Chapter 2: Surveillance

Contents

Introduction

Purpose

Use this section to do the following:

- Understand the importance of surveillance in tuberculosis (TB) control and prevention
- Report suspected and confirmed TB cases
- Ensure you are using the required data collection forms
- Understand how the Wisconsin Electronic Disease Surveillance System (WEDSS) works
- Understand how Whole Genome Sequencing (WGS) can assist TB control efforts

Surveillance—the ongoing systematic collection, analysis, interpretation, and dissemination of data about a health-related event—is a critical component of successful TB control, providing essential information needed to do the following:

- Determine TB patterns and trends of the disease
- Identify sentinel events, such as potential outbreaks, recent transmission, multidrug resistance, and deaths
- Identify high-risk populations and settings
- Establish priorities for control and prevention activities
- Strategically plan use of limited resources[1]

Surveillance data are also essential for quality-assurance purposes, program evaluation, and measurement of progress toward TB elimination.

State and local TB control programs should have the capability to monitor trends in TB disease and latent TB infection (LTBI) in populations at high risk, in order to detect new patterns of disease and possible outbreaks. Populations at high risk should be identified and targeted for active surveillance and prevention, including targeted testing and treatment of LTBI. The following populations have been demonstrated to be at risk for TB exposure, progression from exposure to disease, or both in Wisconsin: children (especially those under 5 years old), people born outside the U.S., people visiting family and friends or working for prolonged periods in countries with high TB incidence rates, and people living with human immunodeficiency virus (HIV). Surveillance and surveys from throughout the United States indicate that certain epidemiologic patterns of TB are consistently observed among these populations, suggesting that the recommended control measures are generalizable. State and local surveillance data should be analyzed to determine additional high-risk population groups.

In addition to providing the epidemiologic profile of TB in a given jurisdiction, state and local surveillance are essential to national TB surveillance.[2] Data for the national TB surveillance system are reported by state health departments in accordance with standard TB case definition and case report formats. The *Report of Verified Case of Tuberculosis (RVCT)* forms are designed to collect information on cases of TB. The Centers for Disease Control and Prevention's (CDC's) national TB surveillance system publishes epidemiologic analyses of reported TB cases in the United States.[3]

Reporting of new cases is essential for surveillance purposes.[4]

Surveillance in TB control activities

Case detection: Case reporting to the jurisdictional public health agency is done for surveillance purposes and for facilitating a treatment plan and case management services.[5]

For more information on case reporting, see the "Reporting Tuberculosis" topic in this section.

Outbreak detection: Surveillance data should be routinely reviewed to determine if there is an increase in the expected number of TB cases, one of the criteria for determining if an outbreak is occurring. For an increase in the expected number of TB cases to be identified, the local epidemiology of TB should be understood. Detection of a TB outbreak in an area in which prevalence is low might depend on a combination of factors, including recognition of sentinel events, routine whole genome sequencing or genotype cluster analysis of surveillance data, and analysis of *Mycobacterium tuberculosis* drug resistance and genotyping patterns.[6] Genotyping data should routinely be reviewed by the state TB Program and affected jurisdictions notified of any actionable data, because genotype clusters also may indicate an outbreak. Prompt identification of potential outbreaks and rapid responses are necessary to limit further TB transmission. When an outbreak is identified, short-term investigation activities should follow the same principles as those for the epidemiologic part of the contact investigation (that is, identifying the infectious period, settings, risk groups, and mode of transmission and conducting contact identification and follow-up). However, long-term activities require continued active surveillance.

For more information on outbreak investigations, see the "Outbreak Investigation" topic in the Contact Investigation section.

Contact investigation: Collecting, analyzing, interpreting, and disseminating data on contacts and contact investigations are necessary for prioritizing the highest-risk contacts to focus the use of resources, in accordance with national guidelines. Although surveillance of individual contacts to TB cases is not conducted in the United States, the CDC collects aggregate data from state and local TB programs through the *Aggregate Report for Program Evaluation (ARPE).* Routine collection and review of this data can provide the basis for evaluation of contact investigations for TB control programs.[7] **In Wisconsin, this information is gleaned from WEDSS, so any contact investigation related outcome data needs to be entered into**

WEDSS linked to an index case, or the data will not be represented in the state aggregate report.

For more information on surveillance in contact investigations, see the Contact Investigation section.

Targeted testing: Review and interpretation of surveillance data inform targeted testing policies and strategies. Targeted testing is intended to identify people other than TB contacts who have an increased risk for acquiring TB and to offer diagnostic testing for *M. tuberculosis* infection and treatment, if indicated, in order to prevent subsequent progression to TB disease. Targeted testing and treatment of LTBI are best accomplished through cost-effective programs aimed at patients and populations identified on the basis of local surveillance data as being at increased risk for TB.[8] If your jurisdiction or facility has an idea for target testing, please reach out to the state TB program to discuss the intended program as additional funding for this type of activity may be available.

For more information on surveillance and targeted testing, see the Targeted Testing section.

Treatment of LTBI: Surveillance of people with LTBI does not routinely occur in the United States. However, in Wisconsin, **suspected or confirmed cases of LTBI are a category II reportable condition.**

For more information on updated LTBI treatment recommendations, see the National Tuberculosis Coalition of America's "Testing and Treatment of Latent Tuberculosis Infection in the United States: Clinical Recommendations."

Policy

Data collection and reporting on TB should be done in accordance with Wisconsin laws and regulations. Reporting and recordkeeping requirements are covered in this section.

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

For more information on confidentiality and the Health Insurance Portability and Accountability Act (HIPAA), see the Confidentiality section.

Laws and rules

Wisconsin laws and rules on tuberculosis (TB) are located in the Wisconsin State Statutes and Annotations. You can find information regarding specific statutes that deal with tuberculosis and communicable disease control in the introduction section also.

Contact the Wisconsin TB Program at 608-261-6319 or email DHSWITBProgram@dhs.wisconsin.gov for assistance with interpreting state laws and rules regarding TB control.

Reporting tuberculosis

Detecting and reporting suspected cases of tuberculosis (TB) is the key step in stopping transmission of *Mycobacterium tuberculosis* because it leads to prompt initiation of effective multiple-drug treatment, which rapidly reduces infectiousness. The Centers for Disease Control and Prevention (CDC) reports that delays in reporting cases of pulmonary TB are one of the major challenges to successful control of TB.[9] As one of the strategies to achieve the goal of reduction of TB morbidity and mortality, the CDC recommends immediate reporting of a suspected or confirmed case of TB to the jurisdictional health agency.[10] Also, by Wisconsin law and regulation, a case of TB disease must be reported to the local public health agency.

When reporting TB, keep the following definitions in mind:

- **Case:** An episode of TB disease in a person meeting the laboratory or clinical criteria for TB, as defined in the document "Case Definitions for Infectious Conditions Under Public Health Surveillance."[11] These criteria are listed below.
- **Suspect:** A person for whom there is a high index of suspicion for active TB (for example, a known contact to an active TB case or a person with signs or symptoms consistent with TB) who is currently under evaluation for TB disease.[12]
- **Confirmed:** A case that meets the clinical case definition or is laboratory confirmed, as described below in Table 2.1.[13]

Table 2.1: Case definitions[14]

Clinical case definition	Laboratory criteria for diagnosis
• In the absence of laboratory confirmation of M. tuberculosis complex after a diagnostic process has been completed, people must have all of the following criteria for clinical TB: Evidence of TB infection based on a positive tuberculin skin test result or positive interferon-gamma release assay for M. tuberculosis • Signs and symptoms compatible with current TB disease, such as a chest radiograph, chest computerized tomography scan, or other chest imaging study with results that are consistent with	• Isolation of Mycobacterium tuberculosis complex1 from a clinical specimen. • The use of identification techniques for M. tuberculosis performed on growth from culture of a clinical specimen, such as DNA probes or sequencing, is acceptable under this criterion, or • Demonstration of M. tuberculosis complex from a clinical specimen by nucleic acid amplification (NAA) test. NAA tests must be accompanied by cultures of mycobacterial species. However, for surveillance purposes, CDC will accept results

TB or clinical evidence of current disease (for example, fever, night sweats, cough, weight loss, hemoptysis). • Current treatment with two or more anti-TB medications	obtained from NAA tests approved by the Food and Drug Administration (FDA) and used according to the approved product labeling on the package insert, or a test produced and validated in accordance with applicable FDA and Clinical Laboratory Improvement Amendments (CLIA) regulations, or Demonstration of acid-fast bacilli (AFB) in a clinical specimen when a culture has not been or cannot be obtained or is falsely negative or contaminated; historically this criterion has been most commonly used to diagnose TB in the postmortem setting.
1 Most laboratories use tests that do not routinely distinguish *Mycobacterium tuberculosis* from very closely related species. These laboratories report culture results as being positive or negative for "*Mycobacterium tuberculosis* complex" (MTC). Disease caused by any member of the MTC meets the TB surveillance case definition **except** for the BCG strain of *M. bovis*, which should not be reported as TB, even if there is no history of BCG vaccination or cancer immunotherapy.	

Source: Adapted from: 2020 RVCT Reference Manual: Recommendations for Reporting, Verifying, and Counting Tuberculosis Cases (Revised March 27, 2020).

Suspect pulmonary TB and initiate a diagnostic investigation when the historic features, signs, symptoms, and radiographic findings of TB are evident among adults. TB should be suspected in any patient who has a persistent cough for over two to three weeks, or other indicative signs and symptoms.[15]

For more information on suspected pulmonary TB, see the Diagnosis of Tuberculosis Disease section.

Mandatory and timely case reporting from community sources (that is, providers, laboratories, hospitals, and pharmacies) should be enforced and evaluated regularly. Reporting enables the TB control program to take action at local, state, and national levels and to understand the magnitude and distribution of the TB problem.[16]

Prompt reporting (prior to culture confirmation) allows the state and local public health agency to do the following quickly:

- Verify diagnosis.
- Assign a case manager and coordinate treatment.
- Determine if an outbreak is occurring.
- Control the spread of TB.

Failure to report cases threatens public health because it may result in the adverse outcome of a patient's treatment or delayed contact investigation of an infectious case.[17]

Reporting gives physicians access to resources provided by the local public health agency. Private physicians are encouraged to work collaboratively with their local public health agency in the management of their TB cases and contacts. All providers who undertake evaluation and treatment of patients with TB must recognize that, not only are they delivering care to an individual, they are assuming an important public health function that entails a high level of responsibility to the community, as well as to the individual patient. The following public health services may be available to assist physicians and providers with managing care of people with TB:

- Epidemiologic investigation, including identification and examination of contacts.
- Antituberculosis medications.
- Sputum collection.
- Local public health agency laboratory services and consultation: At least one *M. tuberculosis* isolate should be sent to WSLH so that drug susceptibility testing and whole genome sequencing can be performed. [18]

Table 2.2: Wisconsin laws and regulations relating to reporting tuberculosis

Wisconsin laws and regulations	
Wisconsin Stat. § 252.03(1)	Every local health officer, upon the appearance of any communicable disease in his or her territory, shall immediately investigate all the circumstances and make a full report to the appropriate governing body and also to the department. The local health officer shall promptly take all measures necessary to prevent, suppress and control communicable diseases, and shall report to the appropriate governing body the progress of the communicable diseases and the measures used against them, as needed to keep the appropriate governing body fully informed, or at such intervals as the secretary may direct. The local health officer may inspect schools and other public buildings within his or her jurisdiction as needed to determine whether the buildings are kept in a sanitary condition.
Wisconsin Stat. § 252.05(1)	Any health care provider, as defined in Wis. Stat. § 146.81 (1) (a) to (p), who knows or has reason to believe that a person treated or visited by him or her has a communicable disease, or having a communicable disease, has died, shall report the appearance of the communicable disease or the death to the local health officer. The health agency of a federally recognized American Indian tribe or band may report this information to the local health officer. The local health officer shall report this information to the department or shall direct the person reporting to report to the department. Any person directed to report shall submit this information to the department.
Wisconsin Stat. § 252.07(1m)	Infectious tuberculosis and suspect tuberculosis are subject to the reporting requirements specified in Wis. Stat. § 252.05. Any laboratory that receives a specimen for tuberculosis testing shall report all positive results obtained by

	any appropriate procedure, including a procedure performed by an out-of-state laboratory, to the local health officer and to the department.

For more information on confidentiality and the Health Insurance Portability and Accountability Act (HIPAA), see the Confidentiality section.

Reporting suspected or confirmed cases of tuberculosis to the local public health agency

Health care providers and laboratories should report suspected or confirmed cases of TB using the information in the table 2.3.

Table 2.3: When to report tuberculosis

What condition/ test result	Who reports	When to report	How to report
Confirmed or suspected cases of TB disease Confirmation by laboratory tests is not required to report suspicion of TB. Specimens should be collected for laboratory analysis whenever possible. This includes pulmonary and extrapulmonary cases.	• Physicians • Other health care providers • Hospitals • Other similar private or public institutions • Anyone providing treatment appropriate for TB disease (four drug RIPE therapy) **Note:** The attending physician or other health care provider must report even if the laboratory is also reporting the test results.	**Report within 24 Hours**	Category I diseases are urgent public health matters and **should be reported by telephone to the patient's local health officer or to the local health officer's designee upon identification of a case or suspected case.** In addition to the immediate report, complete and fax, mail, or electronically complete a TB Suspect Case Data form, or enter the data into the Wisconsin Electronic Disease Surveillance System **within 24 hours**. Public health intervention is expected as indicated.
Sputum smears positive for acid-fast bacilli (AFB) **Cultures growing AFB or cultures that are demonstrated positive for *Mycobacterium tuberculosis* complex***	All laboratories that perform TB testing. In-state laboratories that send specimens for out-of-state testing. In Wisconsin, any lab with TB in culture must send a specimen to the Wisconsin State Lab of Hygiene for drug susceptibility testing.	**Report within 24 Hours**	**Note:** If specimens or isolates are sent to the state public health laboratory within two days after specimen collection or identification of *M. tuberculosis,* then the requirement to report results are fulfilled.

What condition/ test result	Who reports	When to report	How to report
Nucleic acid amplification tests/DNA probes positive for *M. tuberculosis* complex	**Note:** The laboratory must report even if the attending physician or other health care provider is also reporting.		
Confirmed or suspected cases of LTBI	• Physicians • Other health care providers • Hospitals • Other similar private or public institutions • Anyone providing treatment appropriate for LTBI **Note:** The attending physician or other health care provider must report even if the laboratory is also reporting the test results.	**Report within 72 Hours**	Category II diseases **should be reported by fax, mail, or electronic reporting to the patient's local health officer or to the local health officer's designee** on a Latent Tuberculosis Infection Confidential Case Report form by other means or by entering the data into the Wisconsin Electronic Disease Surveillance System **within 72 hours of the identification of a case or suspected case**
* Note: This includes both the preliminary report of cultures growing AFB without confirmation of *M. tuberculosis* complex and the final report of cultures that are demonstrated to be positive for *M. tuberculosis* complex.			

Use the following forms to report suspected and confirmed cases of TB or LTBI:

- TB Suspect Case Data Form (F-42001)
- Active Tuberculosis Disease Follow-Up Report (F-02474)
- Latent Tuberculosis Infection Confidential Case Report Form (F-02265)
- Latent Tuberculosis Infection Follow-Up Report Form (F-44125)

Health care providers

Health care providers should report the information in Table 2.4 on confirmed or suspected cases of TB.

Table 2.4: Information health care providers should report on confirmed or suspected cases of TB

Type of information	Details
Reporting health care provider	• Name • Address • Phone number • Date of report
Patient information	• Name • Address • Phone numbers • Marital status • Who lives with client? • Employment information and primary occupation • Hospital admission information (name of hospital if applicable, date of admission) • Type of isolation arrangements (if applicable, home, hospital, other) • Client's preferred language
Demographic and social information	• Date of birth • Sex assigned at birth • Race and ethnicity • Country of birth and date of arrival in the United States • Drug, alcohol, or tobacco use? Current or former? • Homeless status-currently? Within the past year? • Diagnosed in a correctional facility or long-term care facility? • History of incarceration? What type of facility? • Known contact to infectious TB ever? Known contact with infectious TB patient(s) in the last 2 years?
Medical information	• Reason for testing • Symptoms and onset-if applicable • Disease site and areas of potential TB involvement • Comorbid health conditions • Human immunodeficiency virus (HIV) status • Is client immunosuppressed (not HIV/AIDS related)? • Results of QuantiFERON®-TB Gold (QFT-G), T.spot.TB Test, or tuberculin skin test (TST) (TST in mm) and date of test

	• Chest radiograph results and dates (if applicable) • Bacteriology results, date(s), and name of laboratory performing test(s) • Drug therapy (medications used, dates given, mode of treatment) • If client is diabetic, A1c and fasting blood glucose at time of TB diagnosis • Is the client pregnant at time of diagnostic workup? If yes, what is the due date? • Has the client received BCG vaccine previously? Is the client receiving or have they received BCG treatment for bladder cancer? • Does the client have a history of previous positive TB tests or history of TB or LTBI treatment?

Laboratories

Laboratories should report the information in table 2.5 on test results.

Table 2.5: Information laboratories should report on TB test results

Type of information	Details
Reporting laboratory	• Name • Address • Phone number • Date of report
Sputum smears positive for acid-fast bacilli (AFB)	• Specimen positive for AFB (qualitative result) • AFB positive grade (quantitative result)
Cultures growing AFB or cultures positive for *Mycobacterium tuberculosis*	• Specimen positive for AFB, no identification yet • Culture growth identified as *M. tuberculosis* complex
Nucleic acid amplification tests/DNA probes positive for *M. tuberculosis* complex	• Specimen AFB smear-positive/AFB smear-negative • MTB complex DNA detected/not detected • Rifampin susceptibility prediction (if applicable)

Required reports from local public health agencies to the Wisconsin Tuberculosis Program

Local public health agencies are required to completely enter and submit the reports listed in the table below in the WEDSS if other reporting method does not fulfill the reporting requirements. Please note that once the Interjurisdictional TB Notification Form(s) are completed, you must notify the state TB program of the need for them to send the form to the appropriate state.

Table 2.6: Required reports

Report title	When due
Acute and Communicable Disease Case Report Form	**Within 24 hours** of identified suspect or confirmed case of active TB disease
Latent TB Infection Confidential Case Report Form	**Within 72 hours** of identified suspect or confirmed case of LTBI
Interjurisdictional Tuberculosis Notification Form	As soon as possible after learning that the case patient has relocated to another jurisdiction.

To download forms for the above required reports, click on the report title link, or go to the Wisconsin TB Program webpage.

The Report of Verified Case of Tuberculosis (RVCT) forms are designed to collect information on cases of TB. Data obtained from case records in WEDSS are entered into RVCT forms by the state tuberculosis nurse consultant(s) and then transferred electronically to the CDC. While a case of TB is required to be reported to the CDC only if active disease is verified and the case is to be part of the annual morbidity count, the CDC encourages the use of the RVCT forms for the collection of data on suspected cases of TB. The state handles these forms, you may see them in the WEDSS "file cabinet", **but please do not edit or otherwise update them**. If you happen to notice a discrepancy or incorrect information, you may email the TB program.

Data collection

Forms

It is recommended that the following standardized forms (or similar forms developed by local public health agencies) be completed and placed in the patient's chart if the related activities are performed.

Table 2.7: Recommended forms for a tuberculosis patient's chart

Chart of a patient on treatment for tuberculosis disease	
TB disease treatment/case management • TB Risk Assessment Questionnaire • WI TB Risk Assessment and Symptom Evaluation for Annual Employee Screening Form • Acute and Communicable Disease Case Report Form • TB Suspect Case Data Form	**Wisconsin TB treatment assistance program** • Treatment Assistance Enrollment and Agreement Form • Treatment Assistance Program Request for Reimbursement Form • Treatment Assistance Program Special Request Form

• Active TB Disease Follow Up Report • Nurse Case Management Checklist and Timeline • Home Isolation Agreement for TB • LTBI Case Report Form • LTBI Follow Up Report **Wisconsin TB dispensary program** • TB Disease Initial Request for Medication • Active TB Disease Medication Refill Request • LTBI Initial Request for Medication • TB Ordering and Billing Interface (TOBI) Access Request	**Transfer notifications** • Interjurisdictional TB Notification Form for transfers inside of Wisconsin • Interjurisdictional TB Notification Follow Up Report for transfers inside of Wisconsin • Interjurisdictional TB Notification Form for transfers outside of Wisconsin (NTCA form)

Wisconsin Electronic Disease Surveillance System (WEDSS)

To carry out mandatory community public health responsibilities, the state TB control program requires all suspect and confirmed cases of TB and LTBI be entered into WEDSS. The WEDSS record should ensure that laboratory data, including all initial diagnostic tests, are promptly reported, if applicable, to the health care provider and local and state TB control programs. Follow-up tests, including data on sputum culture conversion and drug susceptibility testing of clinical isolates, should also be promptly reported so any needed modifications in management can be made. Aggregate program data should be analyzed, interpreted, and made available to the health care community and to community groups and organizations with specific interests in public health. Providing this information supports education and advocacy and facilitates collaboration in the planning process.

To ensure appropriate follow-up of all TB patients and people suspected of having TB, it is crucial that public health staff at the local level enter information into the WEDSS record on a continuing basis:[19] Keep in mind that the fields for minimum data requirements in WEDSS are highlighted in **red** text. At a minimum, these fields should be completed to the greatest extent possible:

- Acid-fast bacilli smear results
- Culture results
- Drug susceptibility results
- Symptom evaluation and symptom onset
- Chest radiograph results
- Doses of medications being administered
- Documentation of data obtained through taking of patient's medical history
- Any adverse reactions or events that may be related to treatment

- Accurate information regarding contacts that should be evaluated after exposure

Document retention

Effective in 2006, all TB public health records are to be reported, followed, and stored in WEDSS. These records are permanent.

All State of Wisconsin active TB cases prior to 2006 have been converted to PDF. Contact the TB Program for record retrieval of those records.

Radiographs and other imaging are not stored by the state. Radiographs may be held by the principal health care provider or radiology office where those radiographs and other imaging were obtained.

Case management health information and other TB records should be maintained at the local public health agency according to current applicable record retention rules and regulations. Consult with your local corporation counsel regarding record retention requirements at the local level.

Whole genome sequencing (WGS)

WGS is a useful tool for studying the pathogenesis, epidemiology, and transmission of *Mycobacterium tuberculosis. M. tuberculosis* genotyping refers to laboratory procedures developed to identify *M. tuberculosis* isolates that are identical in specific parts of the genome (of similar strain types).

WGS generates DNA sequence data for the entire *M.tuberculosis* genome, which can be used for various applications in TB prevention and control activities. Mycobacteria reproduce by binary fission, which means that in almost all cases each new bacillus has identical DNA, just as human identical twins are genetically identical to each other. However, changes in the DNA occur spontaneously at low frequency. Over time, these changes, known as DNA mutations, have accumulated to produce the diversity of *M. tuberculosis* strains currently circulating in the world.

The diversity of strain provides a means to identify instances of recent transmission of TB as well as the chains of transmission that occur among people with TB. This diversity also helps to elucidate the patterns and dynamics of TB transmission. When a person with TB improves but then becomes ill again, this diversity can differentiate reactivation with the same strain of *M. tuberculosis* from reinfection with a different strain. Genotyping can also be used to identify false-positive cultures.

Advances in DNA analytic methods have made it possible for TB programs to obtain rapid and reliable genotyping results. These advances include the following:

- The determination of the complete DNA sequence of *M. tuberculosis* in 1998

- The development of IS6110-based restriction fragment length polymorphism (RFLP) genotyping, which provided a discriminatory typing method and led to a standardized system for genotyping *M. tuberculosis* isolates.
- Whole-genome multilocus sequence typing (wgMLST): each of 2,672 genetic loci are analyzed and assigned a number such that isolates that have the same sequence at a locus will have the same number assigned for that locus. Isolates that match at ≥99.7% of the loci will form a genotype cluster, designated with a wgGLST name. This genotyping scheme helps define TB clusters.
- Whole-genome single nucleotide polymorphism (wgSNP) comparison: this comparison is performed to identify single nucleotide polymorphisms (SNPs) that distinguish isolates in a genotype-matched cluster. SNPs result from mutations at a single position in the DNA sequencing. Because SNPs gradually accumulate over time, the number of SNPs that differ between isolates can provide information about whether the TB cases could be the result of recent transmission.
- Detection of possible drug resistance: WGS data is used to detect mutations associated with drug resistance for surveillance purposes.

Two new methods, spoligotyping and mycobacterial interspersed repetitive units (MIRU) analysis, are based on polymerase chain reaction (PCR) and provide much more rapid results than RFLP analysis. The addition of genotype information to the pool of information generated by surveillance data and data collected through epidemiologic investigation allow confirmation of suspected transmission. A potential outbreak should be suspected whenever there is more than one case of TB whose isolate has the same genotype (genotype cluster). Further investigation that includes review of surveillance data, chart review, and reinterview of TB cases may refute or confirm the epidemiologic connection between more than one TB case. In some instances, a genotype cluster reflects a false-positive culture that may be a result of laboratory cross-contamination. Routine review of genotyping data, along with epidemiologic, clinical, and laboratory data, may identify patients who are wrongly classified as TB patients and should be further investigated.

The Wisconsin TB Program, in partnership with the Wisconsin State Lab of Hygiene ensures that all isolates are appropriately sent for WGS. When necessary, WITBP staff may reach out to staff at the local level to follow up on genotyping results—for example, if separate cases can be tied together genotypically, there may be a need for re-evaluation of contact information and expansion of the contact investigation.

For more information on genotyping, see the National Tuberculosis Controllers Association and Centers for Disease Control and Prevention Advisory Group on Tuberculosis Genotyping's Guide to the Application of Genotyping to Tuberculosis Prevention and Control (2004).

All positive *M. tuberculosis* cultures should be sent to your state public health laboratory to ensure WGS is performed on one isolate for each confirmed case of TB.

For more information on laboratory testing, contact the state TB program or see the Laboratory Services section.

Dissemination

TB surveillance data should be disseminated periodically to health care providers, health agencies, and the public through multiple channels including health alerts, reports, summaries, and presentations.

- Wisconsin TB data
- United States TB data

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