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Tuberculosis (TB) Screening and Diagnosis

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Wisconsin Tuberculosis (TB) Program
Northeast TB Summit
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TB Screening and Diagnosis

- Overview of TB in Wisconsin
- Difference between TB and LTBI
- TB Disease
- Latent TB Infection (LTBI)
- LTBI Case Studies

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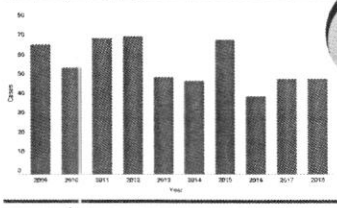
Tuberculosis Cases, Wisconsin 2009-2018



49 cases of tuberculosis were reported in Wisconsin in 2018

Case average
Wisconsin has had an average of 57 TB cases per year during the past 10 years.

Multi-drug resistance
Wisconsin's rate of multi-drug resistant TB is one of the highest in the U.S. Wisconsin treated 20 patients with MDR-TB in the past 10 years.

Deaths
In 2018, seven people died from TB or complications of the disease.

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DIFFERENCE BETWEEN TB AND LTBI

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LTBI versus TB Disease

Person with LTBI (Infected)	Person with TB Disease (Infectious)
Has a small amount of TB bacteria in his/her body that are alive, but inactive	Has a large amount of active TB bacteria in his/her body
Cannot spread TB bacteria to others	May spread TB bacteria to others
Does not feel sick, but may become sick if the bacteria become active in his/her body	May feel sick and may have symptoms such as a cough, fever, and/or weight loss

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LTBI versus TB Disease

Person with LTBI (Infected)	Person with TB Disease (Infectious)
Usually has a TB skin test or TB blood test reaction indicating TB infection	Usually has a TB skin test or TB blood test reaction indicating TB infection
Radiograph is typically normal	Radiograph may be abnormal
Sputum smears and cultures are negative	Sputum smears and cultures may be positive

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LTBI versus TB Disease

Person with LTBI (Infected)	Person with TB Disease (Infectious)
Encourage treatment for LTBI to prevent TB disease	Needs treatment for TB disease
Does not require respiratory isolation	May require respiratory isolation

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LTBI versus TB Disease

Person with LTBI (Infected)	Person with TB Disease (Infectious)
Category II communicable disease	Category I communicable disease
Report within 72 hours to patient's local health department (enter data into WEDSS* or complete case report form).	Immediately report by phone to patient's local health department. Within 24 hours, enter data into WEDSS* or complete case report form.

*WEDSS= Wisconsin Electronic Disease Surveillance System

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TB DISEASE

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TB Disease

- Airborne disease caused by the bacterium *Mycobacterium tuberculosis*
- Expelled when a person with infectious TB coughs, sneezes, shouts, or sings
- Transmission occurs when droplet nuclei (airborne particles) are inhaled and reach the alveoli of the lungs, via nasal passages, respiratory tract, and bronchi
- Usually considered a respiratory disease but can affect many other parts of the body.

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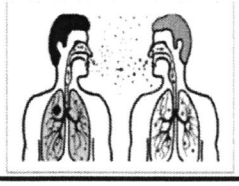
Tuberculosis

- 1.7 billion people infected worldwide (1/4 of the world's population)
- Estimated 10 million new cases of TB disease in 2017
- 1.6 million deaths in 2017
- US: 9,025 TB cases in 2018
- WI: 49 cases in 2018

http://www.cdc.gov/tb/education/corecurr/index.htm
http://www.who.int/tb/publications/global_report/en/



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Wisconsin TB Case Definition

- Communicable Disease Case Reporting and Investigation Protocol
- https://www.dhs.wisconsin.gov/publications/p01928.pdf

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Wisconsin TB Case Definition

- **Suspected:** symptoms and lab tests are consistent with tuberculosis, but diagnostic evaluations are not complete
- **Confirmed:** *M. tuberculosis* complex detected in culture (growth) or by nucleic acid amplification test (NAAT, DNA)
- **Clinical case:** lab results unable to confirm by culture or NAAT, but patient has signs and symptoms consistent with TB, improves on treatment, and has positive tuberculin skin test (TST) or interferon gamma release assay (IGRA) blood test.

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TB Screening and Diagnosis

Risk Assessment: form (F-02314)	**Symptom evaluation**	**Test for TB Infection:** tuberculin skin test (TST) or interferon gamma release assay (IGRA) blood test	**Chest Imaging:** Chest x-ray (CXR) or computed tomography (CT)	**Microbiology:** AFB smear, culture, nucleic acid amplification testing (NAAT)

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TB Screening and Diagnosis

Risk Assessment: form (F-02314)	**Symptom evaluation**	**Test for TB Infection:** tuberculin skin test (TST) or interferon gamma release assay (IGRA) blood test	**Chest Imaging:** Chest x-ray (CXR) or computed tomography (CT)	**Microbiology:** AFB smear, culture, nucleic acid amplification testing (NAAT)
This presentation	This presentation Dr. Misch (extrapulmonary)	This presentation	Dr. Kanne	Laura Louison

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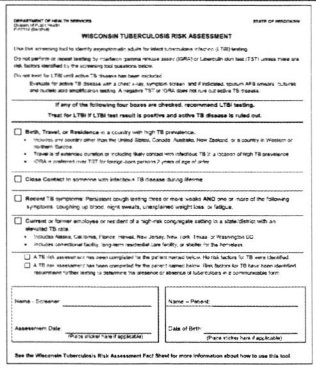
Wisconsin TB Risk Assessment Questionnaire

https://www.dhs.wisconsin.gov/tb/index.htm



WISCONSIN TUBERCULOSIS RISK ASSESSMENT

If any of the following four boxes are checked, recommend LTBI testing.
Treat for LTBI if LTBI test result is positive and active TB disease is ruled out.

☐ Birth, Travel, or Residence in a country with high TB prevalence.

☐ Close Contact to someone with infectious TB disease during lifetime

☐ Recent TB symptoms: Persistent cough lasting three or more weeks AND one or more of the following symptoms: coughing up blood, night sweats, unexplained weight loss, or fatigue.

☐ Current or former employee or resident of a high-risk congregate setting in a state-(tribe) with an elevated TB rate.

Name - Screener:
Assessment Date:
(Patient sticker here if applicable)

Name – Patient:
Date of Birth:
(Patient sticker here if applicable)

See the Wisconsin Tuberculosis Risk Assessment Fact Sheet for more information about how to use this tool.

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Wisconsin TB Risk Assessment

- Recently updated to align with national recommendations.
- Includes risk for infection and risk for progression.
- If the patient has any of the risks below, recommend LTBI testing.
- Risks for infection:
  - Birth, travel or residence in a country a high TB rate
  - Close contact to someone with infectious TB disease

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Wisconsin TB Risk Assessment

- Immune suppression alone is not a risk for acquiring TB infection.
- Risk for progression:
  - HIV infection
  - Current or planned immunosuppression (e.g., organ transplant, TNF-alpha antagonist, chronic steroids) in combination with risk for infection from above

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Wisconsin TB Risk Assessment

- Wisconsin has very low incidence of TB in healthcare, homeless, corrections and long-term care settings.
- A recent systematic review found that a low percentage of HCP have a positive TB test at baseline and upon serial testing (MMWR, 2019).
- Higher-risk congregate settings occur in Alaska, California, Florida, Hawaii, New Jersey, New York, Texas or Washington DC

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Wisconsin Populations at Risk for TB

- Immigrants and refugees from TB high-burden countries
- Lao-Hmong born outside the US
- Students and tech workers born in TB high-burden countries
- Hispanic or Latino migrant farm or livestock workers
- African American individuals in Southeast Wisconsin in the Milwaukee-Chicago corridor

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TB Signs and Symptoms

- Cough for more than three weeks with sputum production, bloody sputum
- Unexplained fever or fatigue for more than three weeks, chills
- Drenching night sweats
- Unexplained weight loss of more than ten pounds
- Enlarged lymph node
- Pain (in joint)
- Confusion (meningitis)

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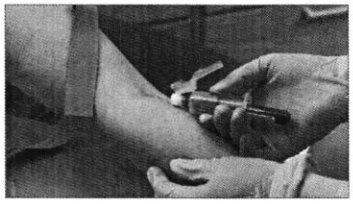

INTERFERON GAMMA RELEASE ASSAYS (IGRAs)

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Interferon Gamma Release Assays (IGRAs)

- Detect the presence of *M. tuberculosis* infection by measuring the immune response to TB proteins (antigens) in whole blood.
- Cannot differentiate between LTBI and active TB disease. Additional tests are needed to diagnose or rule out TB disease.
- Can be used in all situations in which CDC recommends tuberculin skin test (TST) as an aid in diagnosing *M. tuberculosis* infection.

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Interferon Gamma Release Assays (IGRAs)

Two IGRAs are commercially available and approved by the U.S. Food and Drug Administration (FDA) as aids in diagnosing *M. tuberculosis* infection:

- QuantiFERON®-TB Gold In-Tube test (Qiagen)
- T-SPOT®.*TB* test (Oxford Immunotec)

How IGRAs Work

- A whole blood sample is collected from the patient.
- During the assay:
  - Blood cells are exposed to TB-specific antigens (ESAT-6, CFP-10, TB7.7).
  - Interferon gamma is released from patient's activated white blood cells (T-cells) and measured.
- The amount of interferon gamma detected indicates whether the patient has been exposed to *M. tuberculosis* complex.

IGRA Results

Result	Description	Acceptable Value (IU/mL)	Significance
Mitogen	Positive Control	≥ 0.5 ≥ 20 spots	Addresses the immune competence of the patient's immune cells. A low mitogen result indicates inability to respond to an antigen.
Nil	Negative Control	≤ 8.0 ≤ 10 spots	Indicates the presence of any residual gamma interferon found in the patient's blood due to an ongoing immune response (infection) that can cause a false-positive result.
Patient Result	TB Antigen Minus Nil	See next slide	Quantitation of interferon gamma: Indicates patient's response to TB antigens.

IGRA Results

IGRA Test Result	QuantiFERON	T-SPOT	Notes
Positive	≥ 0.35	≥ 8 spots	Infection is likely
Negative	< 0.35	≤ 4 spots	Infection unlikely
Indeterminate or invalid	High nil value or low mitogen value	High nil value or low mitogen value	Not clinically interpretable. Occurs if controls do not perform as expected. Collect another specimen for retesting.
Borderline (equivocal)	Not applicable	5, 6 or 7 spots	Uncertain likelihood of TB infection. Collect another specimen for retesting.

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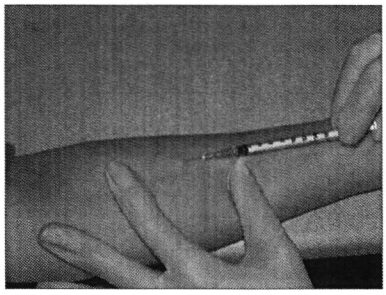
Tuberculin Skin Test (TST)



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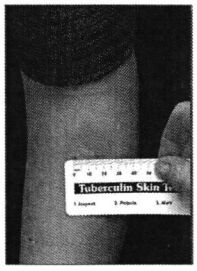
Tuberculin Skin Testing (TST)



- Five Tuberculin Units (TU) of Purified Protein Derivative (PPD)
- Read at 48-72 hours
- False positives include:
  - Non-Tuberculosis Mycobacteria (NTM)
  - Recent Bacillus Calmette-Guérin (BCG) vaccination
- Interpretation depends on person's risk factors

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TST Interpretation Reaction in Millimeters

≥ 5 mm induration is considered positive for:

- Persons infected with HIV*
- Recent contact of a person with infectious TB disease
- Persons with fibrotic changes on chest radiograph consistent with prior TB; and
- Patient with organ transplants and other immunosuppressed patients (including patients receiving the equivalent of ≥15mg/day of prednisone for ≥ 1 month or those taking TNF-α° antagonists.

* Human immunodeficiency virus. °Tumor Necrosis Factor –alpha inhibitor

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TST Interpretation Reaction in Millimeters

≥ 10 mm induration is considered positive for:

- Recent arrivals from high-prevalence countries
- Injection drug users
- Health care workers
- Residents and employees of high-risk congregate settings
- Mycobacteriology laboratory personnel
- Children < 4-years-old or child and youth exposed to adults at high-risk
- Persons with conditions that increase risk for progressing to TB disease including: silicosis, diabetes mellitus, chronic renal failure, certain types of cancer, gastrectomy or jejunoileal bypass and weight loss of at least 10% below ideal body weight

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TST Interpretation Reaction in Millimeters

≥ 15 mm induration is considered positive for:

- Persons with no known risk factor for TB disease
- Although TST testing programs should be conducted only among high-risk groups, certain individuals may required testing for employment or school attendance. An approach independent of risk assessment is not recommended by the Centers of Disease Control and Prevention (CDC).

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Chest Imaging

- Chest radiographs (x-ray or CT) are performed when there is a positive TST, IGRA or symptom screening evaluation.
- Findings suggestive of TB disease:
  - Nodules, opacities, granulomas, millets, infiltrate
  - Cavitation
  - "Tree in bud" patterns
  - Pleural effusion or thickening
  - Enlarged lymph nodes
- These findings often warrant sputum collection.

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Indications for Sputum Collection

- Initial diagnosis of TB: Collect a series of three sputum specimens, 8-24 hours apart, at least one of which is an early morning specimen.
- Optimally, diagnostic sputum should be collected before the initiation of drug therapy.
- Monitoring of therapy: Obtain sputum specimens for culture at least monthly until cultures convert to negative.

Centers for Disease Control and Prevention. Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Settings. MMWR 2005:54, RR-17

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Methods of Diagnosis: Microbiology

Method	Sensitivity for TB	What positive result looks like	Interpretation
Smear (view bacteria by microscope)	Poor	AFB smear positive # organisms per field Few/moderate/many	Does not confirm tuberculosis
Culture (growth of bacteria)	Very good	Isolated: *M. tuberculosis* complex	Confirms tuberculosis disease
PCR (detection of DNA)	Good	"*M. tuberculosis* complex DNA detected"	Confirms tuberculosis disease

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Case Study #1

- 45 year old male, born in U.S.
- Respiratory symptoms for several weeks
- QuantiFERON® negative
- Abnormal CXR
- Five sputum smears are all negative
- Work with foreign-born individuals through his job as a salesperson

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Case Study #2

- 75 year old woman from Laos
- Respiratory symptoms on and off for several months
- Diagnosed with asthma, allergies, COPD, pneumonia
- QuantiFERON® negative
- Abnormal CXR

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LATENT TUBERCULOSIS (TB) INFECTION

Claire Leback, RN, MPH
Tuberculosis Nurse Consultant
Wisconsin Tuberculosis Program
Nov 6th, 2019

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LTBI OVERVIEW

- Review key features
- Case definitions and reporting
- Employee screening & testing
- Testing interpretation
- Case studies

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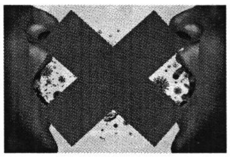
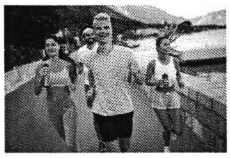
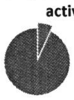
Review: Latent Tuberculosis Infection (LTBI) is different than active TB disease





Only a small % progress to active disease



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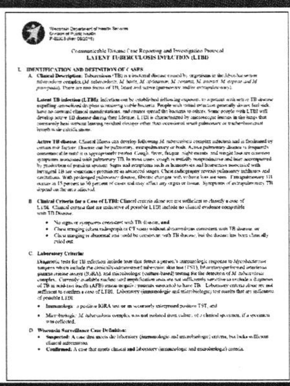
LTBI Reporting and Investigation Protocol

https://www.dhs.wisconsin.gov/publications/p02303.pdf

Report LTBI within 72 hours to the local health department.



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Case Definition for LTBI: Laboratory Criteria

- Immunologic:
  - Positive interferon gamma release assay (IGRA) blood test or
  - Positive tuberculin skin test (TST)
- Microbiologic:
  - Culture negative for *M. tuberculosis* complex (if specimen collected)

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Case Definition for LTBI: Clinical Criteria

- No signs or symptoms consistent with TB disease **AND**
- Chest imaging without abnormalities consistent with TB disease
- If chest imaging is abnormal and could be consistent with TB disease, then TB disease must be clinically ruled out.

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Case Definition for LTBI

- **Suspected:** A case that meets the laboratory (immunologic and microbiologic) criteria, but lacks sufficient clinical information
- **Confirmed:** A case that meets clinical **AND** laboratory (immunologic and microbiologic) criteria
- Both suspected and confirmed LTBI are reportable.

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Reporting and Documenting LTBI

For reporting:

- **Form F-02265 (LTBI Confidential Case Report)**
- Form F-44151 (Acute and Communicable Disease Case Report)

For documentation of follow-up:

- **Form F-44125 (LTBI Follow-Up Report)**

https://www.dhs.wisconsin.gov/tb/forms.htm

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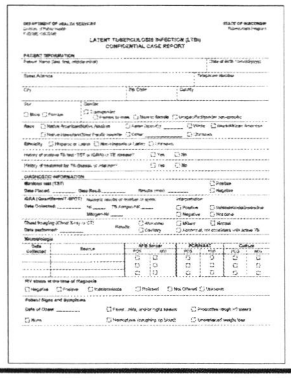
LTBI Confidential Case Report Form F-02265 (preferred)



LATENT TUBERCULOSIS INFECTION (LTBI)
CONFIDENTIAL CASE REPORT

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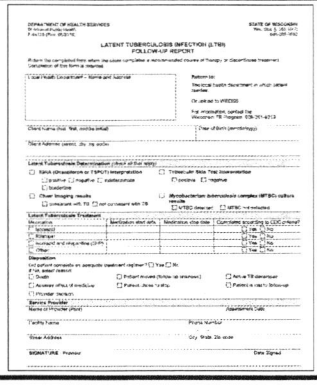
LTBI Follow-Up Report Form F-44125



LATENT TUBERCULOSIS INFECTION (LTBI)
FOLLOW-UP REPORT

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Knowledge Check

True/False: LTBI is reportable to the local health department within 24 hours.

False! LTBI is reportable within 72 hours. Active TB cases must be reported immediately.

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TB SCREENING FOR SPECIAL POPULATIONS

TB screening in healthcare settings is regulated by Wisconsin statutes and administrative codes.

- Requirements for screening upon hire for healthcare personnel (HCP) and caregivers
- Screening: TB risk assessment, symptom evaluation, TB testing

Administrative Code	Facility Type
DHS 124 (not enforceable)	Hospital
DHS 132	Nursing Home
DHS 133	Home Health Agency
DHS 83	Community Based Residential Facility

New Guidance for TB: Screening and Testing of HCP

Morbidity and Mortality Weekly Report

Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019

Lynn E. Sosa, MD[1,2]; Gibril J. Njie, MPH[3]; Mark N. Lobato, MD[2]; Sapna Bamrah Morris, MD[3]; William Buchta, MD[4,5]; Megan L. Casey, MPH[6]; Neela D. Goswami, MD[3]; MaryAnn Gruden, MSN[7]; Bobbi Jo Hurst[7]; Amera R. Khan, MPH[3]; David T. Kuhar, MD[8]; David M. Lewinsohn, MD, PhD[9]; Trini A. Mathew, MD[10]; Gerald H. Mazurek, MD[3]; Randall Reves, MD[2,11]; Lisa Paulos, MPH[2,12]; Wendy Thanassi, MD[2,13]; Lorna Will, MA[2]; Robert Belknap, MD[2,11]

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New MMWR 2019 Guidance: TB Screening and Testing of HCP

Testing	Old guidelines	New guidelines
Baseline IGRA or two-step TST	Yes, for all HCP, regardless of risk	Yes, for all HCP, regardless of risk
Serial (annual) testing using IGRA or TST	Based on risk classification of facility	**Not recommended**
IGRA or TST for HCP upon unprotected exposure to *M. tuberculosis*	Perform a contact investigation (i.e. administer one test as soon as possible at the time of exposure, and if result is negative, perform another test 8-10 weeks after the end of exposure to *M. tuberculosis*).	

IGRA, interferon gamma release assay; TST, tuberculin skin test

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New MMWR 2019 Guidance: TB Screening and Testing of HCP

Annual testing:

- A systematic review found a low percentage of U.S. HCP have a positive TB test at baseline and upon serial testing.
- No routine serial TB testing is recommended at any interval after baseline in the absence of a known exposure or ongoing transmission.

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New MMWR 2019 Guidance: TB Screening and Testing of HCP

- Encourage treatment for all health care personnel with untreated LTBI, unless treatment is contraindicated
- Annual symptom screening for health care personnel with untreated LTBI
- Annual TB education of all health care personnel
  - TB risk factors
  - Signs and symptoms of TB disease
  - TB infection and control policies and procedures

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What does HCP screening look like?

Screening and Testing New HCP:

- HCP should be tested upon hire using IGRA (preferred) or tuberculin skin test, include TB risk assessment, and symptom evaluation.
- Baseline screening and testing can:
  - Serve as a baseline should an exposure occur and a TB contact investigation be necessary
  - Facilitate detection and treatment of LTBI or TB disease in HCP before employment begins.
  - Risk assessment used to interpret test results

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What does HCP screening look like?

Screening New HCP:

- Baseline screening should be performed before assumption of duties in which HCP will have contact with patients.
- If TST is used as the baseline testing, 2-step testing is recommended for HCP who do not have a documented TST result during the previous 12 months or fewer than 2 TSTs over lifetime.[1]

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What does HCP screening look like?

Screening and Testing New HCP:

- At the discretion of the facility, previous documented negative IGRA or TST results may be used for employment.
  - A new baseline TB risk assessment and symptom evaluation should be performed.

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What does HCP screening look like after baseline?

Annual screening of HCP:

- Instead of annual testing, facilities can consider annual individual TB risk assessments.
  - Recognizes non-occupational exposures to TB.
- HCP should be educated on TB risk factors for infection and progression, the signs and symptoms of TB disease, and TB infection control policies.
- HCP with history of LTBI or previous positives should have symptom evaluation annually.

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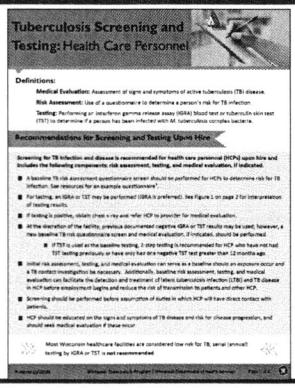
TB Screening and Testing in Healthcare Personnel


Tuberculosis Screening and Testing: Health Care Personnel

Definitions:

Medical Evaluation: Assessment of signs and symptoms of active tuberculosis (TB) disease.

Risk Assessment: Use of a questionnaire to determine a person's risk for TB infection.

Testing: Performing an interferon gamma release assay (IGRA) blood test or tuberculin skin test (TST) to determine if a person has been infected with M. tuberculosis complex bacteria.

Recommendations for Screening and Testing Upon Hire

Most Wisconsin healthcare facilities are considered low risk for TB; serial (annual) testing by IGRA or TST is not recommended.

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Screening in Wisconsin Schools

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Screening and testing in schools is regulated by WI DHS 118.25 and DHS 125

- School employees who are in contact with children or prepare food are required to have a physical examination, symptom evaluation, and TB risk assessment at hire.
  - TB testing needed if indicated by risk assessment.
- School bus drivers are required to have symptom evaluation, risk assessment, and testing at hire.

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WTBP Website>Forms

- Record for school employees, F-02284
- Risk Assessment for Public School Employees, F-02314A

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Screening in Corrections

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Screening in corrections is based on CDC recommendation and facility policy

- All facilities should screen all detainees for active TB disease.
  - Symptom evaluation, but can be chest radiograph, especially for certain high risk populations (e.g., HIV+).
- Some facilities should also test for TB infection.
  - Those that house a "substantial" number of detainees with risk factors or house long-term inmates (>1 year).
  - Test long-term inmates annually.
- All workers should have baseline and annual risk assessment, symptom evaluation, and testing if indicated.

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Knowledge Check

True/False: Healthcare personnel and caregivers should undergo annual testing.

False! It is not recommended that healthcare personnel and caregivers receive repeated/serial testing in the absence of known exposure or evidence of transmission.

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YOU'VE SCREENED & TESTED... NOW WHAT?

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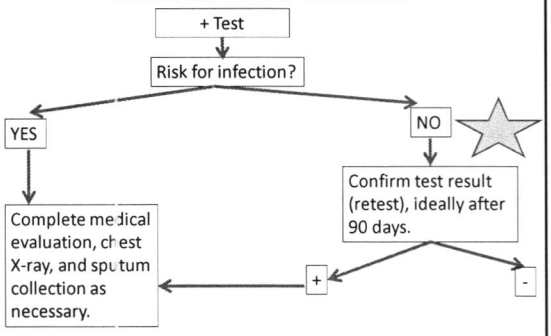
IGRA or TST Results: What Next?



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Interpretation of results for low-risk individuals

- Guidelines recommend confirmatory or dual testing for individuals unlikely to be infected. [4]
- Individuals unlikely to be infected and at low risk for progression should have a second test (IGRA or TST) performed.
- Low-risk individuals should be considered infected with *M. tuberculosis* only if both the first and second tests are positive. [4]

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Additional Tip: Look at IGRA numeric results to help evaluate low-risk patients

- Especially for patients with little or no risk for *M. tuberculosis* infection, numeric IGRA results are helpful to determine likelihood of infection.
- TB antigen values between 0.36 and 1.11 IU/mL were found to represent a "borderline" range. [2-8]
  - Results in this range may be considered a transient positive result with a high likelihood of reversion to negative upon retesting.

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TST-Induced IGRA Response Boosting: What does it mean?

- If an IGRA is performed three or more days after a TST, the numeric results might increase.
- This is because the TST causes an immune response within the patients' body which can subsequently be detected by IGRA testing.
- In studies, boosting occurred in both T-SPOT®*TB* and QFT-GIT® assays.
- Boosting occurred predominantly in IGRA-positive subjects, however a significant percentage (12.5%) also occurred in IGRA-negative subjects. [9]

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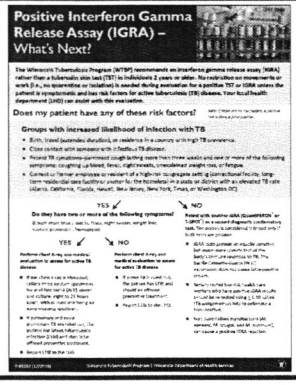
IGRA Positive: What's Next?



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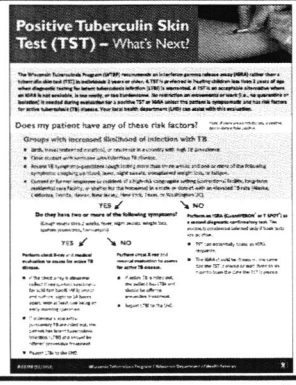
TST Positive: What's Next?



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LTBI CASE STUDIES

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Case study 1

55 y.o. Caucasian woman undergoes pre-employment testing by TST. Her result is 16mm. No symptoms. CXR is negative. No reported exposure, born in the U.S.

- What would you classify her risk as?
- What would you anticipate for next steps?

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Case Study 1

What would you classify her risk as?

A. Low risk
B. High risk

What would you anticipate for next steps?

A. Order LTBI medications
B. Perform second, confirmatory test
C. Collect sputum

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Case study 2

29 y.o. Asian male undergoes testing by QFT for his graduate school program. Results are as follows nil=0.05, Tb1-nil=0.76, Tb2-nil=0.56, Mit=>10.0. No symptoms. CXR is negative. No reported exposure, born in China.

- What would you classify his risk as?
- What would you anticipate for next steps?

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Case study 2

What would you classify his risk as?

A. Low risk
B. High risk

What would you anticipate for next steps?

A. Order LTBI medications
B. Perform a second test
C. Collect sputum

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Questions?

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References

1. P. Jensen, L. Lambert, M. Iademarco, R. Ridzon, Division of Tuberculosis Elimination, National Center for HIV, STD, and TB Prevention. "Guidelines for preventing the transmission of mycobacterium tuberculosis in health-care settings, 2005." *MMWR*, vol. 54, RR 17, pp1-141, 2005.

2. R. Belknap, J. Kelaher, K.Wall et al., "Diagnosis of latent tuberculosis infection in U.S. health care workers: reproducibility, repeatability and 6 month follow-up with interferon-γ release assays (IGRAs)," *American Journal of Respiratory and Critical Care Medicine*, vol. 179, Article ID A4101, 2009.

3. J. T. Costa, R. Silva, R. Vaz, M. J. Cardoso, and A. Nienhaus, "Serial testing with the interferon-γ release assay in Portuguese healthcare workers," *International Archives of Occupational and Environmental Health*, vol. 84, no. 4, pp. 461–469, 2011.

4. K. S. Fong, J. W. Tomford, L. Teixeira et al., "Challenges of interferon-γ release assay conversions in serial testing of health care workers in a tuberculosis control program," *Chest*, vol. 142, no. 1, pp. 55–62, 2012.

5. D. Lewinsohn et al. Official American Thoracic Society/Infectious Diseases Society of America/Centers for Disease Control and Prevention Clinical Practice Guidelines: Diagnosis of Tuberculosis in Adults and Children. Clin Infect Dis 2017; 64 (2): 111-115.

6. M. Pai, R. Joshi, S. Dogra et al., "Serial testing of health care workers for tuberculosis using interferon-γ assay," *American Journal of Respiratory and Critical Care Medicine*, vol. 174, no. 3, pp. 349–355, 2006.

7. A. Schablon, M. Harling, R. Diel et al., "Serial testing with an interferon-γ release assay in German healthcare workers," *GMS Krankenhhygiene Interdisziplinär*, vol. 5, no. 2, Article ID Doc05, 2010.

8. W. Thanassi, A. Noda, B. Hernandez, J. Newell, P. Terpeluk, D. Marder, JA Yesavage. Delineating a retesting zone using receiver operating characteristic analysis on serial QuantiFERON tuberculosis test results in US healthcare workers. Pulm Med 2012;2012:291294.

9. R. Van Zyl-Smit, M. Pai, K. Peprah, R. Meldau, J. Kieck, J. Juritz, M. Bardi, A. Zumla, L. Sechi, E. Bateman, K. Dheda. Within-subject variability and boosting of T-cell interferon-γ responses after tuberculin skin testing. *American Journal of Respiratory and Critical Care Medicine* , vol. 180, pp. 49-58, 2009.

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