Chapter 5: Diagnosis of Tuberculosis Disease

Contents

Introduction

Purpose

Use this section to understand and follow national and Wisconsin guidelines to do the following:

- Classify patients with tuberculosis (TB) disease and latent TB infection (LTBI)
- Detect suspected cases of TB
- Know when to report suspected or confirmed cases of TB
- Diagnose TB disease

It is important to understand when a person should be evaluated further for TB disease. Not recognizing TB symptoms promptly leads to delays in treating a TB case—and to more infection, TB disease, and contacts to evaluate.

In the 2005 guideline, "Controlling Tuberculosis in the United States: Recommendations from the American Thoracic Society, Centers for Disease Control and Prevention, and the Infectious Diseases Society of America," one of the recommended strategies to achieve the goal of reduction of TB morbidity and mortality is early and accurate detection, diagnosis, and reporting of TB cases, leading to initiation and completion of treatment.[1]

Contacts are mentioned within this section, but their evaluation and follow-up and contact investigation are covered in more depth in the Contact Investigation section. For information on treatment, refer to the Treatment of Tuberculosis Disease section.

Improvement in the detection of TB cases is essential to progress toward elimination of TB in the United States.[2] Case detection includes the processes that lead to the presentation, evaluation, receipt of diagnosis, and reporting of people with active TB.[3] Detecting and reporting suspected cases of TB are key steps in stopping transmission of *Mycobacterium tuberculosis* because it leads to prompt initiation of effective multiple-drug treatment, which rapidly reduces infectiousness.[4]

TB is commonly diagnosed when a person seeks medical attention for symptoms caused by the disease or a concomitant medical condition. Thus, health care providers, particularly those providing primary health care to populations at high risk, are key contributors to TB case detection.[5] However, the majority of pulmonary TB cases continue to be diagnosed at an advanced stage. Earlier diagnosis would result in less individual morbidity and death, greater success in treatment, less transmission to contacts, and fewer outbreaks of TB.[6]

A diagnosis of TB disease is usually based on positive cultures or NAAT result for *M. tuberculosis.* However, TB may also be diagnosed on the basis of clinical signs and symptoms in the absence of a positive culture.

Policy

In Wisconsin:

People who show or report signs and symptoms of TB should be evaluated for TB disease as described in the “Diagnosis of Tuberculosis Disease” topic in this section and reported as suspected cases of TB as described in the “Reporting Tuberculosis” topic in the Surveillance section.

Contacts should be evaluated as described in the Contact Investigation section.

For roles and responsibilities, refer to the “Roles, Responsibilities, and Contact Information” topic in the Introduction.

State laws and regulations

Wisconsin Statutes

Wisconsin Stat. ch. 252 Communicable Diseases

- Tuberculosis section begins with Wis. Stat. § 252.07 on page 3

Wisconsin Stat. ch. 118 General School Operations

- Employee health examination requirements related to tuberculosis Wis. Stat. § 118.25 (1) (6) on page 20

Wisconsin administrative codes

Wisconsin Admin. Code ch. DHS 145 Control of Communicable Diseases

- Tuberculosis section begins with Wis. Admin. Code ch. DHS 145, subch. II

Wisconsin Admin. Code ch. DHS 124 Hospitals

- Tuberculin skin testing for employees DHS 124.07(2)(c) on page 87 and 124.07(5)
- Beginning on July 1, 2016, the department may not enforce any of the rules contained in s. DHS 124.40 or subch. II, III, or IV of ch. DHS 124, Wis. Adm. Code, in effect on April 10, 2014

Wisconsin Admin. Code ch. DHS 132 Nursing homes

- Tuberculin skin testing of employees Wis. Admin. Code § DHS 132.42(3)
- Tuberculosis screening of residents Wis. Admin. Code § DHS132.52(2)(c) and Wis. Admin. Code § HFS 132.60(1)(c)4.(e) on p.156

Wisonsin Admin. Code ch. DCF 250 Family child care centers

- Personnel health qualifications related to tuberculosis Wis. Admin. Code § DHS 46.05 (1) (j) 1. a. on page 34-8

Wisconsin Admin. Code ch. DCF 54 Child-placing agencies

- Tuberculosis-related admission examinations of children in foster care Wis. Admin. Code § DCF 54.04 (2)(c)3 on page 70

Wisconsin Admin. Code ch. DCF 57 Group foster care for children

- Tuberculosis-related personnel health qualifications
  Wis. Admin. Code § DHS 59.04 (1)(b)3 on page 141

Wisconsin Admin. Code ch. DHS 75 Community substance abuse service standards

- Tuberculosis-related screening of patients Wis. Admin. Code § DHS 75.15 (17) on page 232-17

Wisconsin Admin. Code ch. DHS 83 Community-based residential facilities

- Tuberculosis screening of employees Wis. Admin. Code § DHS 83.13 (4) on page 258-9
- Tuberculosis screening of residents Wis. Admin. Code § DHS 83.33 (2)(g) on page 258-20

Wisconsin Admin. Code ch. DHS 88 Licensed adult family homes

- Tuberculosis screening of licensees Wis. Admin. Code § DHS 88.04 (2)(g) on page 262-5
- Tuberculosis screening of residents Wis. Admin. Code § DHS 88.06 (2)(a) on page 262-7

Wisconsin Admin. Code ch. DHS 133 Home health agencies

- Tuberculosis screening of employees Wis. Admin. Code § DHS 133.06 (4)(d) on page 187

Wisconsin Admin. Code ch. DHS 134 Facilities serving people with developmental disabilities

- Tuberculosis screening of employees Wis. Admin. Code § DHS 134.44 (5) on page 200
- Tuberculosis screening of residents Wis. Admin. Code § DHS 134.52 (2)(d) on page 203 and DHS 134.66 (3) on page 210

Forms

Required and recommended forms are available on the Wisconsin Tuberculosis Program website.

Case finding

Identifying suspected tuberculosis cases

The majority of TB cases are detected during the medical evaluation of symptomatic illnesses. People experiencing symptoms ultimately attributable to TB usually seek care not at a public health TB clinic but rather from other medical practitioners in other health care settings.[7] Professionals in the primary health care sector, including hospital and emergency department clinicians, should be trained to recognize patients with symptoms consistent with TB.[8]

Be alert for cases of TB among people who have not sought medical care during evaluation of contacts to patients with pulmonary TB and to other people with newly diagnosed infection with *Mycobacterium tuberculosis.* Perform screening for TB also during evaluation of immigrants and refugees with Class B1, Class B2, or Class B3 TB notification status, during evaluations of people involved in TB outbreaks, and occasionally in working with populations with a known high incidence of TB. Also, screen for TB disease when the risk for TB in the population is high and when the consequences of an undiagnosed case of TB are severe, such as in jails, prisons, and other correctional or congregate facilities.[9]

Suspect pulmonary TB and initiate a diagnostic investigation when the historic features, signs, symptoms, and radiographic findings listed in Table 5.1 below occur among adults. The clinical presentation of TB varies considerably as a result of the extent of the disease and the patient's response. TB should be suspected in any patient who has a persistent cough for more than two to three weeks, or other compatible signs and symptoms.[10]

Note that these symptoms should suggest a diagnosis of TB but are not required. TB should still be considered a diagnosis in asymptomatic patients who have risk factors for TB and chest radiographs compatible with TB.

All people with risk factors for TB who have a chronic cough for more than two to three weeks [11] should be evaluated and be asked to use a mask or tissue to cover their mouth. Hemoptysis, or coughing up blood, is a serious symptom, and patients who cough up blood should be evaluated as soon as possible. Be sure to have these patients use a mask and tissues.

Table 5.1: When to suspect pulmonary tuberculosis in adults[12]

Historic Features	• Exposure to a person with infectious TB • Positive test result for *Mycobacterium tuberculosis* infection • Presence of risk factors, such as immigration from a high-prevalence area, human immunodeficiency virus (HIV) infection, homelessness, or previous incarceration* • Diagnosis of community-acquired pneumonia that has not improved after 7 days of treatment [†,13]
Signs and Symptoms Typical of TB	• Prolonged coughing (2–3 weeks or longer) with or without production of sputum that might be bloody (hemoptysis)[§,14]

	• Chest pain[15] • Chills[16] • Fever • Night sweats • Loss of appetite[17] • Weight loss • Weakness or easy fatigability[18] • Malaise (a feeling of general discomfort or illness)[19]
Chest Radiograph: **Immunocompetent patients**	Classic findings of TB are "tree-in-bud" nodules, upper-lobe opacities, frequently with evidence of contraction fibrosis and cavitation¶ Lower-lobe and multilobe opacities, hilar adenopathy, or interstitial opacities might indicate TB

* See Table 1: People at High Risk for Tuberculosis Infection and Progression to Tuberculosis Disease in the section on Diagnosis of Latent Tuberculosis Infection.

† Patients treated with levofloxacin or moxifloxacin may have a clinical response when TB is the cause of the pneumonia.

§ Do **not** wait until sputum is bloody to consider a productive cough a symptom of TB. Sputum produced by coughing does **not** need to be bloody to be a symptom of TB.

¶ These features are not specific for TB, and, for every person in whom pulmonary TB is diagnosed, an estimated 10–100 people are suspected on the basis of clinical criteria and must be evaluated.

Source: Adapted from: 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):33.

Extrapulmonary tuberculosis

If a patient has a positive tuberculin skin test or interferon gamma release assay (IGRA), also consider whether they have signs and symptoms of extrapulmonary TB.

Signs and symptoms of extrapulmonary TB may include:

- Headache, difficulty thinking, or loss of consciousness
- Shortness of breath, or cough
- Lymphadenopathy
- Back pain (vertebral tuberculosis osteomyelitis)
- Difficulty urinating, kidney failure, dysuria, hematuria, or flank pain
- Abdominal pain, diarrhea, nausea, or vomiting
- One or more painful, swollen joints
- Infertility (in people who are able to become pregnant)
- Skin lesions (rare; cutaneous TB)
- Chronic meningeal thickening on brain MRI; Tuberculomas of the brain

- Pleural effusions with or without calcification
- Enlarged lymph nodes
- Synovitis, osteomyelitis (in spine, classically in adults involving two contiguous vertebrae with intervening disc relatively spared)
- Hepatic lesions or granulomas orascites
- Peritoneal masses or studding on laparoscopy
- Hydroureter, hydronephrosis, caliectasis, renal masses, testicular or epididymal masses, kidney failure or insufficiency, microscopy hematuria, or sterile pyuria
- Genitourinary TB in females: pelvic pain, infertility, or vaginal bleeding
- Pancreatic mass

Note that breast, ocular and cutaneous TB are rare.

Follow-up on suspected cases of tuberculosis

When a suspected case of TB is identified, the following should be done:

When a suspected case of pulmonary TB is identified, refer to the table below: **Guidelines for the Evaluation of Pulmonary Tuberculosis in Adults in Five Clinical Scenarios** in the “Diagnosis of Tuberculosis Disease” topic in this section. This table presents guidelines for the initial steps of TB case detection in five clinical scenarios encountered by providers of primary health care, including those serving in medical emergency departments.[20]

To formally report a suspected case of TB, see the “Reporting Tuberculosis” topic in the Surveillance section.

The patient should be masked and immediately excluded from the workplace or placed in airborne infection isolation (AII) until confirmed noninfectious. For more information, see the “Isolation” topic in the Infection Control section of this manual.

Laboratories should report positive smears or positive cultures, and primary health care providers should report suspected or confirmed cases of TB to the health department, as specified in the “Reporting Tuberculosis” topic in the Surveillance section. Prompt reporting allows the health department to organize treatment and case management services and to initiate a contact investigation as quickly as possible.[21]

Within 48 hours of suspect identification, administer a tuberculin skin test (TST) or perform an IGRA. If the selected test is positive, provide a chest radiograph. Evaluate the patient for TB disease as specified in the “Diagnosis of Tuberculosis Disease” topic in this section.

Diagnosis of tuberculosis disease

Consideration of TB disease as a possible diagnosis is the first step that must be taken before further evaluation, diagnosis, and management can occur. The diagnosis of TB disease is often overlooked because of the failure to consider it among possible diagnoses. While a definitive diagnosis may involve the addition of laboratory and radiographic findings, a high degree of suspicion can be based on epidemiology, medical history, and physical examination. In considering TB disease, it is also important to consider factors that may affect the typical presentation of TB, such as the patient’s age, nutritional status, and coexisting diseases.

An individual who is suspected of having TB disease requires a complete medical evaluation, including the following:

- Medical history, including exposure, symptoms, previous treatment for TB, and risk factors
- Human immunodeficiency virus (HIV) screening
- Physical examination
- Tuberculin skin test (TST) or interferon gamma release assay (IGRA)
- Chest radiography
- Bacteriologic examination which involves sputum collection for acid-fast bacilli smear and culture by the Wisconsin State Lab of Hygiene

When a suspected case of pulmonary TB is identified, refer Table 5.2 for guidelines on the initial steps of TB case detection in five clinical scenarios encountered by providers of primary health care, including those serving in medical emergency departments.[22]

Table 5.2: Guidelines for the evaluation of pulmonary tuberculosis in adults in five clinical scenarios[23]

Patient and setting	Recommended evaluation
Any patient with risk factors and a cough of more than–3 weeks’ duration or cough that cannot be attributed to another cause.	Chest radiograph: If suggestive of TB*, collect 3 sputum specimens for acid-fast bacilli (AFB) smear microscopy, culture, and nucleic acid amplification (NAA), if available[24]

Any patient at high risk for TB with an unexplained illness, including respiratory symptoms of 2–3 or more weeks' duration[†]	Chest radiograph: If suggestive of TB, collect 3 sputum specimens for AFB smear microscopy, culture, and NAA, if available
Any patient living with HIV and unexplained cough or fever	Chest radiograph, and collect 3 sputum specimens for AFB smear microscopy, culture, and NAA, if available
Any patient at high risk for TB with a diagnosis of community-acquired pneumonia who has not improved after 7 days of treatment[†]	Chest radiograph, and collect 3 sputum specimens for AFB smear microscopy, culture, and NAA, if available
Any patient at high risk for TB with incidental findings on chest radiograph suggestive of TB even if symptoms are minimal or absent[†§]	Review of previous chest radiographs, if available, 3 sputum specimens for AFB smear microscopy, culture, and NAA, if available

***** Opacities with or without cavitation in the upper lobes or the superior segments of the lower lobes.[25]

[†] See Table 1: People at High Risk for Tuberculosis Infection and Progression to Tuberculosis Disease in the section on Diagnosis of Latent Tuberculosis Infection.

[§] Chest radiograph performed for any reason, including targeted testing for latent TB infection and screening for TB disease.

Source: Adapted from: 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):33.

Medical history

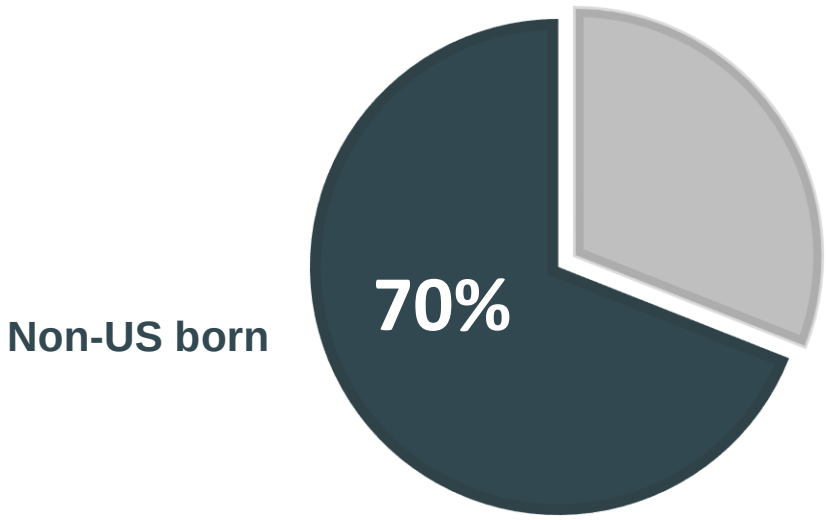
The clinician should interview patients to document their medical histories. A written record of a patient's medical history should include the following:

- Exposure to infectious TB
- Symptoms of TB disease (as listed in the following tables: **When to Suspect Pulmonary Tuberculosis in Adults, Guidelines for the Evaluation of Pulmonary Tuberculosis in Adults in Five Clinical Scenarios,** and **Symptoms of Tuberculosis Disease**)
- Previous TB infection or disease
- Risk factors (as listed in the table: **People at High Risk for Tuberculosis Infection and Progression to Tuberculosis Disease** in the section on Diagnosis of Latent Tuberculosis Infection)
- Recent medical encounters (for example, going to the emergency department for pneumonia)
- Previous antibiotic therapy

1. Exposure to Infectious TB: Ask patients if they have spent time with someone with infectious TB**.**

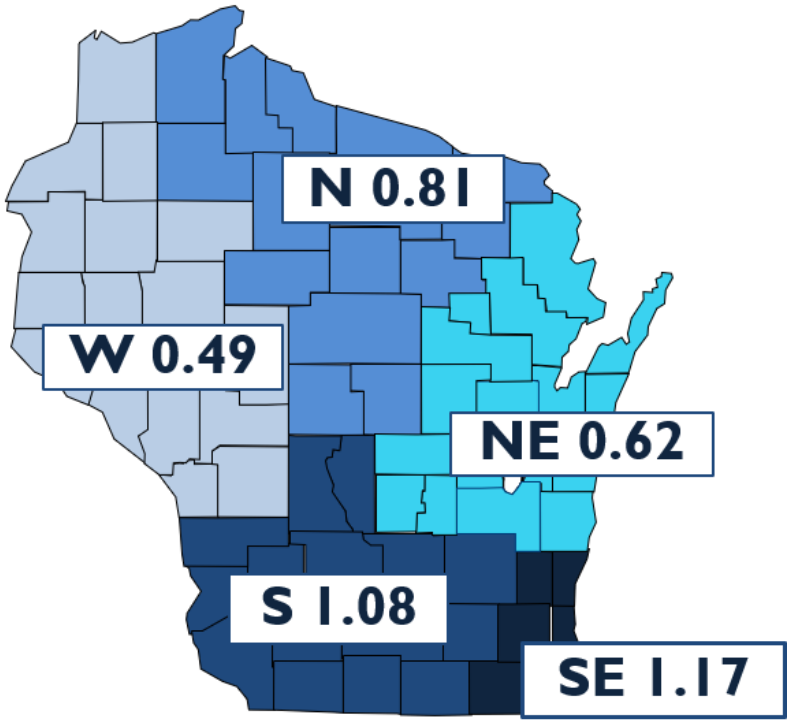
Question patients about whether they know of any contact in the recent or distant past with people diagnosed with pulmonary, pleural, or laryngeal TB. It is important to note that patients often refer to latent TB infection (LTBI) as TB disease. Be aware that most people become infected with *Mycobacterium tuberculosis* without knowing they were exposed. Clinicians should also consider demographic factors that may increase a patient's risk for exposure to TB disease and drug-resistant TB, such as country of origin, age, ethnic or racial group, occupation, and residence in congregate settings (such as a jail, homeless shelter, or refugee camp).

In 2023, 70% of Wisconsin's tuberculosis cases were not born in the United States.



Regional tuberculosis incidence rates for 2023

Wisconsin DOA population estimates are used for calculating rates.



Rates are per 100,000 and are based on Department of Administration population estimates.

See CDC's Tuberculosis Data page and DHS's Tuberculosis in Wisconsin data page for more TB data.

2. Symptoms of TB Disease: Ask patients about their symptoms.

Although TB disease does not always produce symptoms, most patients with TB disease have one or more symptoms that led them to seek medical care. When symptoms are present, they usually have developed gradually and been present for weeks or even months. Occasionally, however, TB is discovered during a medical examination for an unrelated condition, such as ruling out a cancer diagnosis (for example, through a chest radiograph given to patients before surgery).

The symptoms in Table 5.3 below may be caused by other diseases, but they should prompt the clinician to suspect TB disease. For historic features and chest radiograph results that should raise suspicion of pulmonary TB disease, refer to Table 5.2.

Table 5.3: Symptoms of tuberculosis disease[26]

Pulmonary	General: pulmonary and extrapulmonary	Extrapulmonary
• Coughing • Coughing up sputum or blood	• Chills[27] • Fever	• The symptoms depend on part of body affected by tuberculosis (TB) disease:

• Pain in the chest when breathing or coughing	• Night sweats • Loss of appetite[28] • Weight loss • Weakness or easy fatigability[29] • Malaise (a feeling of general discomfort or illness)[30]	• TB of the spine may cause pain in the back. • TB of the kidney may cause blood in the urine. • Meningeal TB may cause headaches or psychiatric symptoms. • Lymphatic TB may cause swollen and tender lymph nodes, often at the base of the neck.

Source: Adapted from: 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):33.

3. Previous Latent TB Infection or TB Disease: Ask patients whether they have ever been diagnosed with or treated for TB infection or disease.

Patients who have had TB disease before should be asked when they had the disease and how the disease was treated. Ask how many pills were taken per day (to determine what treatment regimen was used and whether they received injections). If the regimen prescribed was inadequate or if the patient did not follow the recommended treatment, TB may recur, and it may be resistant to one or more of the drugs used.

Patients known to have a positive skin test reaction probably have TB infection. If they were infected within the past 2 years, they are at high risk for TB disease if certain immunosuppressive conditions exist or if immunosuppressive therapies are being taken. (See Table 3.1: **People at High Risk for Tuberculosis Infection and Progression to Tuberculosis Disease** in the section on Diagnosis of Latent Tuberculosis Infection.)[31] For people previously skin tested, an increase in induration of 10 mm within a two-year period is classified as a conversion to positive.

4. Risk Factors for Developing TB Disease: Determine whether patients have any conditions or behaviors that are risk factors for developing TB disease.

For a list of behaviors and conditions that appear to increase the risk that TB infection will progress to disease, see the table: **People at High Risk for Tuberculosis Infection and Progression to Tuberculosis Disease** in the section on Diagnosis of Latent Tuberculosis Infection.

Human immunodeficiency virus screening

Voluntary counseling and testing for HIV is recommended for all patients with TB. HIV counseling and testing has also been recommended for contacts of people with TB.[32]

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 any patient's known risks for HIV infection

- Annual HIV screening of patients known to be at high risk[33]

Physical examination

A physical examination is an essential part of the evaluation of any patient. It cannot be used to confirm or rule out TB, but it can provide valuable information about the patient's overall condition; other factors, such HIV infection, which may affect how TB is manifested; and the presence of extrapulmonary TB.[34]

Tuberculin skin test and interferon gamma release assays

Use the Mantoux tuberculin skin test (TST) or an IGRA to test for *M. tuberculosis* infection. Note that for patients with a previous documented positive TST reaction, a TST is not necessary. However, an IGRA can be done if there is suspicion that the TST result was a false positive.

For both the TST and IGRA, additional tests, such as chest radiography and bacteriologic examination, are required to confirm TB disease.[35]

People with a positive TST, QFT™, or T.spot TB.test result, regardless of signs or symptoms, should be evaluated for TB disease before LTBI is diagnosed. At minimum, a chest radiograph should be examined for abnormalities consistent with TB disease.[36]

A negative TST, QFT™, or T.spot TB test does not rule out TB disease[37]—as many as 20% of patients with TB disease have a negative test for infection.[38] A negative TST, QFT™, or T.spot TB.test result should not be used alone to exclude *M. tuberculosis* infection in people with symptoms or signs suggestive of TB disease. Medical evaluation of such people should include a history and physical examination, chest radiograph, bacteriologic studies, serology for HIV, and, when indicated, other tests or studies.[39]

The Wisconsin Tuberculosis Program offers two publications to help with decision making when a client has a positive TST or IGRA result:

- Positive Tuberculin Skin Test (TST)- What's Next?
- Tuberculosis Blood Test: Interferon Gamma Release Assay (IGRA)

For more information on the Mantoux TST, see the Diagnosis of Latent 6Tuberculosis Infection section. For more information on IGRAs and the QuantiFERON®-TB Gold (QFT-G) Test, see the CDC's "Guidelines for Using the QuantiFERON®-TB Gold Test for Detecting Mycobacterium tuberculosis Infection, United States" (*MMWR* 2005;54[No. RR-15])

Chest radiography

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

Children younger than 5 years of age should receive posterior-anterior and lateral radiographs.[40] These are commonly referred to as "2-view" chest x-rays.

Certain abnormalities on chest radiographs are suggestive, but are not diagnostic, of TB. In pulmonary TB, radiographic abnormalities are often seen in the apical and posterior segments of the upper lobe or in the superior segments of the lower lobe. However, lesions may appear anywhere in the lungs and may differ in size, shape, density, and presence or absence of cavitation, especially in people who are living with HIV or are immunocompromised.

In HIV-infected people, pulmonary TB may present atypically on the chest radiograph. For example, TB may cause opacities without cavities in any lung zone, or it may cause mediastinal or hilar lymphadenopathy with or without accompanying opacities or cavities. In HIV-infected people, almost any abnormality on a chest radiograph may indicate TB. In fact, the radiograph of an HIV-infected person with TB disease may even appear entirely normal.[41]

For more information on chest radiography, see the Francis J. Curry National Tuberculosis Center's Radiographic Manifestations of Tuberculosis: A Primer for Clinicians.

Bacteriologic examination

Refer to Table 5.4 below to determine the types of specimens needed to assist in the diagnosis of TB.

Table 5.4: Specimens for diagnosing tuberculosis disease

Suspected diagnosis	Specimen needed
Pulmonary or laryngeal tuberculosis (TB)	Sputum (phlegm from deep in the lungs) samples for AFB smear and culture examination. If a diagnosis of pulmonary TB cannot be established from sputum smear, other procedures may be necessary, including nucleic acid amplification (NAA), bronchoscopy, and gastric aspiration in children.
Extrapulmonary TB	Depending on the anatomical site, other clinical specimens are necessary, such as: • Urine • Cerebrospinal fluid

	• Pleural fluid • Pus or other aspirated fluid • Biopsy specimens

Refer to Table 5.5 below for information on the bacteriologic tests used to diagnose TB.

Table 5.5: Bacteriologic tests used in diagnosing tuberculosis disease[42]

Test	Description	Laboratory turnaround times
Acid-fast bacilli (AFB) smear	Provides the physician with a preliminary confirmation of the diagnosis. It usually is the first bacteriologic evidence of the presence of mycobacteria in a clinical specimen. If positive, gives a semiquantitative estimate of the number of bacilli being excreted (which is of vital clinical and epidemiologic importance in assessing the patient's infectiousness).	On-site test: within 24 hours from specimen collection Off-site test: within 24 hours from laboratory receipt of specimen (time from specimen collection to laboratory receipt should be 24 hours or less)[43]
Nucleic acid amplification (NAA) assay[44] or PCR test ***confirmatory**	A test done on sputum specimens for the direct and rapid identification of the *Mycobacterium tuberculosis* complex. Allows for the amplification of specific target sequences of nucleic acids that will be detected by a nucleic acid probe. Does not replace the need for routine AFB smear and culture.[45]	Within 48 hours from specimen collection[46,47]
Culture ***confirmatory**	Usually necessary for species identification of all clinical specimens suspected of containing mycobacteria. Required for drug susceptibility testing and genotyping.	Mycobacterial growth detection: within 14 days from specimen collection Identification of mycobacteria: within 21 days from specimen collection[48,49]
Phenotypic drug susceptibility testing (PDST)	For first-line drugs: performed on initial isolates of all patients to identify an effective antituberculosis regimen. For both first-line and second-line drugs: repeated on interim isolates when a patient remains culture-positive after 3 months of treatment.[50,51]	First-line drugs: within 30 days from specimen collection Second-line drugs: within 4 weeks from date of request
Molecular detection of drug-resistance (MDDR)	Provides rapid and accurate results for detection of drug resistance in *M. tuberculosis* complex. Detects known potentially resistance conferring mutations to first- and second-line TB medications.	Typical turnaround time is 5–7 days from specimen receipt.

Sources: 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):19; and Tenover, R., et al. The resurgence of tuberculosis: is your laboratory ready? *Journal of Clinical Microbiology* 1993:767–770.

Laboratories should report positive smears or positive cultures, and primary health care providers should report suspected or confirmed cases of TB to the health department, as specified in the "Reporting Tuberculosis" topic in the Surveillance section. Prompt reporting allows the health department to organize treatment and case management services and to initiate a contact investigation as quickly as possible.[52]

For information on reporting, see the "Reporting Tuberculosis" topic in the Surveillance section.

For a list of all laboratory services available and information on specimen collection and shipment, see the Laboratory Services section.

For laboratory services available in Wisconsin, contact the Wisconsin State Laboratory of Hygiene's Customer Service line at 800-862-1013.

Resources and references

Resources

ATS, CDC, IDSA. "Clinical Testing and Diagnosis for Tuberculosis" (Available at: Clinical Testing and Diagnosis for Tuberculosis | Tuberculosis (TB) | CDC.

CDC. *Self-Study Modules on Tuberculosis* (Division of Tuberculosis Elimination Web site; 1999). Available at: Self-Study Modules on Tuberculosis | Tuberculosis (TB) | CDC .

CDC. *Core Curriculum on Tuberculosis (2000)* (Division of Tuberculosis Elimination. Available at: Core Curriculum on Tuberculosis: What the Clinician Should Know | Tuberculosis (TB) | CDC

Tenover, R., et al. "The Resurgence of Tuberculosis: Is Your Laboratory Ready?" (*Journal of Clinical Microbiology* 1993:767–770).

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[1] 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.
[2] 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):32.
[3] 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):32.

[4] 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.

[5] 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):15–16.

[6] 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):32.

[7] 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):32.

[8] 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):32.

[9] 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):34.

[10] 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):33.

[11] 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):33.

[12] 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):33; CDC. Medical evaluation. In: Chapter 5: diagnosis of TB. *Core Curriculum on Tuberculosis (2000)* [Division of Tuberculosis Elimination Web site]. Updated November 2001. Available at: Core Curriculum on Tuberculosis: What the Clinician Should Know | Tuberculosis (TB) | CDC . Accessed July 3, 2006; CDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. *MMWR* 2005;54(No. RR-17):11; ATS, CDC, IDSA. Diagnostic standards and classification of tuberculosis in adults and children. *Am J Respir Crit Care Med.* 2000;161:1378; CDC. Module 3: diagnosis of tuberculosis infection and disease. *Self-Study Modules on Tuberculosis* [Division of Tuberculosis Elimination Web site]. 1999:3. Available at: Self-Study Modules on Tuberculosis | Tuberculosis (TB) | CDC. Accessed July 3, 2006.

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