Acceptable**: IGRA OR TST Consider dual testing where a positive result from either would be considered **positive**[1]	Prevalence of BCG vaccination Expertise of staff and/or laboratory Test availability Patient perceptions Staff perceptions Programmatic concerns
Likely to be Infected **Low** to **Intermediate** Risk of Progression (TST ≥ 10mM)	**Preferred**: IGRA where available **Acceptable**: IGRA or TST	
Unlikely to be Infected (TST > 15mM)	**Testing for LTBI is not recommended** **If necessary:** **Preferred:** IGRA where available. **Acceptable**: Either IGRA OR TST **For serial testing**: **Acceptable**: Either IGRA OR TST Consider repeat or dual testing where a negative result from either would be considered **negative**[2]	

Summary of recommendations for testing for latent TB infection (LTBI). [1] Performing a second diagnostic test when the initial test is negative is a strategy to increase sensitivity. This may reduce specificity, but the panel decided that this is an acceptable trade-off in situations in which the consequences of missing LTBI (ie, not treating individuals who may benefit from therapy) exceed the consequences of inappropriate therapy (i.e., hepatotoxicity). [2] Performing a confirmatory test following an initial positive result is based upon both the evidence that false-positive results are common among individuals who are unlikely to be infected with Mycobacterium tuberculosis and the committee's presumption that performing a second test on those patients whose initial test was positive will help identify initial false-positive results. Abbreviations: IGRA, interferon-γ release assay; LTBI, latent tuberculosis infection; TST, tuberculin skin test.

Source: ATS, CDC, IDSA. Diagnosis of Tuberculosis in Adults and Children. Clinical Infectious Diseases 2017; 64(2):1-33.

To learn about the following topics and more please visit the resources below:

- Selecting a test to detect TB Infection including comparison and advantages and disadvantages of each type of test
- Collecting samples for a TB blood test, how to interpret them and what to do with false-positive and false-negative results
- Administering, reading and interpreting Mantoux Skin Tests (TST) and what to do with false-positive and false-negative results. Special considerations when using a TST (boosting, two step testing, pregnancy, occupational exposures)
- Other considerations such as: BCG vaccination, anergy and timing of TB testing when giving live-virus vaccines.

CDC. Chapter 2: Testing for Tuberculosis Infection. Core Curriculum on Tuberculosis (2021). and

NSTC/ NTCA. Testing and Treatment of Latent Tuberculosis Infection in the United States: Clinical Recommendations. February 2021.

Additional Information Regarding TST and IGRA Testing

Where to find more information, patient/provider education

1. CDC. Mantoux Tuberculin Skin Test Toolkit and video for detailed instructions on how to administer, measure and interpret the test.
2. CDC educational handouts
3. CDC Core Curriculum on Tuberculosis: What the Clinician Should Know, Seventh edition 2021. Chapter 2: Testing for Tuberculosis Infection.
4. For questions or guidance regarding the interpretation of TSTs, call the Washington State TB Program at 206-418-5500.
5. To determine who may administer TB skin tests in Washington State, : https://doh.wa.gov/sites/default/files/2023-03/343-243-WATuberculinSkinTestAdministerReadInterpret.pdf?uid=6419f0cfe7822. This document is located here: https://doh.wa.gov/you-and-your-family/illness-and-disease-z/tuberculosis-tb/laws-guidelines
6. Oxford Diagnostic Laboratories. The T-Spot.TB Test FAQs.
7. Qiagen, Detect TB Infection with confidence. QuantiFERON-TB Gold Plus, page 4 Interpretation of results.

Reporting adverse reactions

1. Report adverse reactions to a TST (e.g., blistering, ulcerations, necrosis) to the FDA's MedWatch Program at 1-800-332-1088, or via the online reporting form.

Storage and Handling of PPD Solution

1. Read the PPD labels carefully before administering a TST. The packaging of tetanus toxoid-containing vaccines (TTCVs) is similar to Tubersol® and Aplisol®, and all are refrigerated. See CDC's "Inadvertent Intradermal Administration of Tetanus Toxoid--Containing Vaccines Instead of Tuberculosis Skin Tests" MMWR July 30, 2004 / 53(29);662-664
2. Opened PPD tuberculin vials must be dated and discarded after 30 days. See the package insert for appropriate storage information.
3. Do not pre-draw tuberculin into syringes prior to testing because some of the tuberculin solution can adhere to the inside of the plastic syringe, the skin test should be given as soon as possible after the syringe is filled.

Documentation

The TB Disease Case Intake Form, TB Patient Health History and the Adult, Pediatric or Employee Risk assessment forms may be used for documentation. They are available in: WA DOH TB Program SharePoint Case Management section, Clinical Resources section and the TB Provider Toolkit (WA DOH TB Program Website).

NSTC/ NTCA. Testing and Treatment of Latent Tuberculosis Infection in the United States: Clinical Recommendations. February 2021.

Other Relevant Testing

1. Negative TST or IGRA results should not be used alone to exclude MTB disease in persons with symptoms or signs suggestive of TB disease. **Medical evaluation** of such persons should include: a

history and physical examination, chest radiograph, bacteriologic studies, serology for human immunodeficiency virus (HIV), and, when indicated, other tests or studies.

2. **Human Immunodeficiency Virus (HIV) Screening -** When testing for TB infection it is important to know a person's HIV status as well. Individuals with HIV infection may have a false negative TB test due to a weakened immune system; an abnormal chest x-ray may look normal in those individuals who are co-infected with HIV and TB and medications used to treat LTBI may interact with medications used to treat HIV. For these reasons the Centers for Disease Control and Prevention (CDC) recommends the following:

    - Routine HIV screening for all patients ages 13–64 seeking health care for any reason, without regard to patient's known risks for HIV infection
    - Annual (or more frequent) HIV screening of patients known to be at high risk

Follow-Up After TB Testing

After TB testing, complete the following tasks:

1. **If the person has signs or symptoms of TB,** evaluate for TB disease as described in the TB Services Manual *Chapter 5: Diagnosis of Tuberculosis Disease*.
2. **If the person is a contact,** follow the procedures for testing and evaluation in the TB Services Manual *Chapter 11: Contact Investigation*.
3. **If the person is a participant in two-step screening,** see the TB Services Manual Chapter 16: Infection Control in the section titled Two-Step Tuberculin Skin Testing.
4. **If the TST or IGRA result is newly positive,** a chest radiograph should be obtained for the patient, as specified in the Chest Radiography section below.

Chest Radiography

All individuals being considered for LTBI treatment should undergo a chest radiograph (chest x-ray) to rule out pulmonary TB disease. Asymptomatic patients whose most recent chest X-ray was taken more than 3 months prior to starting treatment should have a repeat chest X-ray.

Refer to Table 5. *Targeted Testing for LTBI: when chest radiographs are required and how to follow up on radiography results* to determine when to obtain a chest radiograph and what follow-up is required for chest radiograph results.

A posterior-anterior radiograph of the chest is the standard view used for the detection and description of chest abnormalities in asymptomatic adults. In some instances, other views (e.g., lateral, lordotic) or additional studies (e.g., computed tomography [CT] scans) may be necessary.

For detailed information on the diagnosis and treatment of latent tuberculosis infection in children, refer to *Chapter 9: Diagnosis and Treatment of Latent Tuberculosis Infection (LTBI) and Tuberculosis Disease in Children*.

For education on radiographic interpretation of chest imaging for the purposes of TB, refer to
Basic Chest Radiology for the TB Clinician (Self-Study Presentation and
Radiographic Manifestations of Tuberculosis: A Primer for Clinicians, Second Edition.

Chest X-ray Interpretation and Treatment Recommendations

Treatment for LTBI should be prescribed by the patient's health care provider. Such patients must be adequately evaluated and have a chest x-ray. The results of the TST or IGRA, review of symptoms, medical history and risk factors should be recorded in the patient's medical record.

If there are questions regarding the reading or interpretation of the chest x-ray or questions about recommendations for patient management, a TB ECHO consult may be made by contacting the TB Services nurse consultant at 206-418-5500 to schedule the consult.

Table 5. Targeted Testing for LTBI: when chest radiographs are required and how to follow up on radiography results

Signs or Symptoms of TB Disease?	TST or IGRA Result?	Recent Exposure to Infectious TB?	Chest Radiograph: Required and Results?	Follow-up Action
Yes	Positive or Negative	Yes or No	**CXR Required:** Yes **Results:** normal or abnormal	Classify as Class 5. Evaluate for TB disease. Refer to *Chapter 5: Diagnosis of Tuberculosis Disease*.
No	Negative	No	**CXR not recommended** unless the patient has HIV infection or other forms of immunosuppression are present.	Classify as Class 0. No further evaluation or treatment.
No	Positive	No	**CXR Required:** Yes **Results:** normal	Classify as Class 2. Consider treatment for LTBI. Refer to *Chapter 8: Treatment of Latent Tuberculosis Infection*.
			CXR Required: Yes **Results:** abnormal noncalcified fibrotic lesions suggestive of old, healed TB; comparison film available and stable	Classify as Class 4 or 5. Evaluate for TB disease. Refer to *Chapter 5: Diagnosis of Tuberculosis Disease*.
			CXR Required: Yes **Results:** abnormal consistent with TB disease; no comparison film	Classify as Class 3 or 5. Evaluate for TB disease. Refer *to* *Chapter 5: Diagnosis of Tuberculosis Disease*.

Abbreviations: CXR-chest radiograph; HIV-human immunodeficiency virus; IGRA-interferon gamma release assay; LTBI-latent tuberculosis infection; TB-tuberculosis; TST-tuberculin skin test.

Adapted from: Francis J. Curry TB Center. Tuberculosis Program Manual Template. Diagnosis of Latent TB Infection. Revised 8/11/2008. https://www.currytbcenter.ucsf.edu/sites/default/files/07diltbi0808.doc

For more information on chest radiography, refer to the Curry International Tuberculosis Center's Radiographic Manifestations of Tuberculosis: A Primer for Clinicians,2nd Edition (Curry International Tuberculosis Center Web site; 2011)

LTBI Cascade of Care

The World Health Organization (WHO) estimates that a third of the world's population has latent TB infection and that less than 5% of those infected are diagnosed and treated to prevent TB.

The LTBI cascade of care model can help TB programs evaluate the gaps and barriers to TB care at each step in the cascade in their communities. Gaps occur along the LTBI cascade of care in each of the following steps:

1. identification of those individuals who should be screened
2. initial screening of contacts by placing a tuberculin skin test (TST) or drawing an IGRA
3. reading a TST or giving the IGRA results to the patient
4. conducting a medical evaluation
5. recommending and initiating LTBI treatment for eligible individuals
6. monitoring and completion of LTBI treatment.

By evaluating these gaps, a program can develop locally driven solutions to improve LTBI services. Quality care for LTBI must address some of the key challenges to services including:

1. low prioritization of LTBI
2. gaps in healthcare provider knowledge about testing and treatment; and
3. patient concerns about side effects of preventive treatment regimens

TB programs need to ensure that these issues are addressed in a patient-centered manner, with clear communication and ongoing evaluation of the quality of LTBI services. Quality LTBI care must be a central focus, particularly identifying and engaging more household contacts in preventive treatment, in order to halt the progression to active disease and thereby stop TB transmission globally.

For more Information on the LTBI Cascade of Care see:
The cascade of care in diagnosis and treatment of latent tuberculosis infection: a systematic review and meta-analysis

Work or School Clearance

Persons with newly positive TSTs or IGRAs may be cleared for work or school if they are low-risk by history, asymptomatic, and have a negative chest radiograph. Persons with prior positive TSTs may be cleared if they are asymptomatic. Routine chest radiographs are NOT indicated unless persons with prior positive TSTs or IGRAs become symptomatic for TB. Triage and assistance to current and prospective workers in positions for which TB screening is required is more of an occupational health than disease control activity. Still, rare cases of active TB are found through occupational screening, and LTBI diagnosis through occupational screening is a potential opportunity to ensure completion of treatment. This is generally not considered an LHJ activity but involvement is optional based on local resources, epidemiology, and priorities.

The *TB Disease Case Intake Form*, *TB Patient Health History* and the *Adult, Pediatric or Employee Risk assessment forms* may be used for documentation. They are available in: WA DOH TB Program SharePoint Case Management section, Clinical Resources section and the TB Provider Toolkit (WA DOH TB Program Website).

For more Information and recommendations on work or school clearance see: Sosa LE, Njie GJ, Lobato MN, et al. Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019. MMWR Morb Mortal Wkly Rep 2019;68:439–443.

Resources

ATS, CDC, IDSA. Controlling tuberculosis in the United States: recommendations from the American Thoracic Society, CDC, and the Infectious Diseases Society of America**.** MMWR 2005;54(No. RR-12):15.

ATS, CDC, IDSA. Diagnosis of Tuberculosis in Adults and Children. Clinical Infectious Diseases 2017; 64(2):1-33.

ATS, CDC, IDSA. Treatment of Drug-Susceptible Tuberculosis. Clinical Infectious Diseases 2016; 63(7):147-95.

Association of Public Health Laboratories. Updated information on how to use and interpret IGRAs in the document: Implementation of Interferon Gamma-Release Assays.

CDC Core Curriculum on Tuberculosis: What the Clinician Should Know, Seventh edition 2021. Chapter 2: *Testing for Tuberculosis Infection*.

CDC website. Testing For Tuberculosis. Educational Resources.

CDC. Epidemiology and Prevention of Vaccine Preventable Diseases. Atkinson W, Hamborsky J, McIntyre L, Wolfe S., eds. 9th ed. Washington, DC: Public Health Foundation; 2006:24-25, 143.

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