

# PUBLIC HEALTH REFERENCE SHEET

## Tuberculosis



<b>Name</b>	<i>Mycobacterium tuberculosis</i> <b>**This RME must be reported IMMEDIATELY into DRSi**</b>
<b>Reservoir &amp; Transmission</b>	Humans with latent <i>M. tuberculosis</i> infection and active TB disease Droplet transmission through coughing, speaking, and sneezing
<b>Incubation Period</b>	2–10 weeks
<b>Common Symptoms</b>	Cough, fatigue, fever, night sweats, and weight loss Hemoptysis and hoarseness associated with laryngeal TB may occur in advanced stages
<b>Gold Standard Diagnostic Test</b>	Nucleic acid amplification tests (NAAT) Microscopy of smear and culture
<b>Risk Groups</b>	Children < 3 years old, adolescents, young adults, older individuals, and the immunocompromised Humanitarian aid workers and healthcare personnel working in high-prevalence settings (e.g., refugee camps; homeless shelters, HIV clinics, and in-patient hospital wards)
<b>Geographic Significance</b>	Worldwide, but with wide variations by region and social context

### What is tuberculosis?

Tuberculosis (TB) is a chronic bacterial infection caused by a bacterium called *Mycobacterium tuberculosis* (*M. tuberculosis*) characterized pathologically by the formation of granulomas.

Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. People with LTBI are infected with *M. tuberculosis*, but they do not have TB disease, do not have signs and symptoms of TB disease, and they cannot spread *M. tuberculosis* to others.

### What is the occurrence of tuberculosis?

According to the World Health Organization (WHO), approximately 10 million new TB cases and 1.2 million TB-related deaths occurred in 2019. TB occurs throughout the world, but the incidence varies. In some countries in sub-Saharan Africa and Asia, the annual incidence is several hundred per 100,000 population. In the United States, the annual incidence is <3 per 100,000 population, but immigrants from countries with a high TB burden and long-term residents of high-burden countries have a 10 times greater incidence of TB than the U.S. national average. The Centers for Disease Control and Prevention (CDC) estimates that up to 13 million people in the U.S. have LTBI.

### How is tuberculosis transmitted?

Persons with active pulmonary TB transmit the *M. tuberculosis* bacilli (MTB) during coughing or sneezing, aerosolizing the infected droplets, which are inhaled by contacts. *M. tuberculosis* in the droplets reach the alveoli and are ingested by alveolar macrophages; they are then restricted by a granuloma or progress to active disease. The period of infectivity lasts as long as there are viable MTB in sputum. Effective anti-TB therapy usually eliminates contagiousness within 2–4 weeks. Some untreated or inadequately treated patients with active pulmonary TB can remain contagious for years. The degree of communicability depends on intimacy and duration of the exposure, the number of bacilli discharged, virulence of the bacilli, adequacy of ventilation, exposure of bacilli to sun or ultraviolet light, and opportunities for aerosolization through coughing or during aerosolizing procedures. Direct invasion of MTB through mucous membranes or breaks in the skin can occur but is extremely rare.

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### Who is at risk for tuberculosis?

Those at highest risk include persons in close contact with TB patients, healthcare workers, individuals with certain medical conditions, and travelers to areas where TB is common. The risk of active pulmonary TB, once infected, is highest in children younger than 3 years, young adults, the elderly, and the immunocompromised, including those with HIV infection.

### What are the signs and symptoms of tuberculosis?

- *M. tuberculosis* infection can be detected by a positive tuberculin skin test (TST) or interferon-gamma release assay (IGRA) 8–10 weeks after exposure. Overall, only 5%–10% of otherwise healthy people who are infected progress to TB disease during their lifetimes. Progression to TB disease can take weeks to decades after initial infection. People with TB disease have symptoms or other manifestations of illness (e.g., an abnormal chest radiograph). For most people who become infected, *M. tuberculosis* remains in an inactive state (latent TB infection or LTBI) in which the infected person has no symptoms and cannot spread the infection to others.
- TB disease can affect any organ but affects the lungs in 70%–80% of cases. Typical TB symptoms include prolonged cough, fever, hemoptysis, night sweats, decreased appetite, and weight loss. The most common sites for TB outside the lungs (i.e., extrapulmonary TB) are the bladder, bones and joints, brain and meninges, genitalia, kidneys, lymph nodes, and pleura.
- The risk for progression to disease is much higher in immunosuppressed people; for example, progression is 8%–10% per year in HIV-infected people not receiving antiretroviral therapy. People receiving tumor necrosis factor blockers to treat rheumatoid arthritis and other chronic inflammatory conditions also are at increased risk for disease progression.

### What are the potential complications of tuberculosis?

If untreated, TB can be fatal. Complications may include spinal pain, joint damage, meningitis, liver or kidney problems, and heart disorders.

### How is tuberculosis diagnosed?

- TB is diagnosed through a combination of skin or blood tests, chest x-rays, and sputum tests. LTBI is diagnosed by a positive result from positive TST, Mantoux technique using tuberculin purified protein derivative (PPD), or interferon- $\gamma$  release assay (e.g., QuantiFERON-TB Gold) after further examinations (e.g., chest radiograph, symptom review) have excluded TB disease. Infection can be detected 8–10 weeks after exposure. IGRA is preferred over the TST in those that received the bacillus Calmette-Guérin (BCG) vaccine because BCG might induce false-positive TST results. No BCG effects on IGRA results have been detected in multiple studies. Live virus vaccines, if indicated, should be given the same day or 1 month after a TST. A TST that cannot be read in 48–72 hours should be delayed, may need to be repeated, or consider an interferon- $\gamma$  release assay. The Tine TB skin test is no longer used in the U.S. but may be used in other countries for TB and LTBI screenings (CDC, 2023).
- Although diagnosis of TB disease can be made using clinical criteria in the absence of microbiologic confirmation, perform laboratory testing to confirm the diagnosis, guide treatment decisions, and provide bacterial DNA for molecular epidemiology. Molecular tests for mutations that confer drug resistance can be performed directly on specimens and can guide initial treatment while culture results are pending. Culture-based susceptibility testing is recommended for all patients with a positive culture result to help determine the appropriate drug regimen.

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- Collect sputum or other respiratory specimens for culture and smears for acid-fast bacilli (AFB) from people being examined for pulmonary TB. The CDC, the American Thoracic Society (ATS), and the Infectious Diseases Society of America (IDSA) jointly published diagnostic recommendations for both TB disease and LTBI, and can be found at <https://www.cdc.gov/tb/topic/testing/default.htm>.

### How is tuberculosis treated?

- Latent Tuberculosis Infection: People with LTBI can be treated, and treatments are effective at preventing progression to TB disease. Clinicians must exclude TB disease before starting LTBI treatment. In the United States, several regimens exist for the treatment of drug-susceptible LTBI, including 3 months of once-weekly isoniazid and rifapentine; 4 months of daily rifampin; 3 months of daily isoniazid and rifampin; and 6–9 months of daily isoniazid. Given the low completion rates of the 6- to 9-month isoniazid regimen, shorter duration regimens are preferred. CDC guidance on treatment can be found at <https://www.cdc.gov/tb/topic/treatment/default.htm>.
- Tuberculosis Disease: CDC/ATS/IDSA published guidelines for treating drug-susceptible TB disease with a multiple-drug regimen administered by directly observed therapy for 6–9 months. Usually, the regimen is isoniazid, rifampin, ethambutol, and pyrazinamide for 2 months, then isoniazid and rifampin for an additional 4 months.
- Drug-resistant TB is more difficult to treat, historically requiring 4–6 drugs for 18–24 months and best managed by an expert. In a randomized controlled trial, a newer 6-month all-oral regimen of bedaquiline, pretomanid, and linezolid was effective in treating highly-drug-resistant TB or patients who could not tolerate other regimens. For information about the treatment of drug-resistant TB, visit the CDC's Drug-Resistant TB webpage at <https://www.cdc.gov/tb/topic/drtb/default.htm>.

### How can tuberculosis be prevented?

- Early detection and treatment of active TB and TB testing for those at risk.
- Systematic testing and treatment of LTBI.
- Educating the public regarding mode of spread, symptoms, methods of control, and importance of early diagnosis and continued adherence to treatment.
- Establish and maintain effective TB infection control measures in institutional settings where health care is provided and especially where immunocompromised patients congregate, including hospitals, drug treatment programs, prisons, nursing homes, and homeless shelters.
- Address social, economic, and housing determinants by reducing or eliminating these conditions that increase the risk of infection and progression to disease, including poorly ventilated and crowded living conditions, malnutrition, indoor air pollution, smoking, and alcohol abuse.
- Travelers should avoid exposure to people with TB disease in crowded and enclosed environments. Advise travelers who will be caring for patients, or who will be working in healthcare facilities where people with TB are likely to be patients, to consult infection control or occupational health experts about baseline LTBI screening, procedures for obtaining personal respiratory protective devices (e.g., N95 respirators), and recommendations for respirator selection and training.
- Based on WHO recommendations, BCG vaccine is used once, at birth, in countries with higher TB burdens to reduce the severe consequences of TB and extrapulmonary TB infections in infants and children. BCG vaccine has low and variable efficacy in preventing TB in adults; however, U.S. Food and Drug Administration-approved vaccine formulations of BCG are no longer available in the United States. All people, including those who have

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received BCG vaccination, must follow recommended TB infection control precautions to the greatest extent possible. Individuals from countries where BCG vaccine is used may not know or recall if they received this vaccine.

### What are some Public Health considerations?

- Active TB disease is a communicable disease that must be reported through military and civilian public health channels. A CDC Report of Verified Case of Tuberculosis (RVCT) will be completed for each case of active TB disease. The RVCT will be sent to the supporting county and/or State health department and reported through Disease Reporting System internet (DRSi). LTBI is not communicable and is not a reportable event in DRSi.
- When reporting cases of active TB in the DRSi—
  - Document the circumstances under which the case patient was exposed including duty exposure, occupational activities, environmental exposures, or other high-risk activities.
  - Document if the case patient works in, lives in, or attends a high-transmission setting such as food handling, daycare, school, group living, health care, training center, or ship.
  - Note the patient's BCG (tuberculosis vaccine) immunization history.
  - Document evidence of drug resistance.
- Army's TB Surveillance and Control Program can be found at [https://armypubs.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ARN22182\\_P40\\_11\\_FINAL.pdf](https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN22182_P40_11_FINAL.pdf).
- Marine and Navy's TB Prevention and Control program can be found at <https://www.med.navy.mil/Navy-and-Marine-Corps-Force-Health-Protection-Command/Preventive-Medicine/Program-and-Policy-Support/Tuberculosis-Prevention-and-Control/>.
- Air Force's TB surveillance guidelines can be found on <https://www.e-publishing.af.mil/Product-Index/> by searching for the most recent Public Health Surveillance publication.

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<https://wwwnc.cdc.gov/travel/yellowbook/2024/infections-diseases/tuberculosis>

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