VANDERBURGH COUNTY HEALTH DEPARTMENT
Prevent. Promote. Protect. Partner.

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Accredited Health Department • PHAB Advancing Public Health Performance • Public Health Accreditation Board

September, 2023

Dear Health Care Provider:

Children and staff at McGary Middle School have been identified as contacts to an active tuberculosis (TB) case. The likely period of exposure was from 9/1/2022 to 4/25/2023. Due to this exposure, your patients may require clinical evaluation for latent TB infection (LTBI) or active TB disease as soon as possible. Testing has been offered at the schools in May and August by the Vanderburgh County Health Department free of charge. Any testing request outside the Vanderburgh County Health Department school testing dates will not be covered financially. Children and adolescents are among the most at risk for progression to active TB disease, which makes identification of latent TB infection so vital for young patients.

Included below for your information are two algorithms that summarize the process for performing such evaluations. In particular, note the following key concepts that should be following in evaluating a patient who has been exposed to TB, regardless of age or other clinical characteristics:

- The recommendations from the American Academy of Pediatrics (AAP) recommend the use of TB blood tests (IGRAs) instead of TB skin tests (TSTs) – enabling faster, reliable results for children identified to be at risk for latent TB
- IGRAs are preferred in children ages 2 and older, especially if they have received a BCG vaccine
- IGRAs are preferred in children of any age that are unlikely to return for a skin test reading
- Patients with a positive testing and/or symptom consistent with TB disease should receive further diagnostic testing to evaluate the patient for possible active TB disease. Such evaluation should include a chest x-ray and, if indicated (e.g., if the chest x-ray is abnormal), the collection of three sputum specimens or other appropriate diagnostic specimens
- Symptoms of TB disease include prolonged cough (duration of >3 weeks), chest pain, hemoptysis, fever, chills, night sweats, weight loss, appetite loss, and fatigue

- The Vanderburgh County Health Department TB Prevention and Control Program maintains a medication service through which TB medications are provided free of charge for any person in Indiana for whom treatment of LTBI or TB disease is prescribed

A slide deck has been provided with information relating to management of possible active tuberculosis case in the outpatient setting.

Please use below attached form to record the results of your patient's evaluation and fax the form to VCHD at 812-435-6264. The health department is responsible for tracking the outcome of local TB contact investigations and reporting the data to the Indiana Department of Health. Returning this form will facilitate complete reporting of this information.

If you have any questions about this information, please call 812-435-5830. Thank you for your assistance in this important TB prevention and control activity.

Sincerely,

The Vanderburgh County Health Department

ANMC Pediatric Tuberculosis Testing Guideline

Indications for TB testing

- Suspected TB disease, *or*
- Exposed to a source patient with infectious tuberculosis, *or*
- If screening required for work/school etc, *or*
- Recently immigrated (<2 years) from a country with high TB prevalence

Tuberculin Skin Testing (aka PPD or TST) vs. Interferon Gamma Release Assay (IGRA)

Tuberculin Skin Testing (TST) is reasonable in children of all ages requiring testing for TB infection:

- Requires second visit for reading at 48-72h
- Results available faster than IGRA, generally preferred for inpatients
- Cross-reacts with BCG vaccination and Non-tuberculous mycobacteria
- Inter-observer variability confounds interpretation
- Induration >5 mm should be considered positive

Interferon-Gamma Release Assay (IGRA) may be used in patients over 1 year of age, and is preferred if:

- History of BCG vaccination
- Unlikely/unable to return to have TST read
- Urgent results not needed (turn-around time 5-7 days)

AFB smear/culture and PCR sampling

Required if **either** of the following:

- Signs or symptoms suggestive of TB disease
  - >2 weeks of cough, *and/or*
  - Unexplained fever, *and/or*
  - Lethargy, *and/or*
  - Drenching sweats, *and/or*
  - Hemoptysis, *and/or*
  - Unexplained weight loss
- Chest radiograph (CXR) suggestive of active tuberculosis
- Testing should include 3 AFB Culture and 2 AFB PCR Mtb Cmplx

Testing for Active Pulmonary TB

Expectorated sputa x3 q8h preferred in all ages *(Zar, H, Arch Dis Child. 2000 Apr; 82(4): 305-308)*

- If no productive cough, RT to induce sputa with hypertonic saline
  - "Orders for Respiratory Sputum Induction"
  - 5mL of 3% hypertonic saline after albuterol MDI x15'
    - NPO for 2 hours prior to induction
  - If unable to expectorate, collect samples by NP aspirate
  - 1 of 3 MUST be early AM collection
- Gastric aspirates should rarely be required
- If extra-pulmonary TB suspected, contact Pediatric Infectious Diseases for testing recommendations

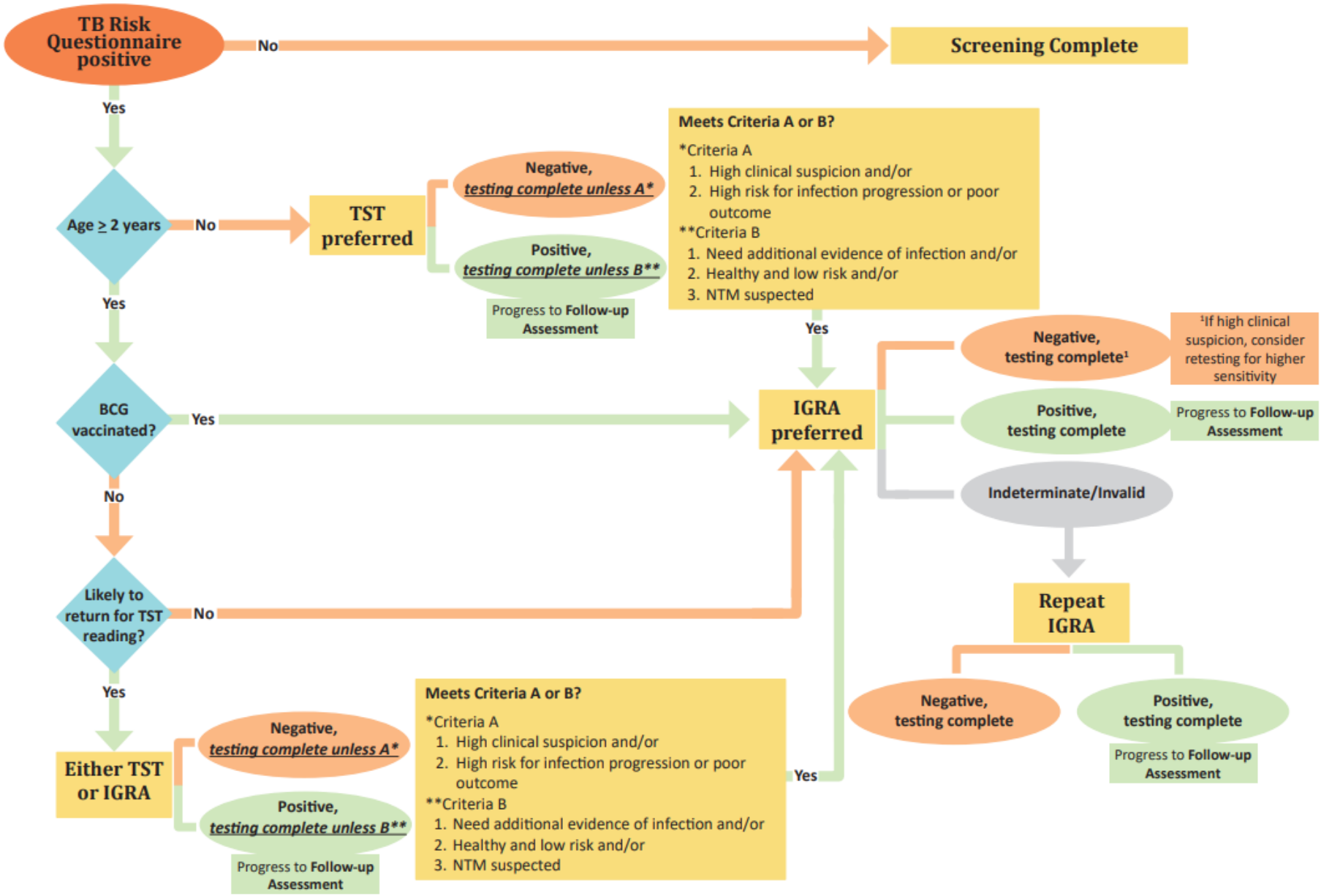
Considerations

- Consider Pediatric Infectious Diseases consultation for all suspected cases of active tuberculosis in children **or** for children <5y who are exposed to active tuberculosis
- Airborne isolation is required for inpatients with suspected pulmonary TB until MTB PCR is negative x2 from sputa, bronchoscopy, or gastric aspirate. For questions please refer to ANMC Infection Control Policies for airborne isolation when ruling out pulmonary TB.
- A negative IGRA or TST does not rule out active TB.
- A positive IGRA or TST indicates a person is infected with TB. Symptoms of active TB (>2 weeks of cough, unexplained fevers, lethargy, drenching sweats, unexplained weight loss, or hemoptysis) or CXR consistent with pulmonary TB defines **TB disease**. AFB smears, cultures, and PCRs should be obtained and treatment considered.
- A positive IGRA or TST in a child WITHOUT symptoms who has a NORMAL CXR defines **Latent TB infection (LTBI)** and treatment should be offered. It is NOT necessary to collect AFB samples prior to treatment in children WITHOUT symptoms who have a NORMAL CXR. Treatment options include INH, rifampin, or INH/rifapentine. Contact Pediatric Infectious Diseases for questions regarding LTBI therapy in children.
- Live virus vaccines including MMR, rotavirus, varicella, yellow fever, and live-attenuated influenza vaccine may temporarily suppress tuberculin and presumably IGRA reactivity for 4–6 weeks. A TST can be applied or blood can be drawn for an IGRA at the same visit during which these vaccines are administered (i.e., before substantial replication of the vaccine virus); otherwise, non-urgent testing should delayed 4–6 weeks post vaccination.
- Consultation with Alaska Section of Epidemiology TB Program should be done for all active TB infections (Ph # 269-8000). Consultation about testing and treating TB disease and LTBI is available if needed.
- **Definitions:** IGRA- Interferon-Gamma Release Assay (Quantiferon TB Gold, not currently available in all areas of Alaska); INH- Isoniazid; LTBI- Latent Tuberculosis Infection; MTB- *Mycobacterium tuberculosis*; PCR- Polymerase chain reaction; TST- Tuberculin Skin Testing

Antimicrobial Stewardship Program Approved October 2019; Updated October 2021

References: CDC. 3HP FAQs for Providers. (Updated June 26, 2018) Available at: https://www.cdc.gov/tb/education/FAQforProviders.htm; State of Alaska Epidemiology Bulletin. Update on Screening and Treatment for Latent Tuberculosis Infection: Treating TB Infection to Prevent TB Disease. 2018: Volume 20(5). Available at: http://www.epi.alaska.gov/bulletins/docs/rr2018_05.pdf

Screening for TB with TST and IGRA in Children

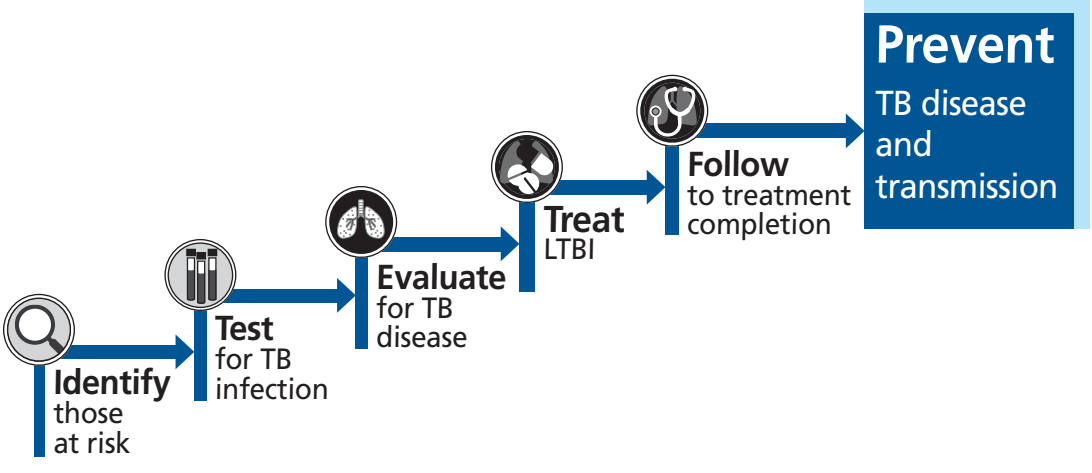


Adapted from the American Academy of Pediatrics Red Book 2018 Committee on Infectious Diseases Chapter 3 Tuberculosis; Figure 3.11.

2021

Diagnosis and Treatment of Latent Tuberculosis Infection (LTBI) in Adults

Content based on national TB guidelines with consideration for practical applications



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Identify, Test, and Treat LTBI in Adults

Test individuals with risk factors for TB infection or host risk for progression to TB disease. *Testing is not recommended in those without risk factors.* LTBI diagnosis is based on tuberculin skin test (TST) or interferon-gamma release assay (IGRA) result and exclusion of TB disease. Evaluate for TB disease before initiating LTBI treatment. Expert consultation is available from state or local health departments; consultation is recommended for diagnosis of TB disease or of LTBI in complex clinical situations (e.g., those on or about to start immunosuppressive therapy).

Identify these adults and test for TB infection	Consider positive if	Evaluate for TB disease
❑ Birth, residence, or extended travel (>1 month) to a country with increased TB prevalence (countries other than the US, Canada, Australia, New Zealand, or in western or northern Europe)	IGRA (+) or TST ≥10 mm (≥5 mm if immunosuppressed)	• Clinical evaluation • Assessment for signs and symptoms • Radiography • Microbiological exams (if indicated) **Treat for LTBI if TB disease is excluded[3]**
❑ Current or planned immunosuppression (e.g., biologic response modiers such as TNF-α antagonists, systemic corticosteroids equivalent to ≥15 mg prednisone/day, organ transplantation, or HIV infection) *See Additional Considerations*	IGRA (+) or TST ≥5 mm	
❑ Household contact or recent exposure to a person with TB disease[1]	IGRA (+) or TST ≥5 mm IGRA (–) or TST <5 mm **AND** immunosuppressed → **Window period treatment[2]**	
❑ Current or former residents of high-risk congregate settings (e.g., homeless shelters and correctional facilities); consider local epidemiology	IGRA (+) or TST ≥10 mm (≥5 mm if immunosuppressed)	

ADDITIONAL CONSIDERATIONS

- Persons living with HIV: Test for LTBI at HIV diagnosis and again after immune reconstitution; consider repeat or annual testing in those at high risk for ongoing exposure to active TB
- Persons on immunosuppressive therapy: Test for LTBI prior to treatment initiation; repeat testing is recommended for those who live, work, or travel in situations where TB exposure is likely
- Other medical conditions that increase the risk of progression to TB disease: Identifying risk, diagnosing, and treating LTBI is a priority in persons with certain medical conditions. This includes: poorly controlled diabetes, chronic renal failure, prior healed TB on CXR without a history of appropriate treatment, IV drug use, lymphoma or leukemia, etc.
- Repeat testing: Periodic testing may be warranted in those with medical conditions that increase the risk of progression or other groups (e.g., residents of high-risk congregate settings) based on history and local epidemiology (risk of exposure)
- Health care personnel: Should receive a TB risk assessment, symptom screen, and baseline testing for TB infection at hire (unless documentation of previous positive result). Serial testing is not recommended unless there is known exposure or ongoing transmission
- Reporting: TB is a reportable disease; LTBI is reportable in some areas
- Vaccines: Some vaccines, e.g., live-virus vaccines, may affect the accuracy of TB testing. For guidance on COVID-19 vaccines and TB testing, visit tbcontrollers.org/resources/tb-and-covid-19/

1. Retest contacts who have an initial negative result 8-10 weeks after last exposure (based on time needed to develop an immune response).
2. In more severely immunosuppressed adult contacts, empiric initiation of LTBI therapy (window period treatment) in consultation with the local health department may be indicated. In some situations, treatment *may* be continued to completion (with expert consultation) even if the repeat test is negative, as false negative tests are more likely in this group.
3. Patient age and length of time since infection should not be a barrier to LTBI treatment.

Select a Test

Two types of tests are available: blood-based IGRAs and the TST:

- Neither test can distinguish between LTBI and TB disease
- A negative result from either or both tests does not exclude LTBI or TB disease
- Test results may remain positive for the patient's lifetime, even after treatment for LTBI

Recommendation for type of test in adults:

- IGRAs are generally preferred though TST is acceptable; test selection may depend on availability, logistics, and resources
- IGRAs are strongly preferred in BCG-vaccinated persons and those who are unlikely to return for interpretation of TST result

IGRAs available in the United States

QuantiFERON®-*TB* Gold Plus (QFT-Plus)	T-SPOT®.*TB*
• Results reported as positive, negative, or indeterminate	• Results reported as positive, negative, invalid, or borderline
• Indeterminate results: Do not have diagnostic interpretation; may be a result of an error in performing the test or immunosuppression. Repeat IGRA or administer TST	• Invalid results: Do not have diagnostic interpretation; may be a result of testing/laboratory issues, patient health or improper specimen handling. Repeat IGRA or administer TST • Borderline results: Quantitative values are near but not reaching the threshold for positivity and result interpretation will depend on patient risk factors. In general, the test should be repeated

TSTs

- Require two patient visits
- Interpretation of result is based on size of reaction in mm, risk for TB infection, and risk for progression; *see previous panel*

Expert consultation is suggested when test results are inconsistent with the clinical picture (e.g., positive tests in a person with low risk), borderline T-SPOT®.*TB* results, or results close to the cut point with QFT-Plus.

Dual testing with both TST and IGRA is not routinely recommended, but *may* be indicated in some situations:

- **Likely to be infected AND**
- **High risk of developing disease**

(e.g., born in a country with high TB prevalence **and** starting immunosuppressive therapy)

\+ Initial test is **NEGATIVE** → Consider dual testing to increase sensitivity → Considered infected if **EITHER** test is positive*

- **Low risk of infection[1] AND**
- **Low risk of progression**

(e.g., healthy US-born college student with no known risk factors)

\+ Initial test is **POSITIVE** → Consider dual or repeat testing to identify false positive results → Considered infected if **BOTH** tests are positive*

Consider expert consultation when both results are available; see resources for more information

- An IGRA may be used for confirmation in TST-positive BCG-vaccinated persons
- Some experts recommend using both tests to increase sensitivity for those who are about to start immunosuppressive therapy, or those who are already on immunosuppressive therapy and have not been tested

1. Testing is NOT recommended in this group, but may be required by law or for credentialing. An IGRA is preferred. Either a TST or IGRA may be used for the second test. A TST result of ≥15 mm is considered positive in those without risk factors.

Treatment of LTBI in Adults[1]

Shorter rifamycin-based regimens are preferred over isoniazid monotherapy

Exclude TB disease with clinical evaluation including symptom screen, chest radiograph, and other studies as indicated before starting LTBI treatment

TREATMENT REGIMENS

PREFERRED

REGIMEN	ADULT DOSAGE	COMPLETION CRITERIA	USE IN ADULTS
3 Months of Once-Weekly Isoniazid (INH) Plus Rifapentine[2]	**Isoniazid** 15 mg/kg rounded to nearest 50 or 100 mg; 900 mg max **Rifapentine** Weight (kg) / Dose (mg) 25.1–32.0 / 600 32.1–49.9 / 750 ≥50 / 900 max	12 doses within 16 weeks	Recommended for all adults, including people living with HIV (as drug interactions allow) Not indicated for: ➢ Persons with *M.tb* infection that is presumed resistant to INH and/or rifampin ➢ Persons who had prior adverse events or hypersensitivity to INH, rifampin, or rifapentine ➢ Women who are pregnant or expecting to become pregnant
4 Months of Daily Rifampin	10 mg/kg; 600 mg max	120 doses within 6 months	Recommended for HIV-negative adults Careful consideration is recommended when using this regimen in severely immunosuppressed persons; *see considerations column*
3 Months of Daily Isoniazid Plus Rifampin[3]	**Isoniazid** 5 mg/kg; 300 mg max **Rifampin** 10 mg/kg; 600 mg max	90 doses within 4 months	Recommended for all adults, including people living with HIV (as drug interactions allow)

ALTERNATIVE

6 or 9 Months of Daily Isoniazid[4]	5 mg/kg; 300 mg max	**6 months:** 180 doses within 9 months **9 months:** 270 doses within 12 months	6 months of INH is recommended for treatment of all adults 9 months of INH is also acceptable May be used when preferred regimens are contraindicated

PATIENT EDUCATION AND ADHERENCE

- Educate patients about importance of good adherence at treatment initiation and throughout treatment
- Explain possible side effects and adverse drug reactions and provide patients with written information
- **Advise to promptly seek medical evaluation for adverse reactions and provide guidance for when to stop treatment in the case of serious adverse reactions**
- Support adherence to ensure successful completion by:
  - Identifying and addressing possible barriers to adherence (appointment conflicts, misinformation about TB, health beliefs and practices, limited financial resources, co-morbidities, side effects, language barriers, and stigma)
  - Collaborating with community agencies to obtain incentives and/or enablers, case management, or in-person or video-based directly observed therapy (DOT); DOT is preferred by many health departments for those at high risk of progression to severe forms of disease and/or if there is evidence of non-adherence
  - Providing effective patient-centered education with opportunities to bring up concerns or questions
  - Discussing pill burden with the patient; although the 12-dose isoniazid-rifapentine regimen has a higher pill burden per dose than other regimens, the total number of doses is much lower

1. Based on Guidelines for the Treatment of Latent Tuberculosis Infection: Recommendations from the National Tuberculosis Controllers Association and CDC, 2020 cdc.gov/mmwr/volumes/69/rr/pdfs/rr6901a1-H.pdf. State or local health department guidelines may differ.
2. Can be self administered or provided by DOT based on local practice, individual patient attributes and preferences, and other considerations, including risk for progression to severe forms of TB disease.
3. Included in the above referenced 2020 NTCA/CDC LTBI treatment guidelines as a conditional recommendation with limited evidence.
4. Twice-weekly dosing may be used if daily dosing cannot be provided; however, it must be delivered by DOT. See Table 4 in 2020 NTCA/CDC LTBI treatment guidelines for additional information.

Treatment of LTBI in Adults

ADVERSE DRUG REACTIONS (ADRs) AND CONSIDERATIONS FOR ALL REGIMENS

Adverse Drug Reactions

Serious adverse drug reactions are rare. The risk of hepatotoxicity is minimal in most patients and should not deter treatment. However, periodic monitoring is recommended. In case of possible severe ADRs, discontinue treatment and provide supportive medical care as indicated.

Isoniazid: Hepatic enzyme elevation, rash, peripheral neuropathy, mild CNS effects

Rifampin and rifapentine: GI intolerance, hepatitis, bleeding problems (from gums or other sites), easy bruising, flu-like symptoms

More commonly associated with 12-dose isoniazid-rifapentine regimen: Hematologic toxicity, hypersensitivity reaction (e.g., hypotension or thrombocytopenia)

Considerations for Treatment

- Rifamycin-based regimens should be used whenever possible, based on individual patient attributes and preferences including potential for drug-drug interactions, local practice, and drug susceptibility results of the presumed source case, if known
- 6 or 9 month INH regimens have lower treatment completion rates than shorter-rifamycin based regimens, but may be used when the preferred regimens are contraindicated due to intolerance, resistance, or drug interactions
- Rifamycin-associated drug interactions include, but are not limited to, hormonal contraceptives, certain HIV antiretrovirals, methadone, and anticoagulants
  - **Weekly** rifapentine has fewer drug interactions than rifabutin, which has fewer interactions than rifampin; thus the 12-dose rifapentine containing regimen can be considered when rifampin is contraindicated
  - Rifabutin has a lower drug interaction profile than rifampin; to minimize drug-drug interactions, consider use of rifabutin in place of rifampin in the 4-month rifampin regimen
  - See clinicalinfo.hiv.gov for current guidelines on treatment for LTBI in people living with HIV and information on drug-drug interactions with HIV antiretrovirals
- Hepatitis risk increases with age, alcohol use, and concurrent use of other hepatotoxic drugs
- Potential for acquired drug resistance if TB disease is not adequately excluded is an important consideration for all regimens
- In any persons with severe immunosuppression (e.g., those on biologic response modifiers such as TNF-α antagonists or those living with HIV who have low CD4 lymphocyte counts), there is an increased risk of subclinical, atypical, or asymptomatic disease. Rifampin resistance could develop if a person is inadvertently treated with rifampin monotherapy for LTBI, when they actually have TB disease
- Women who become pregnant while on LTBI treatment should consult their provider
- If interruptions in therapy occur such that patients cannot complete treatment within the recommended time frame, treatment should be restarted, after a careful evaluation for TB disease
- Patients on INH containing regimens:
  - Pyridoxine (vitamin B6) should be added for pregnant women, patients with malnutrition, alcoholism, diabetes, and those with other conditions associated with neuropathy. Give 50 mg/week with the 12-dose isoniazid-rifapentine regimen and 25–50 mg/day with other INH containing regimens
- Patients on rifamycin containing regimens:
  - Patients should be educated that temporary orange discoloration of urine, sweat, tears, and other bodily fluids is a normal and expected side effect
  - Women who use hormonal birth control should be instructed to **add, or switch to a barrier method**

MONITORING & EVALUATION FOR ALL PATIENTS

Provide education and discuss monitoring plan with patients at treatment initiation.

Clinical monitoring: Patients should be evaluated monthly for:

- Adherence to the prescribed regimen
- Signs and symptoms of TB disease
- Adverse reactions:

  Evidence of hepatotoxicity such as:
  - Nausea or vomiting
  - Abdominal pain or tenderness (especially in right upper quadrant)
  - Anorexia
  - Jaundice

  Other adverse reactions such as:
  - Fever
  - Rash
  - Persistent paresthesia
  - Fatigue ≥3 days
  - Easy bruising/bleeding
  - Arthralgia

  Systemic drug reactions and influenza-like syndrome is usually self-limiting and mild, but can rarely include severe reactions such as syncope and hypotension (more frequently associated with the 12-dose isoniazid-rifapentine regimen).

  If adverse reactions occur, a prompt clinical evaluation is necessary with treatment changes as indicated.

Laboratory Monitoring: Routine monthly monitoring of liver function tests (LFTs) is not generally indicated.

- **Baseline LFTs are indicated for those:**
  - With a history of liver disease or liver disorders
  - Living with HIV
  - Who are regular alcohol users
  - Who are pregnant or <3 months postpartum
  - Taking other potentially hepatotoxic drugs (e.g., anti-convulsants) or over-the-counter drugs (e.g., acetaminophen)
- **LFT monitoring based on clinical scenario is indicated for:**
  - Persons at risk for, or with a history of liver disease
  - Persons who have abnormal baseline LFTs
  - Those who develop symptoms consistent with hepatotoxicity
- **Medications should be withheld and patients evaluated if:**
  - Transaminase levels ≥3 times upper limit of normal in presence of symptoms
  - Transaminase levels ≥5 times upper limit of normal in asymptomatic patients

  When LFTs have returned to normal, consider an alternate regimen, with close clinical and laboratory monitoring. Consult a TB expert

Report adverse events to CDC Division of Tuberculosis Elimination by sending an email to ltbidrugevents@cdc.gov and to FDA MedWatch at accessdata.fda.gov/scripts/medwatch/index.cfm or 1-888-INFO-FDA).

Diagnosis and Treatment of LTBI in Adults

Identify those at risk

This includes those at risk for TB infection and/or those at risk for progression to TB disease:

- Birth, travel, or residence in a country with increased TB prevalence
- Immune suppression
- Close contact to person with infectious TB
- Residence in high-risk congregate settings

Consider use of a risk assessment tool

Test for TB infection

Use IGRA or TST as appropriate to test for TB infection:

- IGRAs generally preferred in adults
- IGRAs strongly preferred in BCG-vaccinated and those unlikely to return

Consider risk of infection and progression to disease when interpreting results

Positive tests do not distinguish LTBI from TB disease

Evaluate for TB disease

Exclude TB disease in those with positive testing:

- Clinical evaluation
- Symptom screen
- Chest radiograph (other studies based on history and physical)
- Microbiological testing, if indicated

LTBI diagnosis is based on IGRA or TST result and exclusion of TB disease

Treat LTBI

Select appropriate regimen based on medical history, clinical characteristics, and patient preference

Shorter rifamycin-based regimens are preferred and have higher completion rates and in general, have lower toxicity

Follow to treatment completion

Monitor patient monthly to assess for adverse reactions and adherence

Provide education and supportive services to enhance adherence

Prevent

TB disease and transmission

For additional resources

Consultation is available from your TB program:
cdc.gov/tb/links/tboffices.htm

Regional TB Centers of Excellence
cdc.gov/tb/education/tb_coe/default.htm

California TB Risk Assessment Tools
cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Risk-Assessment.aspx

Educational materials and consultation are available at globaltb.njms.rutgers.edu

FAQs

Q: What is TB?
A: Tuberculosis (TB) is a disease caused by a bacteria called Mycobacterium tuberculosis. The bacteria can infect any part of the body, but most of the time it affects the lungs.

Q: How is TB transmitted?
A: TB bacteria are expelled into the air when a person who has TB disease of the lungs or throat coughs, sneezes, speaks or sings. These bacteria can remain in the air for several hours, depending on the environment.
TB is NOT spread by

- Shaking someone's hand
- Sharing food or drink
- Touching bed linens or toilet seats
- Sharing toothbrushes
- Kissing
- Touching someone who has TB

Q: What is latent TB infection (LTBI)?
A: Not everyone infected with TB bacteria become sick. As a result, two TB-related conditions exist: latent TB infection and TB disease. Latent TB infection occurs when TB bacteria live in the body without causing sickness. This is because the body is able to fight the bacteria to stop them from growing.
People with latent TB infection (LTBI):

- Have no symptoms
- Don't feel sickness
- Can't spread TB bacteria to others
- Usually have a positive TB skin test reaction or positive TB blood test
- May develop TB disease if they do not receive treatment for latent TB infection

However, if latent TB bacteria become active in the body and multiply, the person becomes sick with TB disease. For this reason, people with LTBI should be treated to prevent them from developing TB disease.
About 10% of the people who have latent TB infection will develop active disease at some time in their life.

Q: What is TB disease?
A: TB bacteria become active when the immune system is unable to stop the bacteria from growing. When TB bacteria are active (multiplying in your body), this is called TB disease. People with TB disease:

- Are sick
- They may be able to spread the disease to others
- TB disease can develop soon after infection or years later when their immune system becomes weak for another reason

Q: What are the symptoms of TB disease:
A: Symptoms of TB disease include

- A bad cough that lasts three weeks or longer
- Pain in the chest

- Coughing up blood or sputum
- Weakness or fatigue
- Weight loss
- Chills
- Fever
- Sweating at night

Q: What are the tests for TB infection?
A: There are two types of tests for TB infection: the TB blood test and the TB skin test. The Vanderburgh County Health Department is conducting TB blood tests.

TB Blood Test: uses a blood sample to find out if you are infected with TB bacteria.

This is done either by the health department or at your doctor's office. Your blood is sent to a laboratory for analysis and results. Only one visit is required to draw blood for the test.

A positive TB blood test means that you have been infected with TB bacteria. Additional tests are then indicated to see if you have TB disease. These tests include a chest Xray. They may also include a test of sputum you cough up. Because TB bacteria can be found in other places in your body other than your lungs, your provider may check urine, obtain other tissues samples, or do other tests. Without treatment, latent TB infection can progress to TB disease. These additional tests and a complete physical examination help to determine whether you have latent TB infection (that is you are not sick or infectious) or have TB disease (are sick). If you have latent TB infection, you should be treated to prevent the development of TB disease. If you have TB disease, you will need to take medicine to treat the disease.

Q: Is TB fatal?
A: If not treated properly, TB disease can be fatal.

Some people develop TB disease soon (within weeks) after becoming infected, before their immune system can fight the TB bacteria. Other people become sick years later, when their immune system becomes weak for another reason. Many people with TB infection never develop TB disease.

Q: What is the definition of a close contact?
A: Close contacts are defined by the CDC as individuals with at least 15 hours of contact per week. This includes those living in the same household or frequent visitors to the house; it may also include contacts at work or school who shared indoor airspace with a patient with pulmonary TB disease for more than 15 hours per week during 1 or more weeks or a total of more than 180 hours during a defined infectious period.

Casual contacts are defined by the CDC as individuals with less than 4 hours of contact per week. This may include health care workers and/or contacts at work or school.

Q: Are some people more at risk than others for TB?
A: Yes. Persons who have been recently infected with TB bacteria or persons with medical conditions that weaken the immune system are more at risk. This includes children and adolescents, who may be more likely to progress from latent TB infection to TB disease.

Those at higher risk for TB include:

- People with HIV infection
- People who became infected with TB bacteria in the last 2 years
- Babies and young children
- People who inject illegal drugs
- People who are sick with other diseases that weaken the immune system
- Elderly people
- People who did not receive the correct treatment for TB in the past

Q: Is special cleaning required?
A: Routine cleaning and disinfection practices are sufficient.

Q: Should close contacts be quarantined?
A: Quarantine is a disease control measure that applies to individuals who have been exposed to a communicable disease but are not yet ill. Individuals who are latently infected with TB pose no risk for transmission of the bacteria, therefore quarantine is not appropriate disease control measure in this case.

Isolation is the separation of ill persons who have a communicable disease from those who are healthy and restriction of their movement to stop the spread of that disease or illness. Public health officials generally may isolate individuals with TB disease if they pose a risk to the public's health. After an individual with TB disease has taken medicines for 2-3 weeks, the individual with TB disease can no longer transmit bacteria to others. Your provider will tell you when you can return to work or school or visit with friends.

Q: What should parents do if they think their child has been exposed?
A: Parents who suspect that they or their child have been in close contact for extended periods of time should reach out to the Vanderburgh County Health Department or their local health department if outside Vanderburgh County, for testing.

Q: Since this has been a bad influenza/RSV/COVID season, are you afraid that TB could be the next illness to arise?
A: Although TB is spread in a similar way to a cold or the flu, it is not as contagious. You would have to spend prolonged periods (around 15 hours of contact per week) in close contact with an infected person to catch the infection yourself.

Risk Assessment

SCAN ME

Tuberculosis

WHAT YOU NEED TO KNOW

AUGUST 2023

Learning Objectives

Basic information about tuberculosis

Introduction to tuberculosis testing and treatment

Infection prevention strategies

Cleaning and disinfection

Tuberculosis and Employee Health

Overview of disease reporting requirements

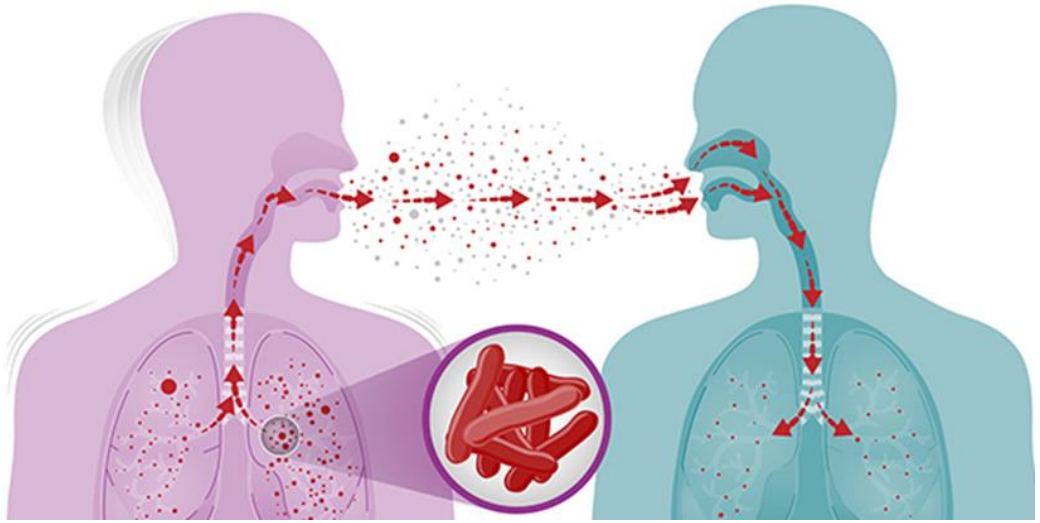
Mycobacterium Tuberculosis

- Tuberculosis disease is caused by a bacterium called *Mycobacterium tuberculosis (MTB)*
- MTB commonly attack the lung, but can attack any part of the body (extrapulmonary TB) via entry into the bloodstream.
- Not everyone infected with MTB will become sick. Two tuberculosis-related conditions exist:
  1. *Active Tuberculosis Disease: person is showing symptoms (5-15% of infected persons), progression to active disease can be rapid or take decades (most common within 2 years of infection), can transmit the disease to others*
  2. *Latent Tuberculosis Infection: Individuals do not become ill or have symptoms, MTB are still alive but inactive in the body; cannot transmit the disease to others*

Mycobacterium tuberculosis

Transmission

- When a person with active pulmonary or laryngeal tuberculosis coughs, sneezes, shouts, laughs, or sings, the MTB are aerosolized.
- Transmission occurs when a susceptible person inhales the airborne particles to the alveoli of the lungs, not usually through surface contact.
- The airborne particles are so small they are able to be suspended in the air for hours and can spread throughout a room or building.
- Young children with pulmonary and laryngeal TB are less likely than adolescents and adults to be infectious.



Factors Affecting Transmission

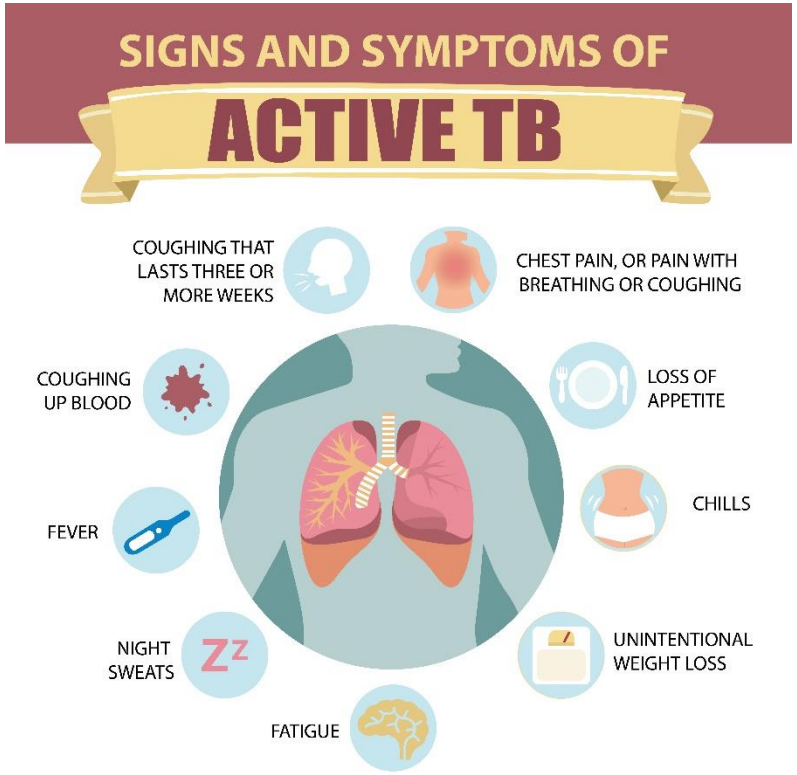
Factor	Description
Susceptibility	Susceptibility (immune status) of the exposed individual
Infectiousness	Infectiousness of the person with TB disease, which is directly related to the number of tubercle bacilli that he or she expels into the air (Table 1.2; see also Chapter 6: TB Infection Control)
Environment	Environmental factors that affect the concentration of *M. tuberculosis* organisms (Table 1.3)
Exposure	Proximity, frequency, and duration of exposure (Table 1.4)

From: Core Curriculum on Tuberculosis: What the Clinician Should Know (cdc.gov)

Signs and Symptoms: Active Disease

SIGNS AND SYMPTOMS OF **ACTIVE** TUBERCULOSIS DISEASE ARE CLASSIC AND INCLUDE:

- Prolonged, productive cough (hemoptysis), > 3 weeks
- Blood-tinged sputum
- Chest pain with breathing or coughing
- Night sweats
- Fever
- Chills
- Fatigue
- Loss of appetite
- Unintentional weight loss

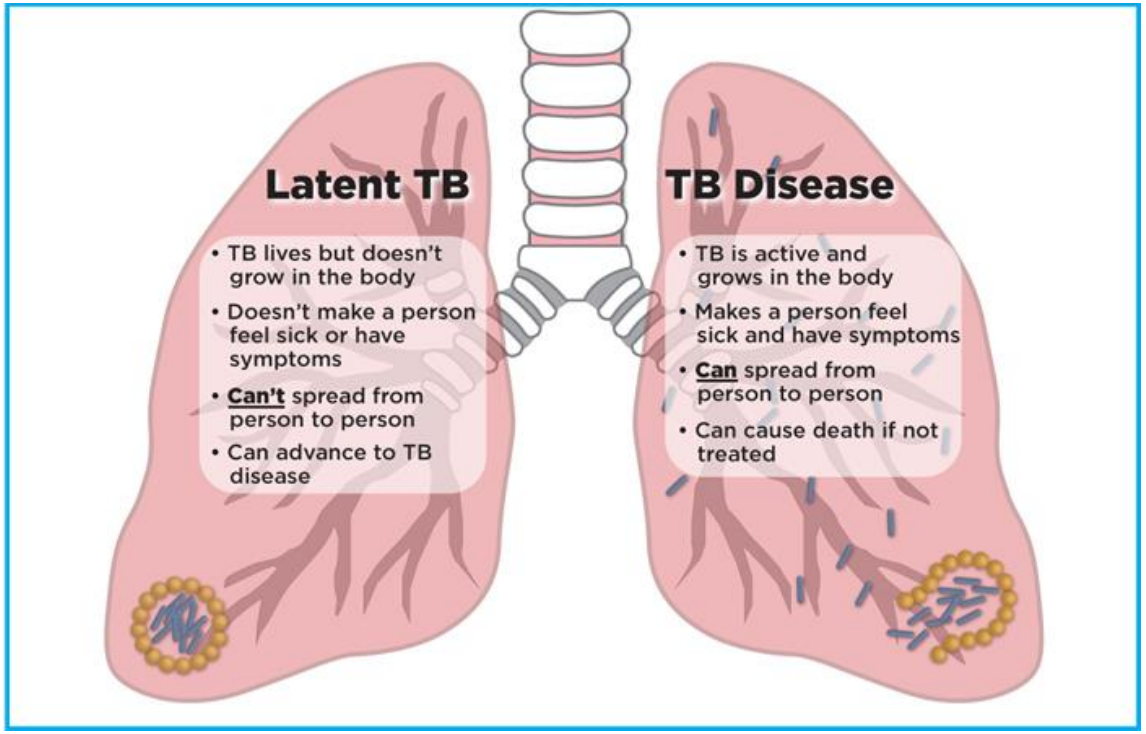


Signs and Symptoms: Latent Infection

SIGNS AND SYMPTOMS OF **LATENT** TUBERCULOSIS INFECTION INCLUDE:

- No symptoms, person does not feel sick
- Negative chest x-ray and a negative sputum smear
- Usually have a positive TB skin test reaction or positive TB blood test, can take 2-8 weeks after initial infection
- Within 2-8 weeks, macrophages will ingest tubercle-shaped MTB forming a granuloma.

❖ *Remember, individuals with latent TB infection cannot spread infection to others.*



Who Should be Tested

- Our Tri-state community has seen a steady increase in prevalence of TB, therefore, **ANY** patient who demonstrates signs/symptoms should have TB included in differential, even if no exposure history, travel history, or otherwise considered high-risk.
- Every patient with pneumonia, cavitary lesions or nodules, clinical suspicion for meningitis, empyema, peritonitis, or septic arthritis will be asked:
  - Country of birth
  - Travel history
  - Exposure to tuberculosis (TB)
  - Immunocompromised status
- Every inpatient with clinical suspicion for pulmonary or laryngeal TB disease will be placed automatically in airborne isolation precautions in a negative pressure room. Suspicion could be based on:
  - Symptoms and exposure risk, OR
  - Any patient with new cavitary lesion, OR
  - Recent cavitary lesion with no work up performed

Diagnostic Testing Methods

AFB Smears/Cultures

- Sputum culture specimens, require at least 3 consecutive specimens collected 8-24 hours apart, with at least one collected in early morning.
- Smears are performed on specimens as a quick, presumptive identification (< 72 hours).
  - Negative smear does not exclude TB.
- AFB cultures take up to 6 weeks to finalize.
  - Drug resistance testing can take an additional 3 weeks

MTB/Rif Assay

- PCR test that can be performed on smear-positive sputum samples, BAL specimens, and may be available on additional specimens by request
- Can detect presence of MTB, as well as any resistance to rifampin in ~ 48 hours.

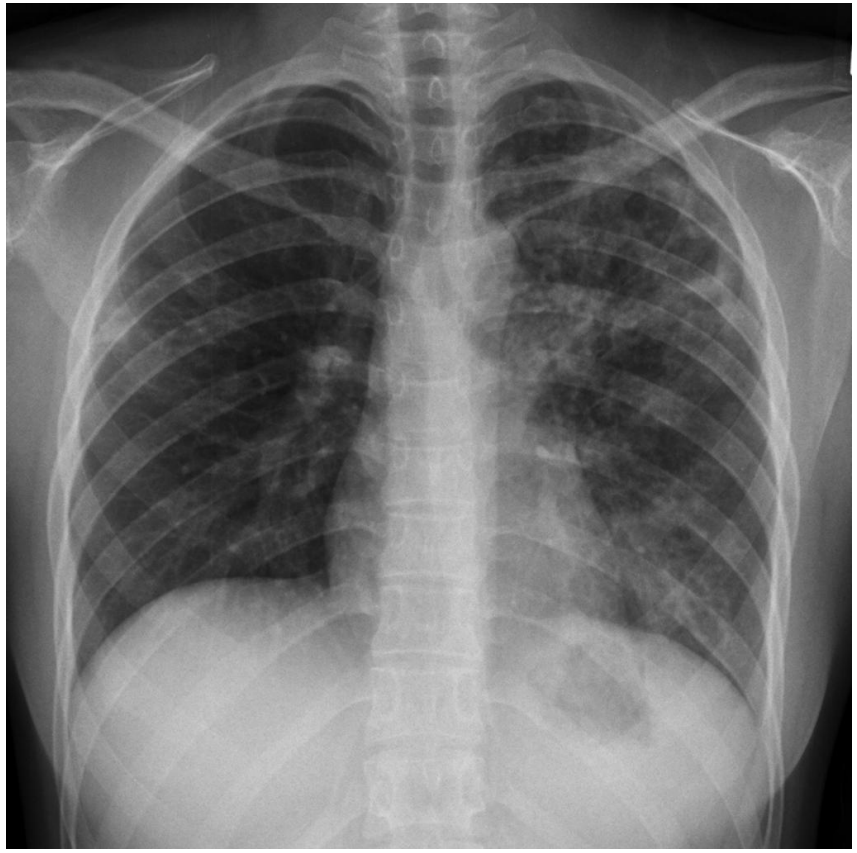
Other acceptable specimens if negative sputum or sputum not obtained:

- Gastric aspiration
- Bronchial washings/brushings/biopsy

Additional Diagnostic Tests

Chest Radiograph

- Aids in diagnosis of pulmonary TB
- Pulmonary cavitary lesions are common
- Those with HIV may have atypical findings
- A negative CXR does not exclude TB in patients with signs/symptoms.
- Lateral view may be helpful in pediatrics.



Additional Diagnostic Tests

Tuberculin Skin Test (TST):

- Performed by injecting a small amount of fluid (called tuberculin) into the skin on the lower part of the arm.
- Negative skin test does *not* exclude latent nor active TB disease.

TB Interferon-gamma release assays (IGRAs) blood tests:

- QuantiFERON®-TB Gold Plus, or
- T-SPOT®.TB test (T-Spot)
- Negative blood test does *not* exclude latent nor active TB disease.

*BCG Vaccination – common vaccine given in countries with high TB prevalence, not generally recommended in the U.S. If BCG received, people may need blood test rather than skin test as it can cause false positive skin test.

Treatment of Tuberculosis

- First-line anti-TB medications (RIPE) for active disease:
  - Rifampin (RIF)
  - Isoniazid (INH)
  - Pyrazinamide (PZA)
  - Ethambutol (EMB)
  - Each regimen consists of initial phase of 2 months, followed by continuation phase of 4-7 months.
- Anti-TB treatment protocols for latent disease:
  - Rifapentine/INH weekly for 12 weeks, OR
  - RIF daily for 4 months, OR
  - INH daily for 9 months
- Special considerations:
  - In cases of drug resistant-TB, alternate anti-TB medications will be prescribed.
  - Untreated TB in pregnancy represents a greater hazard than does treatment.

Infection Prevention and Control

TB disease early and promptly

- Train personnel to detect signs and symptoms of TB. Suggest ordering diagnostic testing.

Isolate those with suspected, rule-out, or confirmed active TB. Airborne isolation in a negative pressure room is needed in healthcare settings.

- Healthcare workers to wear N95 mask or higher level respirator.
- If patient needs to leave the room for any reason, they should be given surgical mask.
- Visitors should also be asked to wear a mask.
- Patients are coached on respiratory hygiene and etiquette, cover your cough.

Treat those with TB disease

- Promptly start appropriate treatment

If testing suggests removal of airborne isolation precautions may be appropriate, contact Infection Prevention and Control Department. Infection Prevention and Control Department is sole authority and MUST CONFIRM that removal from isolation is appropriate before it is discontinued.

TB-Positive Patients in the Clinic

- If patient is still in infectious period, Indiana Department of Health recommends avoiding in-person visits, if possible.
- If patient needs to be seen in person:
  - Patient and any necessary support persons to wear a surgical mask,
  - escorted through back entrance immediately to exam room,
  - healthcare providers in exam room to be fit tested with N95 mask, or trained on use of PAPR or CAPR.
- If exam room not negative pressure, room to stay vacant for a period of time after patient exit to ensure enough air exchanges have occurred.

https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s_cid=rr5417a1_e

Cleaning and Disinfection

- It is important that an airborne precautions sign is hung on door of suspected, rule-out, or confirmed TB room so that anyone entering the room is aware of need for isolation precautions, including environmental services staff.
- When cleaning the room, even at terminal clean, staff must wear N-95 or PAPR/CAPR as infectious particles can remain suspended in the air for hours after patient is transferred or discharged. Other PPE to be worn according to standard precautions.
- All equipment in and surfaces around patient's room are cleaned following manufacturer's recommendations for product use.

Employee Health

- IGRA or 2-step TST with follow-up testing on positive skin tests is required for all new hires in the healthcare setting.
  - Annual testing is required for employees with assignments at Kentucky facilities.
  - Also required for non-employees (volunteers, observers, students, etc.) who are in patient rooms or other areas occupied by patients.
- Employees that will be caring for patients in the airborne isolation rooms will have annual respirator fit testing and education.
- TST, TB screening questionnaires, and/or IGRA tests are offered to possible exposure cases, as identified by Infection Prevention and Control.

Disease Reporting

- Tuberculosis is considered a reportable disease per the states of Indiana, Kentucky, and Illinois.
- Infection Prevention reports any confirmed cases of TB to state and local health departments.
  - Per ISDH (Indiana), confirmed TB cases are to be reported within one working day.
  - Per KDPH (Kentucky), confirmed TB cases are to be reported within one business day.
  - Per IDPH (Illinois), confirmed TB cases are to be reported within seven days.