2020 Report of Verified Case of Tuberculosis (RVCT) Instruction Manual August 2021

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Introduction

Background

Tuberculosis (TB) is a nationally notifiable disease, and reporting is mandated in all states. In 1953, a national surveillance system was established to collect information on new cases of active TB disease. Since 1985, all states have been reporting TB cases to the Centers for Disease Control and Prevention (CDC) using the Report of Verified Case of Tuberculosis (RVCT), for national TB surveillance. Data are collected by state and local TB programs and submitted electronically to CDC, Division of Tuberculosis Elimination (DTBE). These data are used to monitor national TB trends, identify priority needs, and create the DTBE annual surveillance report, *Reported Tuberculosis in the United States.*

To control and eventually eliminate TB, state and local TB control programs must be able to monitor trends in TB disease in high-risk populations, as well as identify new patterns of disease and possible outbreaks. The last major revision of the RVCT was completed in 2009. Since 2016, members of a DTBE-sponsored workgroup consisting of nearly 30 public health professionals from 15 TB control programs, DTBE, and the National TB Controllers Association (NTCA) have been working to revise the RVCT. Modifications to the RVCT data collection now accommodate the changing epidemiology of TB in terms of risk factors, new drug treatments, and enhanced laboratory capacity for diagnostic tests.

Note: A case of TB is defined as an episode of TB disease in a person meeting the laboratory or clinical criteria for TB as defined in **Appendix A** – Tuberculosis Case Definition for Public Health Surveillance.

Tuberculosis Surveillance Data

Some states may use a modified version of the 2020 RVCT or a data collection tool that is unique to their jurisdiction. These forms are used to collect the same data contained in the 2020 RVCT. However, just as the actual 2020 RVCT is not sent to CDC, neither are any locally defined variables or additional data. CDC should never receive directly identifying information (e.g., names) of persons with TB for inclusion in the TB surveillance dataset. CDC does receive certain indirect identifiers (e.g., date of birth); these data are protected using strict data security standards as well as an Assurance of Confidentiality. Locally assigned numbers and characters are used for case identification and are included in **State and Local Case Numbers** (items 3 & 4) for use by CDC to identify cases when communicating with state or local agencies.

Impact of RVCT Data

The 2020 RVCT will assist TB control programs in gathering accurate and useful data. The additions and changes made to the variables of the 2020 RVCT will enable programs to capture data that are more inclusive of a variety of risk factors. These additional data will be essential to efficient and effective TB program management. The following text describes how the 2020 RVCT data can improve TB programs, and the negative effect of using inaccurate or incomplete data.

Benefits of RVCT Data

- Increased ability to assess program performance, completeness of data collection, and accuracy of reporting
- Improved data for program planning and policy development (e.g., personnel, resources, funding)
- Facilitation of patient services (e.g., quality of care, continuity of care, sharing of accurate information with patient and health facilities)

Negative effects of Inaccurate, Incomplete, or Unknown RVCT Data

- Inaccurate follow-up of services to patients
- Inadequate resources (e.g., funding, staff, facilities, drugs, and supplies)
- Inaccurate evaluation and policy development
- Misrepresentation of the public health burden of TB
- Inability to measure TB program indicators that are based on surveillance data

Quality Assurance

Assuring data completeness and quality is encouraged for all case reporting. Each reporting area should develop its own policy or procedure for reviewing and updating incomplete or incorrect data. These procedures should ensure that the data are collected and entered in the surveillance system accurately.

Although health departments share TB surveillance data with CDC, the responsibility and authority for TB surveillance rests with the health department. States vary in the structure and organization of their surveillance systems. As with any reportable disease, the completeness of TB reporting reflects how actively health departments solicit case report information. Historically, disease surveillance systems have been categorized as passive or active.

Passive surveillance
Health departments passively receive case reports from health care providers, depending on the health care providers to know and comply with reporting requirements.

Active surveillance
Health departments actively contact and interact with health care facilities or individual providers to stimulate disease reporting, sometimes directly assuming the primary responsibility of reporting cases from large or high-volume institutions.

CDC provides funding and technical assistance to health departments to support TB surveillance and has encouraged them to take an active rather than passive approach to TB surveillance. Health departments are encouraged to identify local or private health care facilities that serve people with TB. Health departments are also encouraged to use other data sources to identify TB cases, including death certificates and laboratory reports.

Overview

The RVCT is designed for the collection of information on cases of TB. The expanded RVCT was approved by the Office of Management and Budget (OMB) in 2019 to become effective January 2020.

Note: On the RVCT and throughout this document, the term *state* is used to refer to the reporting jurisdiction, though not all jurisdictions are states.

Required and Recommended Uses of the 2020 RVCT

Reporting of all verified cases to CDC is required by the cooperative agreement between CDC and state and local TB programs, regardless of whether the case is counted as part of the jurisdiction's official TB case count (e.g., transfer cases already counted in another state or country, which jurisdictions sometimes call "burden cases").

> U.S. reporting areas include the 50 United States, the District of Columbia, New York City (separate from New York State), five U.S. territories (i.e., Puerto Rico, American Samoa, Guam, Commonwealth of the Northern Mariana Islands, U.S. Virgin Islands), and three freely associated states (i.e., Federated States of Micronesia, Republic of the Marshall Islands, and Republic of Palau). These freely associated states are independent countries but are considered U.S. reporting areas for TB surveillance purposes.

Cases among persons who have been in the United States (or another U.S. reporting area) for <90 days (inclusive of the report date) should <u>not</u> be reported to CDC. TB disease diagnosed in patients <12 months after completion of treatment for a previous TB episode should not be reported as a new TB case; rather, the previous case report should be reopened and updated. All other countable and noncountable TB cases should be reported to CDC.

Noncountable TB cases help measure TB morbidity and case management burden, and reporting is required under the current cooperative agreement with reporting areas.

For the purposes of surveillance, a case of TB is defined based on laboratory or clinical evidence of active disease due to *M. tuberculosis* complex. For more information on the case definition of *M. tuberculosis* complex, see **Appendix A** – Tuberculosis Case Definition for Public Health Surveillance.

2020 RVCT

The 2020 RVCT comprises two data collection reports:

1. Report of Verified Case of Tuberculosis: Complete this for all patients with a verified case of TB.
2. Multidrug-resistant (MDR) TB surveillance form: Complete this for all patients treated as MDR TB, regardless of DST results.

2020 RVCT Items

The revised RVCT includes 43 items. The characteristics are varied; for example,

- Some items include one variable response
- Some items include more than one response (e.g., Items 5 and 6)
- Each item is delineated in its own box

Items are not necessarily listed in the order in which you might receive the information.

Data are entered on the RVCT in several ways:

1. Entering dates and other numbers (e.g., Items 1, 2, and 6)
2. Checking boxes (e.g., Items 8, 9, and 10)
   a. Select one
   b. Select all that apply
3. Entering specific information (e.g., Items 11, 12)

Partial Dates

There are several items that include dates. When entering dates in the RVCT, supply as much known information as possible. If the month and/or day is unknown, enter your best estimate or do the following:

- If the day is unknown, enter the first day of the known month as the date (e.g., if a case was reported in February 2021, but the exact date is unknown, enter 02/01/2021 as the date reported).
- If the month and day are unknown, enter the first day of the known year as the date (e.g., if the year of report is 2021, but the month is unknown, enter 01/01/2021 as the date reported).

Pending vs. Unknown Information

Leave the item blank if the information requested is pending.

Updating of the RVCT

It may be necessary to update RVCT information if a case is reopened (e.g., a patient who had been lost to follow-up is found) or if previously unavailable information is obtained. When updated data are entered in an electronic record, the new data will automatically overwrite the old data.

Additional Reporting Forms

If the reporting area has its own TB case reporting forms and uses them to complete the RVCT variables, the staff should carefully review the RVCT variables and the instructions in this document to ensure that variables on the reporting area's forms match those of the RVCT.

Data Entry and Security

Data for the RVCT are entered in the software system designated by your jurisdiction and then transmitted electronically to CDC. Data security is an important responsibility shared by CDC, state, and local health departments.

Access to the data entry software should be restricted to individuals authorized to perform TB surveillance activities. Access to the approved data entry software, local databases, and all other electronic surveillance files should be controlled using a local user identification (user ID) and password.

Patient Confidentiality

Case numbers must not include personal identifiers. Do not use names, initials, Social Security numbers, addresses, telephone numbers, or other information that could identify a patient.

Because of the sensitive nature of some of the data collected, CDC has provided an Assurance of Confidentiality for the surveillance system. Information collected for the RVCT that would permit identification of any individual will be held in confidence and will not be released without the consent of the individual, in accordance with sections 306 and 308(d) of the Public Health Service Act (42 U.S.C. 242k and 242m). Surveillance information reported to CDC is used for statistical and analytic summaries and for special investigations of TB epidemiology.

What is New

The RVCT has items that are either new or revised from the previous RVCT that was published in 2009.

The RVCT **State Case Number** (Item 3), also known as the RVCT number, remains standardized by adding a 4-digit code for report year and a 2-character (alpha) code for state (or jurisdictional code for jurisdictions that are not states) to the 9-character alphanumeric local identifier, so that each state case number is unique for year and state. The **State Case Number** format is important to help when trying to identify a person with TB who has been transferred from one health jurisdiction (e.g., state) to another, and when trying to link TB cases (e.g., known contacts).

New and Updated Items

Fifteen new items were added to improve data collection. These items are indicated in the table below.

New Items on the Revised RVCT

Item	Item Name
5	Case Already Counted by Another Reporting Area
12	Country of Usual Residence
15	Occupation and Industry
16	Other Risk Factors
19	Current Smoking Status at Diagnostic Evaluation
20	Lived Outside of the United States for >2 months (uninterrupted)
24	Date of Illness Onset/Symptom Start Date
26	Case Meets Binational Reporting Criteria?
27	Case Identified During a Contact Investigation of Another Case?
28	Contact Investigation Conducted for This Case?
29	Complete Table Below for All Known TB and LTBI Cases Epidemiologically Linked to this Case
32	If Initial Drug Regimen Not RIPE/HRZE, Why Not?
35	Was Genotypic/Molecular Drug Susceptibility Testing Done?
36	Was Patient Treated as MDR TB Case (Regardless of DST Results)?
43	Did the Patient Die?

Other revised variables have been updated to reflect the changing field of TB epidemiology. Modified variables include several items where multiple test results may be entered such as responses for Tuberculin Skin Test and Non-DST Laboratory Test Results. All updated items are listed in the table below.

Updated Items on the Revised RVCT

Item	Item Name
2	Date Counted
6	Reporting Address
8	Sex at Birth
9	Ethnicity
10	Race
11	Nativity
13	Status at TB Diagnosis
14	Initial Reason Evaluated for TB
21	Tuberculosis Skin Test and All Non-DST TB Laboratory Test Results
22	Chest Radiograph or Other Imaging Study Results
23	Has the Patient Been Previously Diagnosed with TB Disease or LTBI?
31	Initial Drug Regimen
34	Was Phenotypic/Growth-Based Drug Susceptibility Testing Done?
38	Moved During Therapy?
40	Reason Therapy Stopped or Never Started?
41	Reason TB Disease Therapy Extended >12 Months, if applicable
42	Treatment Administration

Overview of the RVCT Instructions

The RVCT instructions provide information on how to complete the 43 items for the RVCT. The instructions provide details about each item, explain the nuances of how to answer the items, and provide examples to illustrate how to apply the instructions for entering data for a TB case.

Administrative Information

1. DATE REPORTED

Primary Purpose: The Date Reported is used to determine when the health department was first notified that a person may have TB.

Date Format	Description	Comment
Month, day, and year (e.g., 01/17/2020)	Date that a health department first **thought** that the patient may have TB. ***or*** Date the health department received notification (verbal or written) from a health care provider that a patient might have TB**.**	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date reported (e.g., if a case was reported in February 2021, but the exact date is unknown, enter 02/01/2021 date reported). • If the month and day are unknown, enter the first day of the known year as the date reported (e.g., if the year of report is 2021, but the month is unknown, enter 01/01/2021 as the date reported). If the patient had a previous diagnosis of TB, "**Date Reported"** applies to the current TB episode.

Note: If this case is counted by a different jurisdiction, the noncounting jurisdiction should still complete RVCT item 1 (**Date Reported**). This date should correspond to the week that the noncounting jurisdiction first heard about the case (e.g., on an interjurisdictional notification from the other reporting area). In these situations, please be sure to provide the other jurisdiction's state case number in RVCT item 5 (**Case Already Counted by Another Reporting Area**).

2. DATE COUNTED

Primary Purpose: Used to determine the approximate date that the reporting area reviewed the RVCT and determined that the case meets the official TB surveillance case definition for *reporting* to the National Tuberculosis Surveillance System.

Item	Description	Comment
MMWR* Week:	The *Morbidity and Mortality Weekly Report* (*MMWR*) week is the week of the epidemiologic year to when the state health department verified that the case meets the case definition for TB disease.	The *MMWR* week reported should represent the week when the reporting area verified that the case meets the TB surveillance case definition. This is the proxy for the TB case count date. *MMWR* week is used to support public health reporting in the annual *Summary of Notifiable Diseases, United States*.
***MMWR* Year:**	*MMWR* year is the epidemiologic year to which a Nationally Notifiable Diseases Surveillance System case report is assigned.	The *MMWR* year reported should represent the year when the reporting area verified that the case meets the TB surveillance case definition. This is the proxy for the TB case count date. *MMWR* year is used to determine the year in which the case is included for the purposes of determining TB case counts and incidence rates.

*For more info on *MMWR* weeks see link below:

https://ndc.services.cdc.gov/wp-content/uploads/MMWR_Week_overview.pdf

Note: If this case is counted by a different jurisdiction, the noncounting jurisdiction should still complete RVCT item 2 (**Date Counted**). However, this date should correspond to the week that the noncounting jurisdiction began to follow or manage the case for public health purposes (e.g., administer TB medications). In these situations, please be sure to provide the other jurisdiction's state case number in RVCT item 5 (**Case Already Counted by Another Reporting Area**).

3. STATE CASE NUMBER

Primary Purpose: Used to uniquely identify case reports to facilitate communication between reporting areas and CDC.

Item	Description	Comment
Year	Year Reported is the year when the case was reported (e.g., 2020).	This year should correspond to the Report Date, which is not necessarily the same as the *MMWR* Year.
State	State Code indicates the two-letter postal code of the state reporting this case, e.g., GA for Georgia (see **Appendix C**, Reporting Area Codes).	The term *state* is used to refer to the reporting area, though not all reporting jurisdictions are states (e.g., New York City).

Item	Description	Comment
Number	Nine-character string unique within the reporting area.	This string can contain letters or numbers and is assigned by the reporting area.

Comment: Case Numbers

Year + State + Number = State Case Number

A **State Case Number** may not be assigned to more than one case during a calendar year.

Note: The **State Case Number** is the official identification number for the case. If additional communication about a record is required between CDC and a reporting area, this number is used to identify the record. The **State Case Number** is also commonly known as the RVCT number.

Case numbers must not include personal identifiers. To maintain patient confidentiality, do not use names (either patient or provider), initials, Social Security numbers, addresses, telephone numbers, or other information that could directly identify a patient as part of the **State Case Number. State Case Numbers** are transmitted to CDC and therefore must not include personal identifying information.

4. LOCAL CASE NUMBER

Primary Purpose: Used to uniquely identify case reports to facilitate communication between local health departments, reporting areas, and CDC.

Item	Description	Comment
Year	Year Reported is the year when the case was reported (e.g., 2020).	This year should correspond to the Report Date, which is not necessarily the same as the *MMWR* Year.
State	State Code indicates the 2-letter postal code of the state reporting this case, e.g., GA for Georgia (see **Appendix C**, Reporting Area Codes).	The term *state* is used to refer to the reporting area, though not all reporting jurisdictions are states (e.g., New York City).
Number	Nine-character string unique within the local program's registry.	This string can contain letters or numbers and is assigned by the local program.

Note: Local Case Number is the same as **City/County Case Number**. A **Local Case Number** may not be assigned to more than one case during a calendar year. A single case may be assigned identical **City/County Case** and **State Case Numbers**.

This item is optional.

5. CASE ALREADY COUNTED BY ANOTHER REPORTING AREA?

Primary Purpose: TB cases may be reported by multiple reporting areas in the event that the patient moved between reporting areas while under care for a TB episode; however, to avoid double-counting the case, it is important that only one reporting area officially "count" the case. This question helps to determine whether the case report should be considered "countable" for incidence calculations.

Option *(select one)*	Description	Comment
Yes, another U.S. reporting area (Specify state case number from other area.)	The case has already been counted by another U.S. reporting area such as another state (e.g., transfer). Under **"Specify"**, enter the state case number assigned to the case by the other reporting area.	Reporting jurisdictions are encouraged to work collaboratively to resolve disagreements about which reporting area should count a case. If necessary, CDC will arbitrate this determination. See Note (below) for definition of U.S. reporting areas.
Yes, another country (Specify country)	TB case counted by another country that is not a U.S. reporting area. Under **"Specify"**, enter the country where TB treatment was initiated.	It may be difficult to verify whether a case has been counted in another country. If confirmation that the case was counted cannot be obtained, consider the case to have been counted in the other country if the diagnostic evaluation was completed and the patient was prescribed anti-TB medications before arriving in the United States.
No	Case was **not** counted by another reporting area.	None.

Note: U.S. reporting areas include the 50 United States, the District of Columbia, New York City (separate from New York State), five U.S. territories (i.e., Puerto Rico, American Samoa, Guam, Commonwealth of the Northern Mariana Islands, U.S. Virgin Islands), and three freely associated states (i.e., Federated States of Micronesia, Republic of the Marshall Islands, and Republic of Palau). These freely associated states are independent countries but are considered U.S. reporting areas for TB surveillance purposes.

Demographics and Initial Evaluation

6. REPORTING ADDRESS

Primary Purpose: To document the approximate location of the patient's residence for the purpose of geographic analyses.

The **reporting address** is intended to represent the location of the patient's "usual residence" as described in the Council of State and Territorial Epidemiologists (CSTE) Position Statement 11-SI-04 ("Revised Guidelines for Determining Residency for Disease Notification Purposes") and the previous Position Statement 03-ID-10. In general, "usual residence" is defined as "…the place where the person lives and sleeps most of the time, which is not necessarily the same as the person's voting residence, legal residence, or the place where they became infected with a reportable disease." In most cases, determining a patient's usual residence is unambiguous; however, there are various scenarios where the determination might not be as straightforward. The table of scenarios below presents the more common scenarios for which special guidelines for determining usual residence have been established. Additional guidance for reporting, verifying, and counting cases can be found in **Appendix B**.

CSTE Position Statement also established the concept of a "reference point" in time at which the patient's usual residence would be established for surveillance reporting purposes. For the purposes of the RVCT, for consistency with historical practice, the reference point is *the date when the TB diagnostic evaluation was initiated*.

In cases where determining usual residence is not straightforward and where specific guidelines have not been established, reporting areas should confer with DTBE to determine the most appropriate reporting address to report on the RVCT.

Patient Scenarios	How to Count	Reporting Address
Persons temporarily away from their usual residence (e.g., on vacation or a business trip), and *who return to their usual residence* to complete TB treatment.	Count in the reporting area for the patient's usual residence.	Enter city, county, ZIP Code, and census tract of the patient's usual residence.
Persons temporarily away from their usual residence (e.g., on vacation or a business trip), and *who remain in the community that they were visiting* to complete TB treatment.	Count in the reporting area where the TB diagnostic evaluation was initiated.	Enter city, county, ZIP Code, and census tract of location where the patient was staying when the diagnostic evaluation was initiated.
Persons without housing (e.g., persons experiencing homelessness or without a fixed residence)	Count in the reporting area where the TB diagnostic evaluation was initiated.	Enter city, county, ZIP Code, and census tract of location where the patient was staying when the diagnostic evaluation was initiated.

Patient Scenarios	How to Count	Reporting Address
Persons with multiple residences	Count in the reporting area where the patient lives most of the time, based on the length of the typical cycle between residences, subject to the following specific guidelines: 1. Commuter workers living away part of the week while working (on a weekly cycle) should be reported by the jurisdiction where they stay most of the week. 2. People who live in one state most of the year but who regularly spend part of the year in another state (e.g., snowbirds) can be said to have an annual cycle and should be reported by the jurisdiction of the residence where they live most of the year. 3. Children in joint custody should be reported by the jurisdiction of the residence where they live most of the time. If the time is equally divided, they are reported by the jurisdiction where they were staying at the time the TB diagnostic evaluation was initiated. 4. People who move between residences without any regular cycle should be reported by the jurisdiction of the residence where they live most of the time. If their time is equally divided, report based on where they were staying at the time the TB diagnostic evaluation was initiated.	Enter city, county, ZIP Code, and census tract of the location where the patient stays in the reporting area that is counting the case.
Students	1. College or boarding school students on a typical yearly academic cycle should be counted by the reporting area where they live most of the year. 2. Intermittent or part-time students without a regular cycle for moving between parental and school residences should be counted by the reporting area where they were living at the time that diagnostic evaluation was initiated.	Enter city, county, ZIP Code, and census tract of the location where the patient stays in the reporting area that is counting the case.
Foster children and wards of the state	Count in the reporting area where the patient was living when TB diagnostic evaluation was initiated.	Enter city, county, and ZIP Code, and census tract where the patient was living when diagnostic evaluation was initiated.

Patient Scenarios	How to Count	Reporting Address
Uniformed service or merchant marine personnel	1. Uniformed service personnel residing in the United States should be counted by the reporting area for their usual residence, either on- or off-base (this is not necessarily the jurisdiction where the military member is registered to vote, pays taxes, etc.). 2. Crews of uniformed service vessels with a U.S. homeport should be counted by the reporting area for their usual onshore residence if they report one (the place where they live and sleep most of the time when they are onshore); otherwise, they should be counted by the reporting area for their vessel's homeport. 3. Crews of U.S. flag merchant vessels engaged in inland waterway transportation should be counted by the reporting area for their usual onshore residence (the place where they live and sleep most of the time when they are onshore). 4. Crews of U.S. flag merchant vessels docked in a U.S. port or sailing from one U.S. port to another U.S. port should be counted at their usual onshore residence if they report one (the place where they live and sleep most of the time when they are onshore). If they have no onshore residence, count in the reporting area where the diagnostic evaluation was initiated.	Enter city, county, ZIP Code, and census tract of the location where the patient stays in the reporting area that is counting the case.

Patient Scenarios	How to Count	Reporting Address
Institutionalized persons	1. Patients in general hospitals or wards at the time of symptom onset should be counted by reporting area for their usual residence (the place where they live and sleep most of the time when they are not hospitalized). Newborn babies who have not yet been discharged following delivery should be reported by the mother's usual residence. 2. In general, persons who are institutionalized for indefinite or long-term stays should be counted by the reporting area for the facility where they are staying at the time the diagnostic evaluation was initiated. Examples of such facilities include: a. chronic or long-term disease hospitals; hospices; nursing or convalescent homes; b. inpatient drug/alcohol recovery facilities; homes, schools, hospitals, or wards for disabled persons c. federal and state prisons, jails, detention centers, and halfway houses; d. orphanages or residential care facilities for children 3. Staff members living in hospitals, nursing homes, prisons, or other institutions should be counted by the reporting area for their usual residence (the place where they live and sleep most of the time); otherwise by the reporting area where the institution is located.	Enter city, county, ZIP Code, and census tract of the location where the patient stays in the reporting area that is counting the case.
Non-U.S. citizens (including, but not limited to, Immigrants, Refugees, Foreign Visitors (e.g., students, commercial representatives, and diplomatic personnel), and Border Crossers	1. Noncitizens who have established a household or are part of an established household in the United States, including those in the United States for work or study, should be counted by the reporting area for their usual residence in the United States. 2. Noncitizens who live on diplomatic compounds (e.g., embassies, consulates) should be counted by the reporting area where the diplomatic compound is located.	Enter city, county, ZIP Code, and census tract of the location where the patient stays in the reporting area that is counting the case. Note: Additional information about reporting cases among non-U.S. citizens can be found in **Appendix B**.

7. DATE OF BIRTH

Primary Purpose: To calculate the patient's age at the time of relevant events in the patient's lifetime.

Date Format	Description	Comment
Month, day, and year (e.g., 04/26/1968)	Patient's complete date of birth should be entered (i.e., month, day, *and* year).	If the patient is uncertain about his/her exact date of birth, provide as much specificity as possible. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date of birth (e.g., if a patient was born in February 1972, but does not know the exact date, enter 02/01/1972 as the date of birth). • If the month and day are unknown, enter the first day of the known year as the date of birth (e.g., if a patient was born in 1972, but does not know the month or day, enter 01/01/1972 as the date of birth).

8. SEX AT BIRTH

Primary Purpose: To establish the biological sex recorded for the patient at birth for evaluation of epidemiologic trends.

Option *(select one)*	Description
Male	The biological sex recorded for the patient at birth was male.
Female	The biological sex recorded for the patient at birth was female.
Unknown	The biological sex recorded for the patient at birth is **not** known.

If **"Female,"** enter the following:

Pregnant at Time Diagnostic Evaluation was initiated?

Option *(select one)*	Description
Yes	Patient was pregnant when TB diagnostic evaluation was performed or initiated.
No	Patient was **not** pregnant when TB diagnostic evaluation was performed or initiated.

Option *(select one)*	Description
Unknown	It is **not** known if patient was pregnant when TB diagnostic evaluation was performed or initiated.

9. ETHNICITY

Primary Purpose: To establish the patient's ethnicity for evaluation of epidemiologic trends associated with ethnicity.

Option *(select one)*	Description
Hispanic or Latino	Patient considers himself or herself Cuban, Mexican, Puerto Rican, South or Central American, or of other Latin American culture or origin, regardless of race.
Not Hispanic or Latino	Patient does **not** consider himself or herself Hispanic or Latino.
Unknown	Patient's ethnicity is **not** reported or unknown.

Note: Hispanic or Latino
Some patients prefer the term "Spanish origin" to Hispanic or Latino

Self-identity or self-reporting
The response to this item should be based on the patient's self-identity or self-reporting.
It should not be based on physical appearance or surname. For example, if a woman who is not Hispanic marries a Hispanic man, she may self-report as **"Not Hispanic or Latino."** Similarly, people from the Philippines may have Hispanic names, but self-report as **"Not Hispanic or Latino."**

"Other" response option
The NEDSS/HL-7 case notification message format allows reporting areas to select "other" as a response for this question. For the purposes of national TB surveillance, "other" is not an acceptable response and should not be used.

10. RACE

Primary Purpose: To establish the patient's race(s) for evaluation of epidemiologic trends associated with race.

Option *(select all that apply)*	Description
American Indian or Alaska Native	Patient has origins in **any** of the original peoples of North and South America (including Central America).
Asian	Patient has origins in **any** of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent (e.g., including Bangladesh, Cambodia, China, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, the Philippine Islands, Thailand, and Vietnam).
Black or African American	Patient has origins in **any** of the black racial groups of Africa.

Option *(select all that apply)*	Description
Native Hawaiian or Other Pacific Islander (NHOPI)	Patient has origins in **any** of the original peoples of Hawaii, Guam, American Samoa, or Other Pacific Islands, except islands considered to be part of Asia (see table on next page).
White	Patient has origins in **any** of the original peoples of Europe, the Middle East, or North Africa.
Other Race	Patient identifies to another race **not** listed above.
Unknown	Patient's Race is **not** reported or unknown.

Note: Self-identity or self-reporting
The response to this item should be based on the patient's self-identity or self-reporting. Therefore, patients should be offered the option of selecting more than one racial designation. Non-Hispanic patients who report more than one race will be reported as "multiple race" in national surveillance data summaries.

For "**Asian"** or **"Native Hawaiian or Other Pacific Islander"**, use the detailed race categories on the next page to complete **"Specify"**. The chart below indicates who is considered Asian and who is considered Native Hawaiian or Other Pacific Islander.

National Electronic Disease Surveillance System (NEDSS)
Person Race Categories for Asian and for Native Hawaiian or Other Pacific Islander

Asian

- Asian Indian
- Bangladeshi
- Bhutanese
- Burmese
- Cambodian
- Chinese
- Filipino
- Hmong
- Indonesian
- Iwo Jiman
- Japanese
- Korean
- Laotian
- Malaysian
- Maldivian
- Nepalese
- Okinawan
- Pakistani
- Singaporean
- Sri Lankan
- Taiwanese
- Thai
- Vietnamese

Native Hawaiian or Other Pacific Islander

- Carolinian
- Chamorro
- Chuukese
- Fijian
- Guamanian
- Kiribati
- Kosraean
- Mariana Islander
- Marshallese
- Melanesian
- Micronesian
- Native Hawaiian
- New Hebrides
- Other Pacific Islander
- Palauan
- Papua New Guinean
- Pohnpeian
- Polynesian
- Saipanese
- Samoan
- Solomon Islander
- Tahitian
- Tokelauan
- Tongan
- Yapese

11. NATIVITY

Primary Purpose: To establish the patient's country of birth and citizenship status at birth for evaluation of epidemiologic trends.

A. Country of Birth

Item	Description	Comment
Specify (e.g., United States, Puerto Rico, Republic of Marshall Islands, Mexico, China)	Enter the name of the country in which the person was born**. Do not enter "United States" unless the person was born in one of the 50 U.S. states or the District of Columbia.** Otherwise, specify the name of the U.S. territory, freely associated state, or other non-U.S. reporting area/country.	Provide the actual country (or U.S. territory) of birth for all patients regardless of whether they were U.S. citizens at birth.
Date of First U.S. Arrival (**If NOT born in United States)**	Date (mm/dd/yyyy) patient **first arrived in one of the 50 U.S. states or the District of Columbia**, if the patient was born elsewhere. This date should be provided regardless of whether the patient was already a U.S. citizen at the time of first arrival in the United States. Partial dates are acceptable.	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date of first U.S. arrival (e.g., if a patient arrived in the U.S. in February 1972, but does not know the exact date, enter 02/01/1972 as the date of first arrival). • If the month and day are unknown, enter the first day of the known year as the date of first U.S. arrival (e.g., if a patient arrived in the U.S. in 1972, but does not know the month or day, enter 01/01/1972 as the date of first arrival).

B. Eligible for U.S. Citizenship/Nationality at Birth (regardless of country of birth)?

Option *(select one)*	Description	Comment
Yes	Eligible for U.S. citizenship *at birth*.	In certain circumstances, a person might be *eligible* for U.S. citizenship at birth, but the parents must take additional steps to *acquire* citizenship for their child. More information is available at: https://travel.state.gov/content/travel/en/legal/travel-legal-considerations/us-citizenship/Acquisition-US-Citizenship-Child-Born-Abroad.html
No	**Not** eligible for U.S. citizenship *at birth*.	Answer **"No"** if the patient was not eligible for U.S. citizenship at birth, regardless of the patient's current citizenship status.
Unknown	Not known if patient was eligible for U.S. citizenship *at birth*.	Answer **"Unknown"** if it is not known whether the person was eligible for U.S. citizenship at birth.

Note: Country of birth. In order to distinguish persons who were born in another country (whether they had U.S. citizenship by birthright) from those who were born in the United States, this question simply asks to record the actual country of birth.

Eligible for U.S. citizenship at birth. This information is requested because the U.S. Census Bureau bases its "native-born" and "foreign-born" population estimates on this characteristic.

As CDC uses the U.S. Census Bureau population estimates as denominator data in calculating incidence rates, **this information is needed to correctly categorize people with TB as U.S.-born or non-U.S.–born.**

C. Countries of Birth for Primary Guardian(s) (pediatric [<15 years old] patients only)

Please specify the country of birth for up to two primary guardians.

Note: Country of birth. In order to distinguish persons who were born in another country (whether they had U.S. citizenship by birthright) from those who were born in the United States, this question simply asks to record the actual country of birth.

Eligible for U.S. citizenship at birth. This information is requested because the U.S. Census Bureau bases its "native-born" and "foreign-born" population estimates on this characteristic.

As CDC uses the U.S. Census Bureau population estimates as denominator data in calculating incidence rates, **this information is needed to correctly categorize people with TB as U.S.-born or non-U.S.–born.**

12. COUNTRY OF USUAL RESIDENCE

Primary Purpose: To determine whether a patient was a resident of the United States at the time of diagnosis.

A. Country of Usual Residence

Description	Comment
Country where patient lives or sleeps most of the time.	**Do not enter "United States" unless the person resides in one of the 50 U.S. states or the District of Columbia**. If the person resides in one of five U.S. territories or other three U.S. reporting areas, name that reporting area.

B. If NOT U.S. Reporting Area, Remained in United States for ≥90 days (inclusive of Report Date)?

Option *(select one)*	Description
Yes	Patient remained in the United States for ≥90 days inclusive of report date.
No	Patient remained in the United States <90 days inclusive of report date.
Unknown	It is **not** known how long the patient remained in the United States.

Note: Summary of updated guidelines for determining "country of usual residence"

The Council of State and Territorial Epidemiologists (CSTE) recommends that cases of nationally notifiable diseases be reported to CDC by the jurisdiction of the person's "usual residence" at the time of disease onset. For the purposes of the RVCT, for consistency with historical practice, this is defined as the date when the TB diagnostic evaluation was initiated.

The following information has been adapted from CSTE position statement 11-SI-04 ("Revised Guidelines for Determining Residency for Disease Notification Purposes"). In addition, because notifiable disease data are often combined with population data, case notification guidelines based on census residence rules will contribute toward greater consistency in the numerator and denominator data used in disease rates.

Usual residence is defined as the place where the person lives and sleeps most of the time, which is not necessarily the same as the person's voting residence, legal residence, or the place where they became infected with a notifiable disease. Determining usual residence for most people is easy and unambiguous. However, the usual residence for some people is not obvious.

Persons (regardless of citizenship) who have established a household or are part of an established household (i.e., a "usual residence") in the United States should be reported with a country of usual residence of "United States." This includes persons who are in the United States for an extended period for work or study, even if they do not consider the United States to be "home."

Persons (including U.S. citizens) whose established household is outside of the United States (e.g., they are "just visiting" the United States) should be reported with a country of usual residence that is the country where they have established a household.

Persons with established households in more than one country should have country of usual residence determined based on the country where they spent the most time during the year preceding diagnosis.

13. STATUS AT TB DIAGNOSIS

Primary Purpose: To determine if the patient was alive at the time of TB diagnosis.

Option *(select one)*	Description	Comment
Alive	• Patient was alive at time laboratory results confirming a TB diagnosis (e.g., positive culture or nucleic acid amplification [NAA] test result consistent with TB) were known to the provider, **or** • TB medications were started	If the patient • Was known to be culture or NAA test result positive consistent with TB before the date of death, but did not start TB treatment per ATS/CDC/IDSA guidelines, classify the patient as alive at TB diagnosis, **or** • Started empiric therapy for TB disease (per ATS/CDC/IDSA guidelines), but TB was not verified until after the patient's death, classify as alive at TB diagnosis, **or** • Started TB therapy, regardless of laboratory or clinical confirmation for TB diagnosis, classify the patient as alive at TB diagnosis ***Note: Latent TB infection treatment does not count as TB treatment.***
Dead	Patient was deceased at the time laboratory results confirming a TB diagnosis (e.g., positive culture, NAA test result consistent with TB) were known to the provider	• If diagnostic specimens were collected for evaluation of TB before death, but positive results to make a diagnosis of TB were not available until after death, and patient did not start TB treatment, classify as dead at TB diagnosis • If TB diagnosis was made after death based on a constellation of clinical and other findings (e.g., symptoms, TST, and imaging studies) in the absence of laboratory confirmation, and the patient did not start therapy, classify as dead at TB diagnosis • If patient was receiving treatment for latent TB infection at death because the patient was not believed to have TB disease, and TB was diagnosed after death, classify as dead at TB diagnosis • If patient was diagnosed with TB at autopsy, classify as dead at TB diagnosis

14. INITIAL REASON EVALUATED FOR TB

Primary Purpose: To ascertain trends in how TB cases come to the attention of the medical or public health establishment.

Option *(select one)*	Description	Comment
Contact investigation	A health department investigation to identify persons who had close contact with an infectious TB case. **This also includes source case investigations** (e.g., to identify the source of TB transmission to a child with TB disease or LTBI).	Select if TB diagnosis was made based on a contact investigation evaluation and testing results from this investigation.
Screening	Any type of planned screening for TB disease or LTBI in a specific population, other than among contacts of a TB case.	**Screening** includes "targeted testing" of populations at higher risk for TB (e.g., B notification, status adjusters, intake at correctional facilities or homeless shelters, administrative screening required for employment, preenrollment screening of students, and similar activities), regardless of whether the screening activity was consistent with CDC recommendations.
TB symptoms	Signs and symptoms consistent with TB (e.g., prolonged persistent cough, fever, lymphadenopathy, night sweats, weight loss).	**TB symptoms** should only be selected if the patient has TB symptoms at the time of diagnostic evaluation and neither Contact Investigation nor Screening apply to the case. This response is most appropriate when the reason that the patient came to the attention of the medical community was because of the patient's TB symptoms.
Other	Reason that does not fit into any of the above categories.	Other reasons such as incidental chest radiograph, lab results, or other unexpected clinical findings where TB was not suspected at the time the test was ordered.
Unknown	Reason for evaluating the patient **not** known.	Select if the reason the person was evaluated for TB is not known.

Note: Select the **single initial reason** the patient was evaluated for TB disease. The definition of "initial reason" is the situation or reason that led to the initial evaluation for TB disease. If the patient was referred for evaluation, but the reason for the evaluation is unknown, try to determine that reason.

Example: **TB Symptoms**
If a person with TB was initially encountered via a contact investigation and during that investigation was also noted to have TB symptoms, select **"Contact Investigation"** as the initial reason for the evaluation. However, if a patient seeks medical care because of TB symptoms, select **"TB Symptoms"** as the initial reason for the evaluation.

Risk Factors

15. CURRENT OCCUPATION AND INDUSTRY

Primary Purpose: To evaluate potential associations between workplace exposures and TB by collecting information about the person's current occupations and industries.

A. Has the patient ever worked as one of the following?

Option *(select all that apply)*	Description
Healthcare worker	Also known as "health care personnel." Paid or unpaid person working in a health care setting.
Correctional facility employee	Person working in a correctional facility. Persons who have worked as health care personnel within a correctional facility should have both the **"Health care worker"** box and the **"Correctional facility employee"** box checked.
Migrant/seasonal worker	Person who is required to be absent from a permanent place of residence for the purpose of seeking employment, or who may vary their employment for the purpose of remaining employed while maintaining a permanent place of residence.
None of the above	Select if confirmed that the individual never worked as a health care worker, correctional facility employee, or migrant/seasonal worker.
Unknown	Select only when it cannot be confirmed or denied that the individual ever worked as a health care worker, correctional facility employee, or migrant/seasonal worker.

B. Current Occupation and Industry (complete this section for all patients ≥14 years of age [NIOSH standard], regardless of answers to item 15A).

Current Occupation is the type of job that the patient has been doing most recently, whether paid or unpaid (volunteer).

Ask this question:

> "What kind of work do you do? For example, registered nurse, custodian, cashier, auto mechanic, barber, civil engineer, volunteer firefighter, etc."

If the patient has more than one current job, collect information on all of the patient's jobs for entry in the repeating group.

If the patient is unemployed and is not currently seeking employment (e.g., patient is retired, disabled, or a full-time student), do not leave the **Current Industry** and **Current Occupation** fields blank; instead enter "unemployed," "disabled," or "student." Include the level of study for students, e.g., "college student" or "high school student."

If he or she works on a voluntary basis, record what they do in the occupation field (e.g., zoo volunteer, school volunteer, library volunteer).

Tips for getting the best information on occupation that can be coded:

- **Be descriptive:**
  Clearly describe the kind of work.
  - Unhelpful: “teacher”
  - **Helpful**: “preschool teacher,” “high school teacher”

- **Be specific:**
  General or vague terms do not always provide enough information to code.
  - Unhelpful: “laborer”
  - **Helpful**: “bricklayer”

  - Unhelpful: “worked in a warehouse,” “worked in a shipping department”
  - **Helpful**: “forklift operator”

Current Industry is the kind of business or industry the patient works in. For each of the patient’s current occupations, the corresponding current industry should be reported.

This is **not** the name of the employer, although if the correct industry is not apparent, it is acceptable to enter the name, city, and state of the employer unless the name of the business would be sensitive or potentially identifiable.

Ask this question:

“What type of business or industry do you work in? For example, a hospital, dairy farm, restaurant, trade school, library, etc.”

Tips for getting the best information on industry that can be coded:

- If industry is not obvious, ask what is the main focus or product of the employer for which the person works.

  For example, if a patient says they work in manufacturing, ask what was made at the manufacturing plant. For example:
  - Unhelpful: “manufacturing”
  - **Helpful**: “automobile manufacturing”

- **Be specific:**
  General or vague terms do not always provide enough information to code:
  - Unhelpful: “food industry”
  - **Helpful**: “restaurant” or “grocery store”

Note: Occupation and Industry should be completed for all patients ≥14 years of age (NIOSH standard). NIOCCS occupation codes include “child or infant” and “student.”

Other codes include “disabled,” “inmate,” “never employed,” “unemployed,” and “volunteer.”

The standard NIOSH NIOCCS codes are included in the RVCT Message Mapping Guide (MMG). For more information about NIOSH/NIOCCS codes, see this link:
https://csams.cdc.gov/nioccs/Default.aspx

16. OTHER RISK FACTORS

Primary Purpose: To evaluate potential risk factors for TB disease.

Risk factor	Description
Diabetic at diagnostic evaluation	Patient had diabetes (see description below) when TB diagnostic evaluation was performed or initiated.
Homeless in the past 12 months	Patient has been homeless within the 12 months preceding the TB diagnostic evaluation.
Homeless ever	Patient has ever experienced homelessness.
Resident of correctional facility at diagnostic evaluation	Patient was incarcerated or detained in a jail, prison, or other detention center when TB diagnostic evaluation was performed or initiated.
Resident of correctional facility ever	Patient has ever been incarcerated or detained in a jail, prison, or other detention center at any point in their lifetime.
Resident of long-term care facility at diagnostic evaluation	Patient was a resident of long-term care facility when TB diagnostic evaluation was performed or initiated.
Injecting drug use in the past 12 months	Patient used injection drugs in the past 12 months not prescribed by a health care provider.
Noninjecting drug use in the past 12 months	Patient used noninjection drugs in the past 12 months not prescribed by a health care provider or approved by FDA for over-the-counter dispensing.
Heavy alcohol use in the past 12 months	Patient heavily used alcohol (see definition below) in the past 12 months.
TNF-α antagonist therapy	Patient recently received, or was receiving, tumor necrosis factor-alpha (TNF-α) antagonist therapy when TB diagnostic evaluation was performed or initiated.
Post-organ transplantation	Patient has ever received a solid organ transplant (e.g., kidney, heart).
End-stage renal disease	Patient had end-stage renal disease when TB diagnostic evaluation was performed or initiated (e.g., patients on dialysis).
Viral hepatitis (B or C only)	Patient has ever had a diagnosis of Hepatitis B or C (acute or chronic).
Other immunocompromise (other than HIV/AIDS)	Patient is immunocompromised because of either a medical condition (e.g., leukemia, Hodgkin's lymphoma, carcinoma of the head or neck), or immunosuppressive therapy, such as prolonged use of high-doses of corticosteroids.
Other (specify)	Additional risk factors as defined by the reporting area may be entered as "Other." The particular risk factor being reports should be identified in the "specify" field. An unlimited number of "other" risk factors may be reported.

Option *(select one)*	Description
No	Patient does **not** have this risk factor.
Yes	Patient has this risk factor.
Unknown	It is unknown whether the patient has this risk factor.

Definitions:

Diabetic

The American Diabetes Association (American Diabetes Association. *Dia Care*. 2014;37:S81-S90) has established the following criteria for a diagnosis of diabetes:

- Hemoglobin A1c ≥6.5%, **or**
- Fasting (defined as no caloric intake for ≥8 hours) plasma glucose ≥126 mg/dL (7.0 mmol/L), **or**
- 2-hour plasma glucose ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test, as described by the World Health Organization, **or**
- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L)

Persons who do not meet the above criteria only because they are currently receiving treatment for diabetes should still be reported as diabetic.

Homeless

A person experiencing homelessness may be an individual who has:

1. No fixed, regular, and adequate nighttime residence, **and**
2. A primary nighttime residence that is
   a. A supervised publicly or privately operated shelter designed to provide temporary living accommodations, including welfare hotels, congregate shelters, and transitional housing for the mentally ill, **or**
   b. An institution that provides a temporary residence for individuals intended to be institutionalized, **or**
   c. A public or private place not designated for, or ordinarily used as, a regular sleeping accommodation for human beings.

A **person experiencing homelessness** may also be defined as a person who has no home (e.g., is not paying rent, does not own a home, and is not steadily living with relatives or friends). Persons in unstable housing situations (e.g., alternating between multiple residences for short stays of uncertain duration) may also be considered homeless.

A **person experiencing homelessness** may be a person who lacks customary and regular access to a conventional dwelling or residence. Included as homeless are persons who live on streets or in nonresidential buildings. Also included are residents of homeless shelters and shelters for battered women. Residents of welfare hotels and single room occupancy hotels could also be considered homeless. In the rural setting, where there are usually few shelters, a homeless person may live in nonresidential structures, or substandard housing, or with relatives. *Homeless* does not refer to a person who is incarcerated or in a correctional facility.

Injecting drug use

Injecting drug use involves the use of hypodermic needles and syringes for the injection of drugs not prescribed by a health care provider. Route of administration may be intravenous, subcutaneous (e.g., skin popping), or intramuscular.

Noninjecting drug use

Marijuana use should always be recorded as noninjecting drug use, regardless of whether marijuana is legal for medicinal or recreational use in the state of residence.

Noninjecting drug use also includes misuse of licensed or prescription drugs, including opioids, or other drugs that were not injected and were not prescribed for the patient by a health care provider or approved for over-the-counter use by FDA. The drugs may be ingested, inhaled, sniffed, or smoked.

For more information, see Substance Abuse and Mental Health Services Administration, SAMHSA, Opioid Overdose Prevention Toolkit, 2018 at https://store.samhsa.gov/sites/default/files/d7/priv/opioid-use-disorder-facts.pdf.

Heavy alcohol use

The National Institute on Alcohol Abuse and Alcoholism defines heavy alcohol use as binge drinking on 5 or more days in the month preceding diagnosis. Binge drinking is defined as a pattern of drinking that brings blood alcohol concentration levels to 0.08 g/dL. This typically occurs after four drinks for women and five drinks for men in about 2 hours.
https://www.niaaa.nih.gov/

17. IF RESIDENT OF CORRECTIONAL FACILITY AT DIAGNOSTIC EVALUATION, TYPE OF FACILITY?

Primary Purpose: To categorize the type of correctional facility for those patients who were residing in a correctional facility at the time of diagnostic evaluation.

Option *(select one)*	Description
Federal prison	Confinement facility administered by a federal agency (except Immigration and Customs Enforcement); includes privately operated federal correctional facilities.
State prison	Confinement facility administered by a state agency; includes privately operated state correctional facilities.
Local jail	Confinement facility usually administered by a local law enforcement agency, intended for adults but sometimes also containing juveniles; holds persons detained pending adjudication and/or persons committed after adjudication, typically for sentences of 1 year or less.
Juvenile correctional facility	Public or private residential facility; includes juvenile detention centers, reception and diagnostic centers, ranches, camps, farms, boot camps, residential treatment centers, and halfway houses or group homes designated specifically for juveniles.
Other	Includes Immigration and Customs Enforcement (ICE) detention centers, Indian reservation facilities (e.g., tribal jails), military stockades and jails, federal park police facilities, police lockups (temporary holding facilities for persons who have **not** been formally charged in court), or other correctional facilities that are **not** included in the other specific choices.
Unknown	Inmate when the TB diagnostic evaluation was performed, but the type of correctional facility is **not** known.

Note: If the person with TB was a resident of more than one facility during the diagnostic evaluation, select the facility where the initial TB diagnostic evaluation was performed. This question should only be completed if **Resident of Correctional Facility at Diagnostic Evaluation"** is answered as **"Yes"** in item 16.

18. IF RESIDENT OF LONG-TERM CARE FACILITY AT DIAGNOSTIC EVALUATION, TYPE OF FACILITY?

Primary Purpose: To categorize the type of long-term care facility for those patients who were residing in a long-term care facility at the time of diagnostic evaluation.

Option *(select one)*	Description	Comment
Nursing home	Freestanding facility with three or more beds (i.e., is classified as a residential facility or congregate residential setting) that provides nursing care services (e.g., nursing or medical care or supervision of medications that may be self-administered).	Facilities may be certified by Medicare or Medicaid or may be licensed by the state as a nursing home (e.g., skilled nursing facility, intermediate care facility, nursing care unit of a retirement center). **This does *not* include assisted living facilities.**
Hospital-based facility	Distinct unit with three or more beds that is physically attached to, or managed by, a hospital.	Facilities may be certified by Medicare or Medicaid or may be licensed by the state.
Residential facility	Facility with three or more beds (i.e., classified as a residential facility or congregate residential setting) and meets both of the following criteria: 1) Not classified as a nursing home, hospital-based facility, mental health residential facility, or alcohol or drug treatment facility, as described above **and** 2) Provides personal care or supervision (not nursing care services) to its residents, in addition to room and board (e.g., help with bathing, dressing, eating, walking, shopping).	**This includes assisted living facilities.** This option should only be used for facilities that are not for mental health, treatment, or alcohol or drug treatment.

Option *(select one)*	Description	Comment
Mental health residential facility	Facility that provides 24-hour care in a hospital, residential treatment, or supportive setting.	Include state, local, and private psychiatric hospitals, general hospitals, Department of Veterans Affairs facilities, residential mental health treatment centers for children, and multiservice mental health residential treatment programs. For other mental health residential facilities, select **"Other"** long-term care facility. Examples include the Department of Defense, Bureau of Prisons, Public Health Service, Indian Health Service, and Indian reservation facilities.
Alcohol or drug treatment facility	Only long-term rehabilitation or residential facilities designated for treatment of **30 days or longer.**	Exclude all ambulatory or outpatient facilities, detoxification units, and facilities designated for fewer than 30 days of treatment. The state agency responsible for alcohol and drug treatment can assist in determining whether a facility is considered residential.
Other	A facility **not** mentioned above that is designated for treatment of **30 days or longer and facility type is not Unknown.**	Select if the type of long-term care facility is something other than the settings listed in this table.
Unknown	Patient known to be a resident of a long-term care facility, but the type of facility is **not** known.	Select if the type of long-term care facility is not known.

Note: If the person with TB was a resident of more than one facility during the diagnostic evaluation, select the facility where the initial TB diagnostic evaluation was performed. This question should only be completed if **Resident of Long-term Care Facility at Diagnostic Evaluation** is answered as **"Yes"** in item 16.

19. CURRENT SMOKING STATUS AT DIAGNOSTIC EVALUATION

Primary Purpose: Surveillance and patient management. To assess factors that might complicate testing, treatment, and follow-up.

Option *(select one)*	Description
Current every day smoker	Patient currently uses tobacco every day.
Current some day smoker	Patient uses tobacco some days, but not every day.
Former smoker	Patient has smoked at least 100 cigarettes/cigars in his/her lifetime and has quit.
Never smoker	Patient has not smoked at least 100 cigarettes/cigars in his/her lifetime.
Smoker, current status unknown	Patient was a smoker (or tobacco user), but current status is unknown.

Unknown if ever smoked	Patient's tobacco use history is not known.

Note: The definition of smoking includes consumption of tobacco (or nicotine) through combustible tobacco products (e.g., cigarettes) or electronic nicotine delivery systems (ENDS; e.g., vapes, e-cigarettes). It does not include chewing tobacco.

Smoking of substances other than tobacco (e.g., marijuana) should be recorded under noninjecting drug use.

Source: U.S. Food and Drug Administration. (2018). Vaporizers, E-Cigarettes, and other Electronic Nicotine Delivery Systems (ENDS). Retrieved from: https://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm

20. LIVED OUTSIDE OF THE UNITED STATES FOR >2 MONTHS (UNINTERRUPTED)?

Primary Purpose: To determine the extent to which persons with TB have lived or traveled to countries that might pose a higher risk of TB exposure.

Option *(select one)*	Description
Yes	Patient indicates that she/he has lived or traveled outside the United States **(1 of the 50 states or the District of Columbia)** for >2 months (uninterrupted).
No	Patient did **not** live or travel outside the United States (1 of the 50 states or the District of Columbia) >2 months (uninterrupted).
Unknown	No information is available about patient's travel history.

Notes: "Lived" refers to the place where a person stayed or slept most of the time, or the place the person considered home during the stated period.

Examples:
Answer **"Yes,"** if patient traveled outside the United States and visited multiple countries for a total of more than 2 uninterrupted months.

- From January 1 to March 15, the patient lived outside the United States
- Lived in Zambia for 4 weeks, then
- Lived in South Africa for 3 weeks, then
- Lived in Botswana 3 weeks, then
- Returned to the United States

Answer **"No,"** if patient lived outside the United States for a total of more than 2 months, but travel was interrupted, and had no other international travel during lifetime.
From January 1 to March 15, the patient lived outside the United States

- Lived in Zambia for 5 weeks, then
- Returned to the United States for 2 weeks, then
- Lived in South Africa for 5 weeks, then
- Returned to the United States

Diagnostic Testing
(Other than Drug Susceptibility Testing [DST])

21. TUBERCULIN SKIN TEST AND ALL NON-DST TB LAB TEST RESULTS

Primary Purpose: To verify that the case meets the surveillance definition for TB and to identify laboratory test characteristics of TB cases.

Specimen Information	Description	Comment
Date collected/placed	**Month, day, and year** the specimen was collected or tuberculin skin test (TST) was placed (e.g., 01/17/2020).	This date can be found on the laboratory report as the date the specimen was collected or TST placed. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date collected (e.g., if a specimen was collected in March 2020, enter 03/01/2020 as the date collected). • If the month and day are unknown, enter the first day of the known year as the date collected (e.g., if a specimen was collected in 2020, enter 01/01/2020 as the date collected).
Date reported/read	Month, day, and year (mm/dd/yyyy) the laboratory reported the result, or the date that the TST was read.	This date can be found on the laboratory report as the date the report is released or made available. In many instances, the result date and report date are the same; if not, provide the earliest date available. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date reported (e.g., if a result was reported in March 2020, enter 03/01/2020 as the date reported). • If the month and day are unknown, enter the first day of the known year as the date reported (e.g., if a result was reported in 2020, enter 01/01/2020 as the date reported).

Specimen source site	Select appropriate anatomic source site from **Appendix I**.	For TST, the source site is always "skin."

Test Type *(select one)*	Description	Comment
Smear	Microscopic examination of specimen (e.g., sputum, using smear technique)	When reporting these results in the qualitative section, select **"Positive"** if these results were interpreted by the clinician caring for the patient as consistent with TB.
Pathology/ cytology	Microscopic examination of specimen using histopathological or cytological methods	When reporting these results in the qualitative section, select **"Positive"** if these results were interpreted by the clinician caring for the patient as consistent with TB.
NAA	Nucleic acid amplification testing (only when the specimen is tested directly; do not include results from tests on isolates obtained via culture)	When reporting these results in the qualitative section, select **"Positive"** if these results were interpreted by the clinician caring for the patient as consistent with TB.
Culture	Mycobacterial culture of specimen to determine presence of *M. tuberculosis* complex (not nontuberculous mycobacteria)	For sputum specimens, select **"Sputum"** from the value set.
TST	Tuberculin skin test	Routinely reporting TST conversions is highly recommended. In the context of an outbreak, previous negative test results or TST conversions should be captured in the RVCT for outbreak-related cases. If a person has a documented previous negative test result and now has a positive result, record both the previous negative and current positive results.
IGRA-QFT, IGRA-T-Spot, IGRA-Unknown	Interferon-gamma release assay (IGRA) IGRA-QFT: QuantiFERON (any version) IGRA-T Spot: T-Spot IGRA-Unknown: If type is unknown	Routinely reporting IGRA conversions is highly recommended. In the context of an outbreak, previous negative test results or IGRA conversions should be captured in the RVCT for outbreak-related cases. If a person has a documented previous negative test result and now has a positive test result, record both the previous negative and current positive results.
HIV	Serologic test for human immunodeficiency virus infection	Patient self-report of HIV status is not acceptable. HIV serology results must be documented. A documented positive test result can be from any date; a negative test result must be documented ≤12 months before the TB diagnostic evaluation.

Test Type *(select one)*	Description	Comment
CD4 count	Result of test for CD4 T-lymphocytes	Report for people with HIV to characterize the patient's immune status. At least one CD4 count should be reported for HIV-infected patients, as close to the time of TB diagnostic evaluation as possible. Subsequent CD4 counts may also be reported.
Hemoglobin A1c	Result of test to determine the average blood glucose level for the preceding several months	Report for people with diabetes or persons being screened for diabetes. At least one hemoglobin A1c or fasting blood glucose result should be reported for diabetic patients, as close to the time of TB diagnostic evaluation as possible. Subsequent hemoglobin A1c results may also be reported.
Fasting blood glucose	Result of test to determine the blood glucose at a given moment in a patient who has not eaten in several hours	Typically done with people with diabetes or persons being screened for diabetes. At least one hemoglobin A1c or fasting blood glucose result should be reported for diabetic patients, as close to the time of TB diagnostic evaluation as possible. Subsequent fasting blood glucose results may also be reported.
Other (specify)	Any other diagnostic tests that the reporting area wishes to include	None.

Qualitative Test Result *(select one)*	Description
Positive	For tests with a qualitative (or interpreted) result, the test result was considered positive.
Negative	For tests with a qualitative (or interpreted) result, the test result was considered negative.
Indeterminate	For tests with a qualitative (or interpreted) result, the test result was considered indeterminate (neither positive nor negative).
Not done	Used to indicate that initial TST, initial IGRA, initial sputum smear, initial sputum culture, initial NAAT, or initial HIV test was not done in this case.
Unknown	Used to indicate that the test was done but the result is unknown *or* that it is unknown if the test was done.

Quantitative Test Information	Description
Quantitative result	For tests with a quantitative (numerical) result, record the result in this field. These tests include the TST, CD4 cell count, hemoglobin A1c, fasting blood glucose. Quantitative result is not required for IGRA tests.
Quantitative units	For tests with a quantitative (numerical) result, record the units of measurement (e.g., millimeters for TST, percentage for hemoglobin A1c).

Note: Results of the tuberculin skin test (TST) should be interpreted according to Table 7 of the currently accepted guidelines (www.cdc.gov/mmwr/PDF/rr/rr4906.pdf) [see next page].

Minimum requirements:
Always enter initial TST, initial IGRA, initial sputum smear, initial sputum culture, initial NAAT, and initial HIV test. Enter **"Not Done"** for any tests that were not done.

CD4 count should be reported for HIV-infected persons. Hemoglobin A1c or fasting blood glucose at diagnostic evaluation should be reported for people with diabetes. Also include the initial result of any other tests performed that are in the test type value set. If a type of test was done on different specimen sources, include the initial result for each unique combination of test type and specimen source.

Follow-up testing should be done according to CDC guidelines and local clinical judgment. For tests that are done multiple times, only those results for each combination of test type and specimen source where the result changed (e.g., positive to negative) should be entered.

Guidelines for Entering Tuberculin Skin Test (TST) Results

Enter results from a TST performed during the current diagnostic evaluation. If the patient has a documented prior positive TST result, that result should be entered, and it is not necessary to repeat the test.

Do not enter A patient's undocumented self-report of a previous positive TST result is not acceptable.

Interpreting the TST Reaction

		
5 or more millimeters	**10 or more millimeters**	**15 or more millimeters**
An induration of ≥**5** millimeters is considered positive for • People living with HIV • Recent contacts of persons with infectious TB • People who have previously had TB disease • Patients with organ transplants and other immunosuppressed patients (including patients taking a prolonged course of oral or intravenous corticosteroids or TNF-α antagonists)	An induration of ≥**10** millimeters is considered positive for • People who have come to the U.S. within the last 5 years from areas of the world where TB is common (e.g., Asia, Africa, Eastern Europe, Russia, or Latin America) • People who inject drugs • Mycobacteriology lab workers • People who live or work in high-risk congregate settings • People with certain medical conditions that place them at high risk for TB (silicosis, diabetes mellitus, severe kidney disease, certain types of cancer, and certain intestinal conditions) • Children younger than 4 years • Infants, children, and adolescents exposed to adults in high-risk categories	An induration of ≥**15** millimeters is considered positive for • People with no known risk factors for TB

22. CHEST RADIOGRAPH OR OTHER CHEST IMAGING STUDY RESULTS

Primary Purpose: To verify that the case meets the surveillance definition for TB and to identify imaging test characteristics of TB cases.

Study Type (*select all that apply)*	Description
Plain chest x-ray	Standard radiological study resulting in a 2-dimensional projection of internal thoracic structures onto film or a screen.
CT scan	Computed tomography, an advanced imaging technique using radiographs to display 3-dimensional images of thoracic structures with computer assistance.
MRI	Magnetic resonance imaging, an advanced imaging technique using strong magnetic fields to display 3-dimensional images of thoracic structures with computer assistance.
PET	Positron emission tomography, an advanced imaging technique that uses radioactive tracers to identify areas of higher chemical activity in the body.
Other	Select this option for imaging studies that do not fit into any of the above categories.

Result *(select one)*	Description
Consistent with TB	Any initial results showing abnormalities (e.g., hilar adenopathy, effusion, infiltrate[s], cavity, scarring) consistent with TB.
Not consistent with TB	Results showed **no** abnormalities consistent with TB. *This category includes any other abnormalities that are **not** consistent with TB.*
Not done	Used to indicate that a chest radiograph or chest CT scan was not done in this case.
Unknown	Result of chest imaging is not known.

Cavity *(select one)*	Description
Yes	The chest imaging study showed evidence of one or more cavities.
No	Results did **not** show evidence of one or more cavities.
Unknown	It is **not** known if results showed evidence of one or more cavities.

Miliary *(select one)*	Description
Yes	Results showed evidence of miliary disease (e.g., miliary TB, or miliary or bilateral micronodular pattern).
No	Results did **not** show evidence of miliary disease (e.g., miliary TB, or miliary or bilateral micronodular pattern).
Unknown	It is **not** known if results showed evidence of miliary disease (e.g., miliary TB, or miliary or bilateral micronodular pattern).

Note: Miliary TB is a serious type of TB disease. It is a clinical or radiologic finding, rather than a site of disease. Miliary TB is the result of a TB infection eroding into the bloodstream and from there disseminating throughout the body to multiple organs. It appears on radiographs as a great number of small (1- to 2-mm), well-defined nodules that look like millet seeds scattered throughout the lungs, hence the name “miliary.”

Minimum requirements:
Initial plain chest radiograph; initial chest CT scan. Enter **"Not Done"** if applicable. Also include the initial result of any other chest imaging studies performed that are in the test type value set (i.e., MRI, PET). Subsequent results for each chest imaging study type should be entered if the result changed. Note if cavity or miliary lesions are identified for each study.

Note: The minimum requirement is the initial plain chest radiograph or initial chest CT scan result; however, multiple results may be entered into the table.

Clinical History and Findings

23. HAS THE PATIENT BEEN PREVIOUSLY DIAGNOSED WITH TB DISEASE OR LTBI?

Primary Purpose: To determine whether the patient has a prior history of TB disease or LTBI.

History of Previous Illness *(select one)*	Description
Yes	The patient has a history of previous TB disease or LTBI diagnoses. **Note**: Written documentation of the previous episode of TB disease or LTBI is ideal. When written documentation is not available, self-report of a previous episode is acceptable (e.g., medication taken, length of course of medication).
No	The patient did **not** have previous TB disease or LTBI diagnoses
Unknown	It is **not** known if the patient had previous TB disease or LTBI diagnoses.

If **"Yes,"** enter the following:

Previous Diagnosis Information	Description
Diagnosis Type	TB disease or LTBI
Diagnosis Date	Date of previous diagnosis (provide date to the level of specificity that is available; self-report is acceptable). If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the diagnosis date (e.g., if diagnosis was in March 2020, enter 03/01/2020 as the diagnosis date). • If the month and day are unknown, enter the first day of the known year as the diagnosis date (e.g., if diagnosis was in 2020, enter 01/01/2020 as the diagnosis date).
Previous State Case Number	**Provide previous TB state case number or LTBI state case number, if available.** Start with year of report date, then the 2-letter state abbreviation, and then the within-state case number. If the jurisdiction did not assign state case numbers to LTBI cases, you may still complete the report year and 2-letter state abbreviation.

Completed Treatment *(select one)*	Description
Yes	The patient completed treatment for previous TB disease or LTBI. **Note:** Written documentation of the previous episode of TB disease or LTBI is preferred. If the patient had a previous episode of TB that was reported to U.S. surveillance, contact the state in which the case was counted to obtain information about previous diagnoses and case outcomes. Otherwise, self-report is acceptable.
No	The patient did **not** complete treatment for previous TB disease or LTBI.

Completed Treatment *(select one)*	Description
Unknown	It is **not** known if the patient completed treatment for previous TB disease or LTBI.

24. DATE OF ILLNESS ONSET/SYMPTOM START DATE

Primary Purpose: To establish the approximate symptom start date to facilitate estimation of infectious period.*

Date Format	Description	Comment
Month, day, and year (e.g., 01/17/2020)	Date signs and symptoms started for this TB episode.	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the symptom start date (e.g., if symptoms started in March 2020, enter 03/01/2020 as the symptom start date). • If the month and day are unknown, enter the first day of the known year as the symptom start date (e.g., if symptoms started in 2020, enter 01/01/2020 as the symptom start date).

Note: Some symptoms of TB can be nonspecific. The symptom onset date should be recorded as the approximate time when the patient first noticed any sign or symptom consistent with TB, such as the following:

- Severe cough that lasted at least 3 weeks
- Chest pain not explained by another condition
- Coughing up blood or sputum
- Night sweats
- Persistent fever not explained by another condition
- Unintentional weight loss not explained by another condition

If the patient reports not having experienced TB signs or symptoms, record date of earliest clinical finding consistent with TB disease, such as date of first medical encounter for evaluation of cough or other TB signs or symptoms, or date in medical records that unintentional weight loss was first recorded, or date of first abnormal chest radiograph consistent with TB.

*Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis Recommendations from the National Tuberculosis Controllers Association and CDC. MMWR 2005. 54(RR-15):7. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.htm

25. SITE OF TB DISEASE

Primary Purpose: To document site of TB disease.

Option *(select all that apply)*	Description
Pulmonary	TB disease inside the lung structure
Pleural	TB disease in the pleural space outside the lungs (e.g., pleural effusion)
Lymphatic: cervical	TB disease in the cervical lymph nodes (e.g., scrofula)
Lymphatic: intrathoracic	TB disease in the intrathoracic lymph nodes (e.g., hilar, paratracheal, and mediastinal sites of disease)
Lymphatic: axillary	TB disease in the axillary lymph nodes
Lymphatic: other	TB disease in any other lymph nodes
Lymphatic: unknown	TB disease in the lymph nodes, site unknown
Laryngeal	TB disease in the larynx
Bone and/or joint	TB disease in bones or joints (e.g., Pott's disease, spinal TB, spondylitis)
Genitourinary	TB disease in the genitourinary system (except for the BCG strain of *M. bovis*, which should *not* be reported as TB)
Meningeal	TB disease that involves the meningeal space of brain or spinal cord
Peritoneal	TB disease that involves the peritoneum
Other (specify:_____)	If there is another anatomic site of TB disease not provided in the above list, refer to **Appendix I**
Site not stated	The anatomic site of disease is not known

Note: If there is evidence that more than one organ or disease site is involved, select all sites affected by the TB disease process. Report all anatomic sites of disease considered by the clinician caring for this patient to be involved in the TB disease process; laboratory confirmation is not always possible for all sites of disease.

Miliary TB
The RVCT has no place to select miliary TB in **Site of Disease** (item 25). If the report of the initial chest radiograph or the initial chest CT scan indicates "miliary TB or a miliary or bilateral micronodular pattern," record this finding under **Initial Chest Radiograph** (item 22) and enter **"Pulmonary"** as a **Site of Disease** (item 25).

Epidemiologic Investigation

26. CASE MEETS BINATIONAL REPORTING CRITERIA?

Primary Purpose: To determine whether the case meets binational reporting criteria.

Option *(select one)*	Description
Yes	The TB case meets binational reporting criteria. *A case is considered binational when it meets one or more of the following criteria:* • Exposure to suspected product (e.g., unpasteurized milk or cheese) from Canada or Mexico • Has case contacts in or from Mexico or Canada • Potentially exposed by a resident of Mexico or Canada • Potentially exposed while in Mexico or Canada • Resident of Canada or Mexico • Other situations that may require binational notification or coordination of response
No	The case does **not** meet binational reporting criteria.
Unknown	It is **not** known if the case meets binational reporting criteria.

If **"Yes,"** select all the criteria which were met.

Option *(select all that apply)*	Description
Exposure to suspected product from Canada or Mexico	Patient exposed to a product (e.g., dairy product for *M. bovis* case)
Has case contacts in or from Mexico or Canada	Patient has case contacts who live in Mexico or Canada
Potentially exposed by a resident of Mexico or Canada	Patient was potentially exposed to a person with TB from Mexico or Canada
Potentially exposed while in Mexico or Canada	Patient was potentially exposed to TB while physically in Mexico or Canada
Resident of Canada or Mexico	The patient is a resident of either Mexico or Canada

Option *(select all that apply)*	Description
Other situations that may require binational notification or coordination of response	Select this option if the case meets one of the following descriptions: • The patient crossed the border into the United States from Mexico during TB treatment, **or** • The patient was referred to a U.S-funded, binational TB program for treatment continuity (i.e., a patient who was being treated in the United States, but it was known that they would cross the border to Mexico).

27. CASE IDENTIFIED DURING A CONTACT INVESTIGATION OF ANOTHER CASE?

Primary Purpose: To determine whether the case was identified during the contact investigation of another TB case.

Option *(select one)*	Description
Yes	Case was identified during the contact investigation or source case investigation of another case.
No	Case was **not** identified during the investigation of another case.
Unknown	It is **not** known if the case was identified during the investigation of another case.

If **"Yes,"** entering the following:

Evaluated for TB During that Contact Investigation

Option *(select one)*	Description
Yes	Patient was evaluated for TB during that investigation, regardless of whether the patient was diagnosed with TB as part of that evaluation.
No	Patient was **not** evaluated for TB during that investigation.
Unknown	It is not known if patient was evaluated for TB during that investigation.

Note: Remember to record epidemiological (epi) link(s) in item 29.

28. CONTACT INVESTIGATION CONDUCTED FOR THIS CASE?

Primary Purpose: To determine if a contact investigation was performed around this case.

Option *(select one)*	Description
Yes	Contact or source case investigation was conducted for this case.
No	An Investigation was **not** conducted for this case.
Unknown	It is **not** known if an investigation was conducted for this case.

Note: This item should be answered for **all** cases, regardless of whether a contact investigation or source case investigation was warranted. Contact investigations include location-based screenings (e.g., homeless shelter, workplace) after a TB case is identified at that location. This question should be answered **"Yes"** if a contact investigation was conducted that adequately identified contacts related to this case, even if the investigation was prompted by identification of a different case.

Remember to record epidemiological (epi) links in item 29.

For more information, see Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis Recommendations from the National Tuberculosis Controllers Association and CDC. MMWR 2005. 54(RR-15):7.
https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.htm

29. COMPLETE TABLE BELOW FOR ALL KNOWN TB AND LTBI CASES EPIDEMIOLOGICALLY LINKED TO THIS CASE

Primary Purpose: To determine potential transmission links between cases.

Item	Description	Comment
Year	Year Reported is the year when the case was reported (e.g., 2020).	This year should correspond to the Report date, which is not necessarily the same as the *MMWR* Year.
State	State Code indicates the two-letter postal code of the state reporting this case (e.g., GA for Georgia; see **Appendix C**, Reporting Area Codes).	The term *state* is used to refer to the reporting area, though not all reporting jurisdictions are states (e.g., New York City).
Number	Nine-character string unique within the reporting area.	This string can contain letters or numbers and is assigned by the reporting area. If an epidemiologic investigation (contact, source case, cluster, outbreak, etc.) was conducted for this case and no other TB cases or LTBI cases were identified that had epidemiological links with this case, please enter "YYYY-ST-999999999." Leave blank if an investigation was not conducted, i.e., if item 28 is answered as **"No"** or **"Unknown."**

Note: For this variable, an "epidemiologic link" is defined as either a definite or probable link:

- **Definite***:* patients shared airspace at the same location at the same time during one case's estimated infectious period
- **Probable***:* patients shared airspace at the same location during the same general time period, but investigator unable to document that they were there at the same time during one case's infectious period

Epidemiologically linked cases might include any previous, concurrent, or subsequent cases to which this case was linked.
If epidemiologically linked cases are later identified, please update the RVCT record.

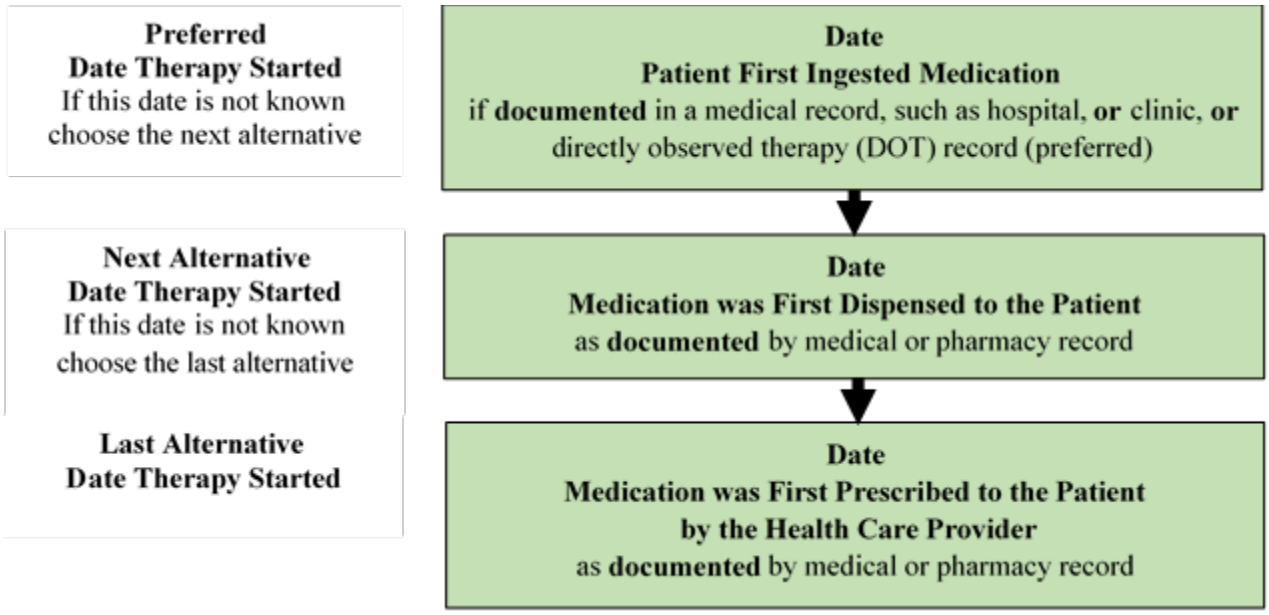
Initial Treatment Information

30. DATE THERAPY STARTED

Primary Purpose: To calculate program management indicators.

Date Format	Description	Comment
Month, day, and year (e.g., 01/17/2020)	Date the patient began multidrug therapy for confirmed or possible TB disease	This may be one of several dates, ideally, when the patient first ingested medication if documented in a medical record. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date therapy started (e.g., if therapy was started in March 2020, enter 03/01/2020 as the date therapy started). • If the month and day are unknown, enter the first day of the known year as the date therapy started (e.g., if therapy was started in 2020, enter 01/01/2020 as the date therapy started).

Note: Date Therapy Started is the month, day, and year the patient began drug therapy for confirmed or possible TB disease. Patient history without medical documentation is not acceptable. Enter a date according to the following chart:



31. INITIAL DRUG REGIMEN

Primary Purpose: To calculate program management indicators.

For each drug listed below, indicate whether it was used:

Option *(select one)*	Description
Yes	Drug is known to be part of the initial regimen. Yes indicates that the drug was **initially** prescribed for treatment of TB disease.
No	Drug is known to **not** be part of the initial regimen.
Unknown	It is not known if drug is part of the initial regimen.

Note: Combination drugs
For combination drugs, select **"Yes,"** for each drug that is a component of the combination drug

Rifamate is a combination of isoniazid and rifampin
Rifater is a combination of isoniazid, rifampin, and pyrazinamide

Initial Drug Regimen

Drug Name	Used?
Isoniazid	☐ Yes ☐ No ☐ Unknown
Rifampin	☐ Yes ☐ No ☐ Unknown
Pyrazinamide	☐ Yes ☐ No ☐ Unknown
Ethambutol	☐ Yes ☐ No ☐ Unknown
Streptomycin	☐ Yes ☐ No ☐ Unknown
Rifabutin	☐ Yes ☐ No ☐ Unknown
Rifapentine	☐ Yes ☐ No ☐ Unknown
Ethionamide	☐ Yes ☐ No ☐ Unknown
Amikacin	☐ Yes ☐ No ☐ Unknown
Kanamycin	☐ Yes ☐ No ☐ Unknown
Capreomycin	☐ Yes ☐ No ☐ Unknown
Ciprofloxacin	☐ Yes ☐ No ☐ Unknown
Levofloxacin	☐ Yes ☐ No ☐ Unknown
Ofloxacin	☐ Yes ☐ No ☐ Unknown
Moxifloxacin	☐ Yes ☐ No ☐ Unknown
Cycloserine	☐ Yes ☐ No ☐ Unknown
Para-Amino Salicylic Acid	☐ Yes ☐ No ☐ Unknown
Linezolid	☐ Yes ☐ No ☐ Unknown
Bedaquiline	☐ Yes ☐ No ☐ Unknown
Delaminid	☐ Yes ☐ No ☐ Unknown
Clofazimine	☐ Yes ☐ No ☐ Unknown
Pretomanid	☐ Yes ☐ No ☐ Unknown
Other:	☐ Yes ☐ No ☐ Unknown

32. IF INITIAL DRUG REGIMEN NOT RIPE/HRZE (SEE NOTE), WHY NOT?

Primary Purpose: To calculate program management indicators.

Option *(select one)*	Description
Drug contraindication/interaction	There was a pharmacologic contraindication or interaction that prevented the use of RIPE/HRZE (combination therapy with isoniazid, rifampin, pyrazinamide, and ethambutol) in this patient.
Drug susceptibility testing results already known	The patient's drug susceptibility results were already known, so a treatment regimen based on susceptibility results was used immediately.
Suspected drug resistance	Drug susceptibility testing results were not yet available, but the provider suspected drug resistance, (e.g., the patient was a contact of a drug-resistant TB case), so a different regimen was used.
Drug shortage	One or more RIPE/HRZE drugs could not be used because of national or local shortage of the drug(s).
Other (specify)	Other reason not covered in one of the provided categories.
Unknown	There is insufficient documentation to determine why a regimen other than standard first-line therapy was used.

Note: This question should only be completed if the standard initial four-drug therapy (RIPE/HRZE, i.e., isoniazid, rifampin, pyrazinamide, and ethambutol) was not used for this patient as recorded in item 31.

Genotyping and Drug Susceptibility Testing

33. ISOLATE SUBMITTED FOR GENOTYPING?

Primary Purpose: To link genotyping results with RVCT data.

Option *(select one)*	Description
Yes	Isolate was submitted for genotyping, regardless of genotyping results.
No	**No** isolate was submitted for genotyping.

If **"Yes,"** enter the following information:

Genotyping accession number

The **genotyping accession number** for the current TB episode. This number is assigned by the genotyping reference laboratory.

Note: If multiple isolates have been submitted for one patient, please consult with your laboratorian or genotyping surveillance coordinator to determine the correct genotyping accession number for the current episode.

When entering the **genotyping accession number**, begin at the first box and continue to fill to the right. Include all hyphens and letters. Do not add zeros in the remaining boxes beyond the number provided by the reference lab.

In 2004, CDC established the National Tuberculosis Genotyping Service (NTGS). The goal was to genotype one *M. tuberculosis* isolate from every culture-confirmed TB case in the United States. The **genotyping accession number** is the number assigned by the genotyping reference laboratory. Currently, the numbers are formatted as YY (the 2-digit year), followed by "RF" and 4 digits (e.g., "06RF5678"). This format might change in the future.

34. WAS PHENOTYPIC/GROWTH-BASED DRUG SUSCEPTIBILITY TESTING DONE?

Primary Purpose: To identify TB cases with drug-resistant isolates using phenotypic/growth-based drug susceptibility testing methods.

Option *(select one)*	Description
Yes	Growth-based drug susceptibility testing was performed.
No	Growth-based drug susceptibility testing was **not** performed.
Unknown	It is unknown whether growth-based susceptibility testing was performed

If **"Yes"**, enter the following for each drug tested

Specimen Source Information	Description	Comment

Date collected	Month, day, and year the specimen was collected**.** (e.g., 01/17/2020)	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date collected (e.g., if a specimen was collected in March 2020, enter 03/01/2020 as the date collected). • If the month and day are unknown, enter the first day of the known year as the date collected (e.g., if a specimen was collected in 2020, enter 01/01/2020 as the date collected).
Date reported	Month, day, and year (mm/dd/yyyy) the laboratory reported the result	This date can be found on the laboratory report as the date the report is released or made available. In many instances, the result date and report dates are the same, if not, report the earliest date available. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date reported (e.g., if a result was reported in March 2020, enter 03/01/2020 as the date reported). • If the month and day are unknown, enter the first day of the known year as the date reported (e.g., if a result was reported in 2020, enter 01/01/2020 as the date reported).
Specimen type	Select appropriate anatomic source site from **Appendix I**.	None.

Result Options	Description
Resistant	Any degree of resistance reported for drug.
Susceptible	Select only if completely susceptible.
Unknown	• It is **not** known whether the test was performed, **or** • Results were **not** available or result is not known for a reason other than pending results.

Note: Include initial result for all unique combinations of drug tested and specimen type as well as any subsequent tests where the result changed when new test results become available.

35. WAS GENOTYPIC/MOLECULAR DRUG SUSCEPTIBILITY TESTING DONE?

Primary Purpose: Provides information on test results for genetic mutations associated with drug resistance.

Option *(select one)*	Description
Yes	Molecular drug susceptibility testing was performed.
No	Molecular drug susceptibility testing was NOT performed.
Unknown	It is not known if molecular drug susceptibility testing was performed.

If **"Yes,"** enter the following information for each gene tested into the table (examples are in **Appendix F**):

Item	Description	Comment
Gene name	Name of the gene associated with resistance to an anti-TB drug.	None.
Date collected	Month, day, and year the specimen was collected (e.g., 01/17/2020).	Each test result should have a date collected. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date collected (e.g., if a specimen was collected in March 2020, enter 03/01/2020 as the date collected). • If the month and day are unknown, enter the first day of the known year as the date collected (e.g., if a specimen was collected in 2020, enter 01/01/2020 as the date collected).
Date reported	Month, day, and year (mm/dd/yyyy) the laboratory reported the result	This date can be found on the laboratory report as the date the report is released or made available. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date reported (e.g., if a laboratory result was reported in March 2020, enter 03/01/2020 as the date reported). • If the month and day are unknown, enter the first day of the known year as the date reported (e.g., if a laboratory result was reported in 2020, enter 01/01/2020 as the date reported).

Item	Description	Comment
Specimen source site	Select appropriate anatomic source site from **Appendix I**.	For sputum specimens, select **"sputum"** from the value set.

Result (select one)	Description
Mutation detected	Mutation was detected.
Mutation not detected	Mutation was not detected
Unknown	It is not known if a mutation was detected.

Item	Description	Comment
Nucleic acid change	For each gene mutation, indicate the nucleic acid (NA) change associated with the mutation as indicated on the laboratory report.	Nucleic acid changes appear only if a mutation has occurred and a sequencing test type was performed.
Amino acid change	For each gene mutation, indicate the amino acid (AA) change associated with the mutation as indicated on the laboratory report.	AA changes appear only if a mutation resulting in a substitution has occurred and a sequencing test type was performed.

Indel Option (select one)	Description
Insertion	Mark this option if an insertion is recorded or noted on the report.
Deletion	Mark this option if a deletion is recorded or noted on the report.
Indel	If a laboratory reports an insertion or a deletion but reports it as an "indel," mark this option.
Unknown	It is unknown whether an insertion, deletion, or "indel" is recorded or noted on the lab report.

Test Type (select one)	Description	Comment
Non-sequencing	Non-sequencing methods can be real-time PCR, line probe assay, or Xpert® MTB/RIF (Xpert® MTB/RIF applies only to the *rpoB* gene associated with rifampin resistance).	Non-sequencing methods do not usually have nucleic acid or amino acid changes reported on the laboratory report.
Sequencing	Pyrosequencing, Sanger sequencing, Next Generation Sequencing (NGS), Targeted-Based Sequencing, Targeted Sequencing, Amplicon-Based Sequencing, Whole Genome Sequencing (WGS).	Sequencing methods will usually have nucleic acid or amino acid changes recorded on the laboratory report.
Unknown	The testing method was unknown or not indicated on the laboratory report.	None.

Note: Include initial result for each combination of gene and test type as well as any subsequent tests where the result changed when new test results become available.

See **Appendix E** for additional instructions on completing this item, including examples.

36. WAS THE PATIENT TREATED AS AN MDR TB CASE (REGARDLESS OF DST RESULTS)?

Primary Purpose: To determine whether a patient was treated as a multidrug-resistant (MDR) TB case, regardless of laboratory results.

Option *(select one)*	Description	Comment
Yes	The patient was treated as an MDR TB case at any point during therapy.	All cases believed by the clinician to have MDR TB should have "Yes" entered for this question. Sometimes TB cases are treated as if they were MDR TB, even if laboratory results are not available to confirm the MDR TB diagnosis (e.g., patients with a clinical diagnosis of TB who are a known contact to an MDR TB case, and thus presumed to also have TB).
No	The patient was not treated as an MDR TB case.	None.
Unknown	It is not known whether the patient was treated as an MDR TB case.	None.

Note: Do **not** mark this question as **"Yes"** if second-line TB drugs were used for reasons other than presumed or confirmed drug resistance (e.g., drug shortage, drug intolerance, interactions, adverse events).

If **"Yes,"** complete the **MDR TB Supplemental Surveillance Form** (**Appendices G and H**).

In addition, you are asked to complete the form if second-line drugs were used for reasons other than presumed or confirmed drug resistance.

Case Outcome

37. SPUTUM CULTURE CONVERSION DOCUMENTED?

Primary Purpose: To monitor the rate of sputum culture conversion.

Option *(select one)*	Description	Comment
Yes	Initial sputum specimen was culture-positive, followed by at least one negative sputum culture (not within initial set of sputa).	There should be no positive cultures after the negative culture(s) and no other positive cultures within the same "set" of sputa (i.e., greater than one consecutive specimen).
No	Initial sputum specimen was culture-positive, and no subsequent sputum specimens were culture-negative.	Examples: all follow-up cultures were positive, patient could **not** produce sputum after therapy started, or no follow-up sputum cultures were obtained.
Unknown	Results of all follow-up cultures are **not** known, or it is not known whether follow-up cultures were done.	None.

If **"Yes,"** enter the date specimen was collected for the FIRST consistently negative sputum culture.

Date Format	Description	Comment
Month, day, and year (e.g., 01/17/2020)	Date of collection for the first consistently negative sputum culture	Complete only for patients who had one or more positive sputum cultures and who subsequently had at least one documented negative culture. A follow-up specimen can be collected at any time after treatment initiation. There should be no positive cultures after this date. If a subsequent culture is positive after an initially documented sputum culture conversion, delete the originally documented date. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date collected (e.g., if a specimen was collected in March 2020, enter 03/01/2020 as the date collected). • If the month and day are unknown, enter the first day of the known year as the date collected (e.g., if a specimen was collected in 2020, enter 01/01/2020 as the date collected).

If **"No,"** select the one best reason for not documenting sputum culture conversion:

Option *(select one)*	Description
No follow-up sputum despite induction	Repeat sputum collection was attempted (including induced sputum collection), but because of clinical improvement, patient was **not** able to produce sputum.
No follow-up sputum and no induction	Repeat sputum collection was attempted, but induced sputum collection was not attempted and patient was **not** able to produce sputum.
Died	Patient died before having an opportunity to submit sputum to document whether the sputum culture had converted.
Patient lost to follow-up	Patient was lost to follow-up before having an opportunity to submit a sputum to document whether the sputum culture had converted.
Patient refused	Patient refused to provide a sputum specimen for a repeat culture.
Other ***(specify)***	A reason **not** included in the above choices (e.g., treatment failed or the patient moved outside the United States).
Unknown	It is **not** known why a repeat sputum culture was **not** obtained.

Note: Provide information on sputum culture conversion only for patients with initially positive sputum cultures. Sources for documentation of sputum culture conversion include patient medical records and laboratory reports.

This item should be completed once sputum culture conversion is documented. If the patient's sputum cultures later become positive again, the response to this item should be updated.

38. MOVED DURING THERAPY?

Primary Purpose: To facilitate efficient communication between TB control programs in providing continuity of care for the patient.

Option *(select one)*	Description
Yes	Patient moved to an area where another reporting area must now provide or coordinate TB care.
No	• Patient did **not** move, or • Patient moved within the same reporting area.

If **"Yes,"** select all the options under **Moved to Where** that apply to the area to which the patient moved:

Option *(select all that apply)*	Description	Comment

Out of state ***(specify)***	Patient moved from one U.S. reporting area to another U.S. reporting area. For this item, "state" refers specifically to U.S. reporting areas. Moves from state to state *within* a U.S. reporting area (e.g., Federated States of Micronesia) should not be reported as an "out of state" move. Enter the name of the state or reporting area to which the patient moved.	U.S. reporting areas include: • The 50 U.S. states • District of Columbia • New York City (separately from New York State) • Puerto Rico • U.S. Virgin Islands • Guam • American Samoa • Commonwealth of the Northern Marianas Islands • Republic of the Marshall Islands • Federated States of Micronesia • Republic of Palau
Out of the U.S. ***(specify)***	Patient moved from a U.S. reporting area to a country not considered a U.S. reporting area. Enter the name of the country to which the patient moved.	For the purposes of this question, "U.S." refers to all U.S. reporting areas, not just the 50 states and the District of Columbia.

If patient moved **"Out of the U.S."**, select one option to indicate whether a **transnational referral** was made.

Option ***(select one)***	**Description**
Yes	Patient was referred to a TB program or physician outside the United States.
No	Patient was not referred to a TB program or physician outside the United States.

Transnational referral includes participation in programs such as
- TBNet
- CureTB

Communication between programs is important:
- To help ensure continued case management after a patient leaves the United States.
- For completing a case management transfer and obtaining information from TB programs or physicians outside the United States for case completion.

Note: This variable is used to record whether the patient moved during TB treatment. The responsibility for follow-up reporting generally remains with the reporting area that initially reported the case to CDC and counted it. (For a detailed description of the responsibility for submitting follow-up reports to CDC, see the instructions for **Reporting Address** [item 6]).

Examples of Moved

Moved from	Moved to	Select
Dekalb County, Georgia	Fulton County, Georgia	Do not report as a move
Yap, FSM	Chuuk, FSM	Do not report as a move
Saipan, CNMI	Rota, CNMI	Do not report as a move
California	Hawaii	Out of state
Washington, D.C.	Baltimore, Maryland	Out of state
California	Guam	Out of state
New York City	New York State (outside of NYC)	Out of state
Guam	Palau	Out of state
Guam	Hawaii	Out of state
Chuuk, FSM	Guam	Out of state
Chuuk, FSM	California	Out of state
Puerto Rico	Florida	Out of state
Guam	China	Out of the U.S.
California	China	Out of the U.S.

39. DATE THERAPY STOPPED

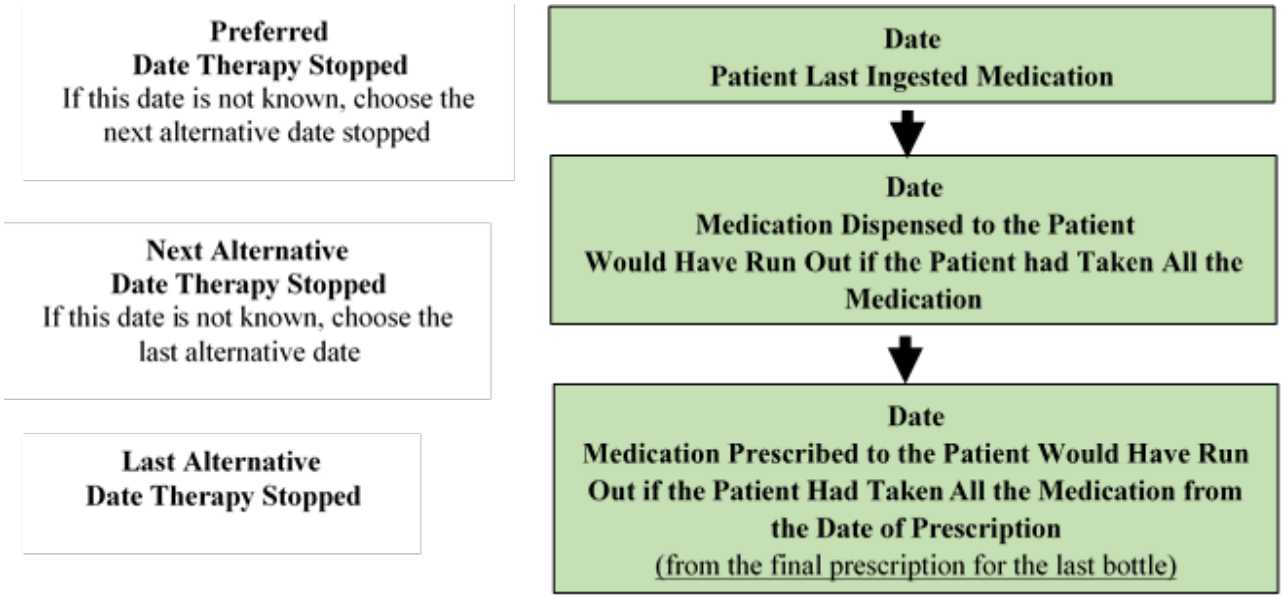
Primary Purpose: To monitor completion of therapy within a specified time.

Date Format	Description	Comment
Month, day, and year (e.g., 01/17/2020)	Date the patient stopped taking medication for confirmed or possible TB disease	This should be when the patient last ingested medication. However, if that date is not documented, see below hierarchy for guidance. Remember that recurrent TB is not countable as a new case of TB unless it is diagnosed at least 12 months after the last dose of treatment for the earlier case. **If the patient had treatment interruptions or experienced relapse within 12 months and had to restart TB medications, use the *last* date treatment was ingested.** If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date therapy stopped (e.g., if therapy was stopped in March 2020, enter 03/01/2020 as the date therapy stopped). • If the month and day are unknown, enter the first day of the known year as the date

		therapy stopped (e.g., if therapy was stopped in 2020, enter 01/01/2020 as the date therapy stopped).

Comment: **Date Therapy Stopped**
The interval between **Date Therapy Started** (item 30) and **Date Therapy Stopped"** (item 39) is meant to encompass the entire period (including interruptions in therapy) that the patient was receiving medication to treat confirmed or possible TB disease. Patient self-report without medical documentation is not acceptable. Although there may be interruptions in TB treatment, enter the final documented date on which the patient last ingested medication for confirmed or possible TB disease. For patients being treated for confirmed or possible TB disease, enter **Date Therapy Stopped**, according to the following chart:

Hierarchy for Determining Date Therapy Stopped
(for entire treatment period)



40. REASON THERAPY STOPPED OR NEVER STARTED?

Primary Purpose: To document treatment outcome.

Option *(select one)*	Description
Completed therapy	Patient completed the prescribed course of therapy per the medical record as recorded by the clinician caring for the patient.
Lost	Patient could **not** be located before the start or the completion of treatment (e.g., the patient moved to an unknown location, or the forwarding address is known but the patient was **not** found at that address). **Code patients who move outside the United States and cannot be followed up as "Other."**
Patient choice	Patient refused to start or complete therapy (e.g., stopped taking drugs). This option was previously "Uncooperative or Refused."
Adverse treatment event	Therapy was permanently stopped because of an adverse event due to anti-TB medications. *Select this option only if the patient survived the adverse event.* If the patient died because of an adverse TB treatment event, select Died as the reason therapy stopped and note that the death was TB-related in item 43.
Not TB	Completed diagnostic evaluation did **not** substantiate the diagnosis of TB (e.g., *M. avium* or *M. bovis* BCG was isolated from a clinical specimen).
Died	Patient was alive at diagnosis but died before the start or completion of treatment.
Dying	Treatment was stopped or never started by the clinician or at patient request because the patient's condition was terminal and death was imminent.
Other	Therapy was discontinued for a known reason **not** included in the above choices and is **not** Unknown (e.g., patient moved outside the United States).
Unknown	Reason that therapy was stopped is **not** known.

41. REASON TB DISEASE THERAPY EXTENDED >12 MONTHS, IF APPLICABLE

Primary Purpose: To document reason for extended treatment and to calculate program indicators.

Option *(select all that apply)*	Description
Inability to use rifampin (resistance, intolerance, etc.)	Rifampin (or another rifamycin such as rifabutin) could not be used to treat the patient (e.g., drug-resistant TB, rifampin intolerance), resulting in the treatment protocol lasting more than 12 months. This option includes all rifamycins.
Adverse drug reaction	Patient had a significant adverse drug reaction or experienced an adverse treatment event from anti-TB medications (other than a rifamycin) that prolonged therapy.
Nonadherence	There were barriers to the patient's adherence to TB treatment (e.g., treatment interruption), resulting in extension of therapy beyond 12 months.

Option *(select all that apply)*	Description
Failure	A culture tested positive 4 or more months after treatment began, resulting in prolonged therapy.
Clinically indicated—other reasons	Clinical indications (other than adverse drug reactions) include central nervous system TB (e.g., meningitis), severe liver disease, or other criteria as specified by the clinician.
Other (specify)	Reason does **not** include any of the choices listed above. Specify the reason that therapy was extended.
Unknown	Reason is unknown.

Note: Use the information entered for **Date Therapy Started** (item 30) and **Date Therapy Stopped** (item 39) to calculate the length of TB treatment. Sources for the reason(s) therapy was extended include patient medical records, patient interview, and health care provider interview.

42. TREATMENT ADMINISTRATION

Primary Purpose: To document administration of TB medications.

Option *(select all that apply)*	Description
DOT	Directly Observed Therapy (DOT), in person. Response applies if DOT was used for any doses for a patient.
EDOT	Electronic DOT (eDOT), via video call or other electronic method. Response applies if eDOT (e.g., video call, electronic medication bottle) was used to document adherence to the medication regimen for any doses.
Self-Administered	Any doses of medication were taken by the patient not under DOT or eDOT (**including any weekend doses**).

Note: Directly observed therapy (DOT), or supervised therapy, involves the direct visual observation by a health care provider (e.g., public health nurse, outreach worker, nurse, nurse's aide) or other reliable trained person (e.g., worker in a homeless shelter) of a patient's ingestion of medication. Delivering medication to a patient without visual confirmation of ingestion does not constitute DOT. However, electronic confirmation of ingestion of medicine of carefully selected patients (e.g., stable and compliant) constitutes electronic DOT.

43. DID THE PATIENT DIE (EITHER BEFORE DIAGNOSIS OR AT ANY TIME WHILE BEING FOLLOWED BY TB PROGRAM)?

Primary Purpose: To collect information on mortality among people with TB.

Option *(select one)*	Description
Yes	The patient died (for any reason) either before the TB diagnosis was made or at any point after TB diagnosis while the TB program was following the status of the patient. If this option is selected, record the date of death.
No	The patient was alive at the time that the TB program stopped following up with the patient.

Option *(select one)*	Description
Unknown	It is unknown whether the patient was alive or dead at the time that the TB program stopped following up with the patient.

If **"Yes,"** enter the date of death and indicate whether or not TB or complication of TB treatment contributed to death:

Date Format	Description	Comment
Month, day, and year (e.g., 10/20/2020)	Patient's date of death should be entered (i.e., month, day, and year).	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date of death (e.g., if a patient died in March 2020, enter 03/01/2020 as the date of death). • If the month and day are unknown, enter the first day of the known year as the date of death (e.g., if a patient died in 2020, enter 01/01/2020 as the date of death.

Did TB or complications of TB treatment contribute to death?

Option *(select one)*	Description	Comment
Yes	TB or complications of TB treatment contributed to death.	Written documentation of the cause of death (e.g., death certificate, autopsy report, medical record) is recommended. However, oral information from a reliable source (e.g., a health care provider) will be accepted. A death certificate is not necessarily required to complete this field, and TB does not need to be listed as a cause of death on the death certificate to conclude that the death was TB-related for the purposes of the RVCT.
No	TB or complications of TB treatment did **not** contribute to death.	TB was not the immediate cause, an underlying cause, or another significant condition contributing to death.
Unknown	It is **not** known if TB or complications of TB treatment contributed to death.	Every effort should be made to determine if the death was related to TB disease before classifying as unknown.

Appendices

The following appendices provide information and codes that are used to complete the RVCT:

- **Appendix A – Tuberculosis Case Definition for Public Health Surveillance**
- **Appendix B – Recommendations for Reporting and Counting Tuberculosis Cases**
- **Appendix C – Reporting Area Codes**
- **Appendix D – Anti-TB Drug Names and Genes Associated with Drug Resistance**
- **Appendix E – RVCT Molecular Drug Susceptibility Testing (DST) Report**
- **Appendix F – RVCT Molecular DST Report Examples**
- **Appendix G – MDR TB Supplemental Surveillance Form**
- **Appendix H – Instructions for MDR TB Supplemental Surveillance Form**
- **Appendix I – Anatomic Sites**
- **Appendix J – Glossary**

Appendix A —
Tuberculosis Case Definition for Public Health Surveillance
Council of State and Territorial Epidemiologists (CSTE) Position Statement 09-ID-65

Clinical description

A chronic bacterial infection caused by *Mycobacterium tuberculosis*, usually characterized pathologically by the formation of granulomas. The most common site of infection is the lung, but other organs may be involved.

Clinical criteria

A case that meets all the following criteria:

- A positive tuberculin skin test or positive interferon gamma release assay for *M. tuberculosis*
- Other signs and symptoms compatible with tuberculosis (TB) (e.g., abnormal chest radiograph, abnormal chest computerized tomography scan or other chest imaging study, or clinical evidence of current disease)
- Treatment with two or more anti-TB medications
- A completed diagnostic evaluation

Laboratory criteria for diagnosis

- Isolation of *M. tuberculosis* from a clinical specimen,[*] *OR*
- Demonstration of *M. tuberculosis* complex from a clinical specimen by nucleic acid amplification test,[**] *OR*
- Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained or is falsely negative or contaminated.

Case classification

Confirmed

A case that meets the clinical case definition or is laboratory confirmed.

Comments

A case should not be counted twice within any consecutive 12-month period. However, a case occurring in a patient who had previously had verified TB disease should be reported and counted again if more than 12 months have elapsed since the patient completed therapy. A case should also be reported and counted again if the patient was lost to supervision for greater than 12 months and TB disease can be verified again. Mycobacterial diseases other than those caused by *M. tuberculosis* complex should not be counted in tuberculosis morbidity statistics unless there is concurrent tuberculosis.

[*] Use of identification techniques for *M. tuberculosis* (e.g., DNA probes, real-time PCR, sequencing, or MALDI-TOF) performed on growth from culture of a clinical specimen are acceptable under this criterion.

[**] Nucleic acid amplification (NAA) tests are rapid tests used for direct detection of *M. tuberculosis* from a clinical specimen. These tests must be accompanied by culture; a culture isolate of *M. tuberculosis* complex is required for complete drug susceptibility testing and also genotyping. However, for surveillance purposes, CDC will accept results 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.

Appendix B —
Recommendations for Reporting, Verifying, and Counting Tuberculosis Cases (Revised March 27, 2020)

Since publication of the 2009 Recommendations for Reporting and Counting Tuberculosis Cases, numerous changes have occurred, and many issues have been raised within the field of TB surveillance. This current version updates and supersedes the previous version. *Any changes in wording or format of this edition of these recommendations are intended only to clarify previous areas of confusion, not to substantively change any existing TB case counting recommendations, except where specifically indicated.*

In the National Tuberculosis Surveillance System (NTSS), a TB case goes through three distinct stages: possible (also known as "suspected"), verified, and counted.

Possible case

A possible TB case exists when the local TB program is initially made aware of a patient with clinical signs, symptoms, or diagnostic test results that are consistent with TB. Ideally, reporting of possible cases occurs early in the diagnostic evaluation of the patient so that the local TB program can ensure appropriate case supervision, completion of appropriate therapy, and initiation of any necessary epidemiologic investigations.

Verified case

Possible TB cases will either be verified or refuted with regard to meeting the TB surveillance case definition in **Appendix A**, "Tuberculosis Case Definition for Public Health Surveillance." Refuted cases require no further action with regard to TB surveillance, and generally should not be reported to CDC. A verified TB case exists when the local TB program confirms that the patient's laboratory results and clinical signs and symptoms meet the TB surveillance case definition. Verified cases are classified as either laboratory-confirmed or clinical cases as outlined below:

Laboratory case definition

Isolation of *Mycobacterium tuberculosis* complex[1] 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 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.

Clinical case definition

In the absence of laboratory confirmation of *M. tuberculosis* complex after a diagnostic process has been completed, persons 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*, **and**
- 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 TB or clinical evidence of current disease (e.g., fever, night sweats, cough, weight loss, hemoptysis), **and**
- Current treatment with two or more anti-TB medications

Reporting of all verified TB cases in the United States for ≥90 days (inclusive of the report date) is required by the cooperative agreement between CDC and state and local TB programs, regardless of whether the case is counted as part of the jurisdiction's official TB case count, as explained below.

Note: The software for TB surveillance developed by CDC includes a calculated variable called VERCRIT, for which one of the values is **"Provider Diagnosis." "Provider Diagnosis"** is selected when the user chooses to override a "Suspected" (corresponding to a "possible" case as described in these recommendations) default value in the case verification screen as **"Verified by Provider Diagnosis."** Thus, **"Provider Diagnosis"** is not a component of the case definition for TB in the current "Tuberculosis Case Definition for Public Health Surveillance" (**Appendix A**). CDC's national morbidity reports have traditionally included all TB cases that are considered verified by the reporting areas, without a requirement that cases meet the published case definition.

Counted case

A counted TB case exists when the NTSS reporting area (each of the 50 states, New York City, the District of Columbia, and the eight U.S.-affiliated island reporting areas) determines that a verified case has not already been counted in another NTSS reporting area or by another country that is not an NTSS reporting area. For situation-specific guidance on whether and when to count a verified TB case, see below:

Verified TB cases

Count

Count only verified TB cases that meet the laboratory or clinical case definitions (see "Verified Case" above). The diagnosis of TB must be verified by the TB control officer or designee.

Do not Count

If diagnostic procedures have not been completed, do not count; wait for confirmation of disease. Do not count as a case the patient for which two or more anti-TB medications have been prescribed for preventive therapy for exposure to multidrug-resistant (MDR) TB, or while the diagnosis is pending.

Nontuberculous Mycobacterial diseases

Count

An episode of TB disease diagnosed concurrently with another nontuberculous mycobacterial disease should be counted as a TB case.

Do not Count

Disease caused by nontuberculous mycobacteria alone should not be counted as a TB case.

TB cases reported at death

Count

TB cases first reported to the health department at the time of a person's death are counted as incident cases, provided the person had current disease at the time of death. The TB control officer should verify the diagnosis of TB.

Do not Count

Do not count as a case of TB if there is no evidence of current disease at the time of death or at autopsy.

Immigrants, refugees, lawful permanent residents, undocumented immigrants, foreign visitors (e.g., students, commercial representatives, and diplomatic personnel), and Border Crossers

Count

In general, cases should be counted by the jurisdiction where the patient resides (however temporarily) at the time the medical evaluation that led to the TB diagnosis began.

Immigrants and refugees who are examined after arriving in the United States and are diagnosed with clinically active TB disease requiring TB treatment should be reported and counted by the locality where the diagnostic evaluation for TB began, regardless of citizenship or residency status.

In addition, border crossers who receive TB treatment from a U.S. locality for a total of ≥90 consecutive (excluding weekends) should be counted by the locality where they receive treatment.

"Border crosser" is defined, by the U.S. Citizenship and Immigration Services (USCIS) as "an alien resident of the United States reentering the country after an absence of less than 6 months in Canada or Mexico, or a nonresident alien entering the United States across the Canadian border for stays of no more than 6 months, or across the Mexican border for stays of no more than 72 hours."[2]

Foreign visitors (e.g., students, commercial representatives, and diplomatic personnel) who are diagnosed with TB, are receiving anti-TB therapy, and have been, or plan to remain in, the United States for 90 days or more should be reported and counted by the locality of current residence.

Do not Count

Any person who was diagnosed and started TB treatment in another country should not be counted as a new case but should be reported as a verified noncountable TB case.

Border crossers and other foreign visitors who are in the United States for <90 days, inclusive of report date, and begin TB treatment in the United States, but return to their native country to continue therapy should not be reported or counted by the U.S. locality where they receive treatment.

Out-of-state or out-of-area residents

Count

A person's TB case should be counted by the locality in which he or she resides at the time the diagnostic evaluation for TB began. The TB control officer should notify the appropriate out-of-area TB control officer of the person's home locality to (1) determine whether the case has already been counted to avoid "double counting," and (2) agree on which TB control office should count the case.

Do not Count

Do not count a case in a person with newly diagnosed TB who is an out-of-area resident and whose TB has already been counted by the out-of-area TB control office.

[2] U.S. Citizenship and Immigration Services. USCIS.gov Glossary. https://www.uscis.gov/tools/glossary?topic_id=b#alpha-listing. Accessed on October 29, 2019.

Migrants and other persons without a fixed U.S. residence

Count

Persons without any fixed U.S. residence are considered to be the public health responsibility of their present locality, and their TB case should be counted by the locality in which they stay at the time their diagnostic evaluation for TB began.

Do not Count

Cases in transient; people with TB should not be counted when there is evidence that they have already been previously diagnosed and counted by another locality.

Federal facilities (e.g., military and veterans administration facilities)

Count

Cases in military personnel, dependents, or veterans should be reported and counted by the U.S. locality where the persons are residing at the time the diagnostic evaluation for TB began.

However, if military personnel or dependents are discovered to have TB at a military base outside the United States but are referred to a U.S. locality for treatment (e.g., a military base located within the United States), the TB case should instead be counted where treated and not where diagnosed.

Do not Count

Do not count if the case was previously diagnosed and counted by another U.S. reporting area.

Tribal Lands

Count

TB should be reported to the local health authority (e.g., state or county) and counted where the diagnostic evaluation for TB began. However, for a group such as the Navajo Nation, which is geographically located in multiple states, health departments should discuss each case and determine which locality should count the case.

Do not Count

Do not count if the case was previously diagnosed and counted by another U.S. reporting area.

Correctional facilities (e.g., local, state, federal, and military), including Immigration and Customs Enforcement (ICE) detention facilities

Count

Persons who reside in local, state, federal, or military correctional facilities, as well as ICE detention facilities, are often transferred within and between facilities. TB in these persons should be reported to the local health authority and counted by the locality with the facility where the person was residing when the diagnostic evaluation for TB began.

Do not Count

Do not count a correctional facility resident's TB case that previously diagnosed and counted by another U.S. reporting area, even if treatment continues at another locale or correctional facility.

To promote uniformity in TB case reporting, the following administrative procedures are recommended:

- All countable TB cases verified by the 50 U.S. states, New York City, and the District of Columbia by December 31 and reported to CDC by the prescribed deadline will be included in the annual U.S. incidence count for that year.
- All TB cases verified during the calendar year by one of the remaining 8 reporting areas (American Samoa, Federated States of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Puerto

Rico, Republic of Palau, and U.S. Virgin Islands) are also counted but are not included in the annual incidence for the United States.

- Cases for which bacteriologic results are pending or for which confirmation of disease is questionable for any other reason should not be counted until their status is clearly determined; they should be counted at the time they meet the case verification criteria. This means that a case reported in one calendar year could be included in the morbidity count for the following year.

Appendix C —
Reporting Area Codes

Name	Alpha	Code
Alabama	AL	01
Alaska	AK	02
Arizona	AZ	04
Arkansas	AR	05
California	CA	06
Colorado	CO	08
Connecticut	CT	09
Delaware	DE	10
Florida	FL	12
Georgia	GA	13
Hawaii	HI	15
Idaho	ID	16
Illinois	IL	17
Indiana	IN	18
Iowa	IA	19
Kansas	KS	20
Kentucky	KY	21
Louisiana	LA	22
Maine	ME	23
Maryland	MD	24
Massachusetts	MA	25
Michigan	MI	26
Minnesota	MN	27
Mississippi	MS	28
Missouri	MO	29
Montana	MT	30
Nebraska	NE	31
Nevada	NV	32
New Hampshire	NH	33
New Jersey	NJ	34
New Mexico	NM	35
New York	NY	36
New York City	NO	975772
North Carolina	NC	37
North Dakota	ND	38
Ohio	OH	39
Oklahoma	OK	40
Oregon	OR	41
Pennsylvania	PA	42
Rhode Island	RI	44
South Carolina	SC	45
South Dakota	SD	46
Tennessee	TN	47
Texas	TX	48
Utah	UT	49
Vermont	VT	50
Virginia	VA	51
Washington	WA	53
Washington D.C.	DC	11
West Virginia	WV	54
Wisconsin	WI	55
Wyoming	WY	56

U.S.-Affiliated Island Reporting Area Codes

For information on citizenship and "U.S.-born" for Island Areas see **Nativity** (item 11)

Name	Alpha	Code
American Samoa	AS	60
Federated States of Micronesia	FM	64
Guam	GU	66
Commonwealth of the Northern Mariana Islands	MP	69
Republic of Palau	PW	70
Puerto Rico	PR	72
Republic of the Marshall Islands	MH	68
U.S. Virgin Islands	VI	78

Appendix D —
Anti-TB Drug Names and Genes Associated with Drug Resistance

Drug name	Gene name	Comments
Isoniazid (INH)	*katG*	None.
Isoniazid (INH) and ethionamide	*inhA*	*InhA* is associated with low level resistance to both isoniazid and ethionamide. Note that ethionamide has another gene associated with resistance, *ethA* (shown below).
Isoniazid (INH)	*ahpC-oxyR*	*None*.
Isoniazid (INH)	*fabG1*	Also known as *mabA*. Mutations associated with fabG1 (mabA) have also been reported for resistance to ethionamide.
Rifampin (RIF)	*rpoB*	Rifampin is among the drug group rifamycins. Rifamycins also include rifapentine and rifabutin. A mutation in the *rpoB* gene does not necessarily confer resistance to all rifamycin drugs.
Pyrazinamide (PZA)	*pncA*	None.
Ethambutol (EMB)	*embB*	None.
Second-line injectables	*rrs*	Second-line injectables include kanamycin (KAN), amikacin (AM), capreomycin (CAP). **Note**: *rrs* is also associated with streptomycin resistance. *rrs* is also known as 16S rRNA.
Kanamycin (KAN)	*eis*	None.
Capreomycin (CAP)	*tlyA*	None.
Fluoroquinolones	*gyrA*	Examples of fluoroquinolone drugs include moxifloxacin (MXF), ofloxacin (OFL), ciprofloxacin (CIP), and levofloxacin (LEV).
Fluoroquinolones	*gyrB*	Examples of fluoroquinolone drugs include moxifloxacin (MXF), ofloxacin (OFL), ciprofloxacin (CIP), and levofloxacin (LEV).
Ethionamide	*ethA*	None.
Streptomycin	*rpsL, rrs*	None.
Bedaquiline	*atpE, rv0678, pepQ (rv2535c)*	p*epQ* is also known as *rv2535c*. Mutations associated with *rv0678* can result in cross resistance with clofazimine.
Linezolid	*23S rRNA, rplC, rrl*	*rrl* gene is also known as 23S.
Clofazimine	*rv0678, pepQ, rv1979c*	Mutations associated with *rv0678* can result in cross resistance with bedaquiline.
Delamanid	*fbiA, fbiB, fbiC, ddn, fgd1*	None.

Appendix E —
RVCT Molecular Drug Susceptibility Testing (DST) Report

Instructions

The **RVCT Molecular DST Report** provides information on test results for mutations associated with drug resistance. Complete this section for confirmed TB cases that have molecular testing performed for drug resistance. For each patient, report the full test results for the samples that have unique features, such as specimen type (sputum or another anatomic site), test type (sequencing or non-sequencing) or mutation (detected or not detected). There is no need to report test results that differ only by date or laboratory and where all other aspects are identical in regards to specimen type, test type, and/or the results of mutation. For example, if patient X has two sputum specimens collected one week apart and the first is sent to a hospital laboratory and found to have a mutation in *rpoB* by Xpert®, and the second is sent to the state laboratory and found to have the same result by Xpert®, then record only the earlier laboratory report. Enter any test result occurring for the first time, or if repeated, the result or conditions change (for example, a mutation for *rpoB non-sequencing* test is performed first, then a mutation for *rpoB sequencing* test is performed two weeks later). Enter as many tests as needed to document possible drug resistance, drug susceptibility, or acquired resistance occurring throughout the patient's clinical care.

Gene name

The gene name is the name of the gene associated with resistance to an anti-TB drug. The most common gene names associated with anti-TB drug resistance, with their associated drug names, are listed in **Appendix D**. Indicate the gene name listed on the laboratory report in the appropriate field.

Collection date

The collection date is the date that the specimen (clinical sample) was collected from the patient as it is listed on the laboratory report. Enter the month, day, and year (mm/dd/yyyy) that the sample was collected as reported on the laboratory report. If the day is unknown, enter the first day of the known month as the collection date (e.g., if a specimen was collected in March 2020, enter 03/01/2020 as the collection date). Each test result should have a *date specimen collected*.

Report date

The report date is the date that the molecular DST test result was reported by the laboratory. The date is found on the laboratory report as the date the report is released or made available to the requestor. Enter the month, day, and year (mm/dd/yyyy) the test result was made available by the laboratory as shown on the lab report (some labs don't report this date but most do). If the day is unknown, enter the first day of the known month as the report date (e.g., if a lab result was reported in March 2020, enter 03/01/2020 as the report date).

Specimen type

The specimen type (**Appendix I**) is the source of clinical sample or isolate (sputum or other) that has been tested for a mutation associated with drug resistance.

Results

Select the results as shown on the laboratory report for the selected gene. If the gene was not tested leave the option blank.

a. Mutation detected
b. Mutation not detected
c. Unknown

There are other items you may see on a laboratory report. Below are a few definitions associated with mutations.

Single nucleotide polymorphism (SNP)

A change in a single nucleotide in the DNA sequence, an A, T, C, or G from what is commonly observed (i.e., wild type). Multiple point mutations can occur within the same locus.

Deletion

A mutation that can occur when a single nucleotide or set of nucleotides is removed from a DNA sequence. A deletion can be small (i.e., one to few nucleotides) or large (i.e., a whole segment of the chromosome) and the effect of the deletion on viability of the organism or antibiotic resistance will depend on the location of the deletion and how the deletion affects protein synthesis.

Insertion

A mutation that can occur when a single nucleotide or set of nucleotides is inserted within a DNA sequence. An insertion can be small (i.e., one to few nucleotides) or large (i.e., a whole segment of the chromosome).

Note: Insertions and deletions are often referred to as **indels**. Also, insertions and deletions can result in what is known as a frameshift mutation (also called frameshift change or FSC). Therefore, if "frameshift" or "FSC" is listed as the result on the laboratory report, mark the gene name, the result of mutation, and the test type. You can record indels in a separate column (see below).

Nucleic acid change

For each SNP, insert the nucleic acid change associated with the mutation as indicated on the laboratory report. Nucleic acid changes appear only if a mutation has occurred and a sequencing test type was performed.

Please insert the nucleic acid change in *abc>xyz* format, if included in the laboratory report. The *abc* is the 3-letter codon for the NA found in the naturally occurring bacterium, e.g. the nonresistant or sensitive (drug-susceptible) strain of *M. tuberculosis*. The *xyz* is the 3-letter codon for the nucleic acid found in the sample tested. Nucleic acid changes and amino acid changes are specific to the gene where the mutation occurs. A codon is three consecutive nucleotides (consisting of adenosine [A], thymidine [T], cytidine [C], or guanosine [G]) that enables the production of a specific amino acid. If the nucleic acid change is not provided in 3-letter codon format, please enter the information as reflected in the laboratory report (e.g., c>z) or leave blank if not provided.

Certain genes, such as *inhA, ahpC-oxyR, rrs* and *eis* will typically only have nucleic acid changes (i.e., no amino acid change to report). Nucleic acid changes in this group of genes may appear differently and the location of the mutation on the genome will be added to the nucleic acid change, e.g., '*C(-34)G'* for *inhA*, '*-45 AT insertion'* for *ahpC-oxyR*, '*A1410G*' for *rrs*, or G(-10)A for *eis*.

If no mutation has occurred then no nucleic acid change should be listed on the laboratory report. The examples below show common mutations occurring in drug resistant TB with the nucleic acid and amino acid changes specific to the mutations occurring in the associated genes.

Examples

Gene tested	Results	Nucleic acid change	Amino acid change
katG	Mutation detected	AGC>ACC	Ser315Thr
rpoB	Mutation detected	TCG>TTG	Ser531Leu
inhA	Mutation detected	C-15T*	Not applicable

* The position on the genome is -15. The nucleic acid change is from C [cytidine] to T [thymidine]

Amino acid change

Indicate the amino acid change associated with the mutation as indicated on the laboratory report. Amino acid changes appear only if a mutation resulting in a substitution has occurred and a sequencing test type was performed. Nucleic acid and amino acid changes do not usually appear on a laboratory report if the test type used was a non-sequencing method.

Amino acid changes are associated with mutations to genes *katG, rpoB, pncA, embB, tlyA, gyrA, gyrB, ethA and rpsL*. If a mutation has not occurred then the amino acid change, as well as a nucleic acid change, should not appear on the laboratory report. The genes *inhA* and *eis* are usually associated with only nucleic acid changes but some research has shown that amino acid changes can occur.

A common amino acid change found in drug resistant TB is the amino acid change for the gene associated with rifampin resistance, *rpoB*, Ser531Leu (or Ser450Leu depending on numbering system used). In this example, 531 refers to the location or position of the codon in the *rpoB* gene and Ser to Leu refers to the change in amino acid (serine to leucine).

The following explains the nomenclature used for reporting amino acid changes, using Ser531Leu as an example:

Ser531Leu

Ser is the abbreviation for serine, the amino acid found in wild-type *M. tuberculosis.*

531 refers to the location or position of the codon in the rifampin-resistant determining region (RRDR) of the *rpoB* gene where the mutation occurred.

Leu is the abbreviation for leucine, the amino acid substitution found in the resistant *M. tuberculosis.*

This amino acid change indicates there was a mutation in the RRDR of the *rpoB* gene at location **531** resulting in a change of the corresponding amino acid from **serine** to **leucine**.

Indels

If a laboratory reports an **in**sertion or a **del**etion (or just simply calls it an "indel") select the appropriate option.

Option (select one)	Description
Deletion	If a deletion is recorded or noted on the lab report
Insertion	If an insertion is recorded or noted on the lab report
"Indel"	If an "Indel" is recorded or noted on the lab report

Test type

Select the test type (method) used for the molecular test as reported on the laboratory report.

Method (select one)	Description
Non-sequencing	Non-sequencing methods can be real-time PCR, line probe assay, or Xpert® MTB/RIF (Xpert® MTB/RIF applies only to the *rpoB* gene associated with

	rifampin resistance). Non-sequencing methods do not usually have nucleic acid or amino acid changes reported on the laboratory report.
Sequencing	Pyrosequencing, Sanger sequencing, Next Generation Sequencing (NGS), Targeted-Based Sequencing, Amplicon-Based Sequencing, Whole Genome Sequencing (WGS). Sequencing methods will usually have nucleic acid or amino acid changes recorded on the laboratory report.
Unknown	The testing method was unknown or not indicated on the laboratory report

Appendix F —
RVCT Molecular Drug Susceptibility Testing (DST) Report Examples

The following examples show how molecular DST results should be recorded on the RVCT according to the variable (item) definitions.

Example 1

Laboratory reports contained the following information:

Sputum samples from patient Y collected on 10/25/2017 and 1/6/2018, were sent to state public health laboratory and to CDC, respectively. The first specimen was tested using real-time PCR and found to have mutations in *katG* and *rpoB* and reported to the state TB program on 10/27/2017. The second sputum specimen, collected on 1/6/2018, had mutations *katG, rpoB, pncA, embB, gyrA* and *eis* and **no** mutations in *inhA, rrs*, or *tlyA* using Sanger sequencing performed on an isolate. These results were reported to the state TB program on 4/15/2018.

RVCT Molecular DST Report

Gene name	**Collection date** (mm/dd/yyyy)	**Report date** (mm/dd/yyyy)	**Specimen type** -sputum -other (indicate site)	**Results** -Mutation detected -Mutation not detected -Unknown	**Nucleic acid change**	**Amino acid change**	**Indels**	**Test type** -Non-sequencing -Sequencing -Unknown
katG	10/25/2017	10/27/2017	Sputum	Mutation detected				Non-sequencing
rpoB	10/25/2017	10/27/2017	Sputum	Mutation detected				Non-sequencing
katG	01/06/2018	04/15/2018	Sputum	Mutation detected	AGC>ACC	Ser315Thr		Sequencing
inhA	01/06/2018	04/15/2018	Sputum	Mutation not detected				Sequencing
rpoB	01/06/2018	04/15/2018	Sputum	Mutation detected	TCG>TTG	Ser531Leu		Sequencing
pncA	01/06/2018	04/15/2018	Sputum	Mutation detected	ATC>CTC	Ile6Leu		Sequencing
embB	01/06/2018	04/15/2018	Sputum	Mutation detected	GAC>GCC	Asp354Ala		Sequencing
rrs	01/06/2018	04/15/2018	Sputum	Mutation not detected				Sequencing
eis	01/06/2018	04/15/2018	Sputum	Mutation detected	C-14T			Sequencing
tlyA	01/06/2018	04/15/2018	Sputum	Mutation not detected				Sequencing
gyrA	01/06/2018	04/15/2018	Sputum	Mutation detected	GGC>TGC	Gly88Cys		Sequencing

Example 1 -- Notes

Record both sputum specimen results collected on different dates when the results or test type differ.

In Example 1, the patient had two sputum specimens collected on different dates (10/25/2017 and 1/6/2018) using two different testing methods. The first specimen was sent to the state public health laboratory and was tested using a real-time PCR test which found two mutations, one for *katG* (isoniazid) and one for *rpoB* (rifampin). For the second specimen, collected on 1/6/2016, the laboratory report noted that the testing method was Sanger sequencing. Due to the two different methods used in testing you would want to record both specimens and test results on this patient in the RVCT.

Record the test type for all tests used to test for mutations.

The test type or method used on the first specimen was recorded as real-time PCR on the laboratory report. Therefore, one would mark **"Non-sequencing"** as the test type. Since non-sequencing tests do not provide nucleic acid or amino acid changes, one would not mark responses to those variables.

The test type or method used on the second specimen was reported as Sanger sequencing on the laboratory report. Therefore, one would mark **"Sequencing"** as the test type and because sequencing tests often provide the nucleic acid and amino acid changes, one would mark responses to those items as well.

When a mutation occurs record the nucleic acid or amino acid changes, as applicable.

This patient's sputum had mutations using a sequencing method for genes *katG, rpoB, pncA, embB, eis,* and *gyrA.* Therefore, you would expect to find the nucleic acid or amino acid changes recorded on the laboratory report. The genes *katG, rpoB, pncA, embB* and *gyrA* typically have nucleic acid changes and the corresponding amino acid changes when a mutation occurs. The genes *inhA, rrs,* and *eis* typically have only nucleic acid changes when a mutation occurs and no corresponding amino acid changes.

Leave cells in the table blank when the necessary information is not available on the laboratory report.

Example 2

Laboratory reports contained the following information:

Sputum samples from patient X collected on 7/4/2018 and 7/26/2018, were sent to the state public health laboratory. They were tested using real-time PCR and found to have **no** mutations in *katG, inhA,* or *rpoB.* The specimen collected on 7/4/2018 was reported to the state TB program on 11/10/2018. The specimen collected on 7/26/2018 was reported to the state TB program on 11/18/2018 and found to have identical results.

RVCT Molecular DST Report

Gene name	**Collection date** (mm/dd/yyyy)	**Report date** (mm/dd/yyyy)	**Specimen type** -sputum -other (indicate site)	**Results** -Mutation detected -Mutation not detected -Unknown	**Nucleic acid change**	**Amino acid change**	**Indels**	**Test type** -Non-sequencing -Sequencing -Unknown
katG	07/04/2018	11/10/2018	Sputum	Mutation not detected				Non-sequencing
inhA	07/04/2018	11/10/2018	Sputum	Mutation not detected				Non-sequencing
rpoB	07/04/2018	11/10/2018	Sputum	Mutation not detected				Non-sequencing

Example 2-- Notes

Record only one specimen result when the results and test type do not differ from later specimens.

In Example 2, the patient had two sputum samples sent to the laboratory. In this case it appears that molecular testing was done after the samples were cultured because the reporting dates are delayed. Yet, both specimens had the same results for all genes using the same test type. Therefore, only one set of test results should be recorded on the RVCT. For this situation, choose the earliest sample tested.

Example 3

Laboratory reports contained the following information:

A biopsy was collected from the right cervical lymph node from patient W on 11/3/2018 and over a year later, a sputum sample was collected on 12/5/2019. The right neck mass sample was tested at CDC using Sanger sequencing and found mutations in *katG* (nucleic acid change AGC>ACC, amino acid change Ser315Thr), *rpoB* (nucleic acid change CAC>TAC, amino acid change His526Tyr), and *pncA* (nucleic acid change TCC>TCT, amino acid change Ser65Ser). No mutations were detected for *inhA, embB, rrs, eis, tlyA,* or *gyrA*. The results were reported on 12/16/2018.

A sputum sample collected on 12/5/2019 was tested by the state public health laboratory using pyrosequencing and resulted in mutations for *katG* (nucleic acid change AGC>ACC, amino acid change Ser315Thr) and *rpoB* (nucleic acid change TCG>TTG, amino acid change Ser531Leu) and *embB*. The mutation for *embB* was an insertion but no additional information was noted on the laboratory report. The laboratory found no mutations for *inhA, ahpC-oxyR, rrs*, nor *gyrA*. The results were reported on 12/11/2019.

RVCT Molecular DST Report

Gene name	**Collection date** (mm/dd/yyyy)	**Report date** (mm/dd/yyyy)	**Specimen type** -sputum -other (indicate site)	**Results** -Mutation detected -Mutation not detected -Unknown	**Nucleic acid change**	**Amino acid change**	**Indels**	**Test type** -Non-sequencing -Sequencing -Unknown

katG	11/03/2018	12/16/2018	Lymphatic cervical	Mutation detected	AGC>ACC	Ser315Thr		Sequencing
inhA	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
rpoB	11/03/2018	12/16/2018	Lymphatic cervical	Mutation detected	CAC>TAC	His526Tyr		Sequencing
embB	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
pncA	11/03/2018	12/16/2018	Lymphatic cervical	Mutation detected	TCC>TCT	Ser65Ser		Sequencing
rrs	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
eis	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
tlyA	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
gyrA	11/03/2018	12/16/2018	Lymphatic cervical	Mutation not detected				Sequencing
katG	12/05/2019	12/11/2019	Sputum	Mutation detected	AGC>ACC	Ser315Thr		Sequencing
inhA	12/05/2019	12/11/2019	Sputum	Mutation not detected				Sequencing
ahpC-oxyR	12/05/2019	12/11/2019	Sputum	Mutation not detected				Sequencing
rpoB	12/05/2019	12/11/2019	Sputum	Mutation detected	TCG>TTG	Ser531Leu		Sequencing
embB	12/05/2019	12/11/2019	Sputum	Mutation detected			Insertion	Sequencing
rrs	12/05/2019	12/11/2019	Sputum	Mutation not detected				Sequencing
gyrA	12/05/2019	12/11/2019	Sputum	Mutation not detected				Sequencing

Example 3 – Notes

Record both specimen results collected when the specimen type, test type, or mutation results differ.

In Example 3, two specimens were collected on 11/3/2018 and 12/5/2019 and both had molecular DST results available. Record the results for both of these specimens because the specimen types differ (right lymph node and sputum).

Notice that between the two samples the genes that were tested and the mutation pattern found was slightly different. The genes *rpoB, embB, pncA, ahpC-oxyR, eis* and *tlyA* were either not tested on both specimens or the results differed. This is another reason to record all results in the RVCT for both specimens.

Training webinars and other resources

- The Curry Center: Molecular Diagnostics for Tuberculosis: What Are NAATs and How Do You Use Them?
  - Webinar
  - Slide handouts
- Drug-Resistant Tuberculosis: A Survival Guide for Clinicians, 3rd edition: Chapter 3, Laboratory
- Association of Public Health Laboratories Training modules
  - Molecular Biology 101
  - Molecular Detection and Identification of Mycobacteria
  - Landscape and Language of Molecular Diagnostics for TB Drug Resistance

Example of Nonsequencing Test Results (Xpert® MTB/RIF)

Date Reported: 12/9/2020 ← Date Reported

PRELIMINARY REPORT

Page 1 of 1

Accession #:

Patient Name:
Race:
County:
Ethnicity:
Region:
Date of Birth:
Sex:
Patient ID:
Facility:
Patient Address:
Medical Record No.:
Specimen Type: **Other** ← Specimen Source
Specimen Source: **Other**
Date Collected: **12/02/2020** ← Date Collected
Date Received: **12/03/2020**
Ordering Provider:
Event ID:
Date of Onset:

	RESULTS	Reference Range	Performing Location
Mycobacteriology Smear			
Fluorochrome	**1-10**	Negative	

Mycobacteriology Culture

Key:
S=Susceptible
I=Intermediate
R=Resistant

RESULT:Mycobacteriology Culture *Pending*

	RESULTS	Reference Range	Performing Location
GeneXpert MTB/Rifampin			
MTB DNA	**Detected**	Not detected	
rpoB mutation ← Gene Name	**Not detected**	Not detected	

Result

Comments:

GeneXpert MTB/Rifampin results are preliminary results. Please refer to culture results and DST results for final determination.

Example of Sequencing Test Results (CDC MDDR)

Patient Name:

Sex: Birthdate: Age:

Specimen ID:

CDC Specimen ID:

Public Health Submitter:

Material Submitted: *M. tubercu losis* complex isolate
Specimen Source: **Sputum** Specimen Type
Medium: **MGIT broth**

Date Collected: 10/26/2020 Date Collected
Date Received: 11/24/2020
Date Reported: 11/27/2020 Date Reported

Results for Molecular Detection of Drug Resistance {Complete Panel); Conventional Drug Susceptibility Test in progress.

Drug	Locus*	Result	Interpretation
Rifampin	rpoB	**Mutation:** Results TCG>TTG; Ser531Leu Amino Acid Change	Rifampin resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are RMP-R.)
Isoniazid	inhA	No mutation	Isoniazid resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are INH-R.)
	katG	**Mutation:** AGC>ACC; Ser315Thr	
	fabG	No mutation Results	
Ethambutol	ernbB	**Mutation:** Results GCG>GAG; Ala431Glu Amino Acid Change; Nucleic Acid Change	Effect of this mutation on ethambutol resistance is unknown. Cannot rule out ethambutol resistance.
Pyrazinamide	pncA	**Frameshift Mutation:** Results GG insert after nt391; Frameshift after codon131 Insertion	Likely pyrazinamide resistant.
Fluoroquinolones	gyrA	**Mutation:** GCG>GTG; Ala90Val	Likely Ofloxacin resistant. (96% of isolates in our in-house evaluation of 550 clinical isolates with this gyrA mutation are OFL-R.)
	gyrB	No mutation	
Second Line Injectables	rrs	**Mutation:** Results T1239C Nucleic Acid Change	The rrs mutation has previously only been detected in strains susceptible to amikacin, kanamycin and capreornycin by conventional drug susceptibility testing. Cannot rule out resistance to injectable drugs (kanamycin, capreomycin, amikacin).
	eis	No mutation	
	tlyA	No mutation	

Gene Name

*A negative result (e.g., no mutation) does not rule out contributory mutations present elsewhere in the genome.

MDDR assays were developed and the performance characteristics determined by the DTBE Reference Laboratory. They have not been cleared or approved by the Food and Drug Administration.

Appendix G —
Multidrug-Resistant (MDR) TB Supplemental Surveillance Form

To be completed for all cases treated with MDR TB medications

1. History of treatment before current episode with second-line TB drugs for the treatment of TB disease (not LTBI)? ☐Yes ☐No ☐Unknown

Treatment Course

2. Date MDR TB treatment started for current episode Month ☐☐ Day ☐☐ Year ☐☐☐☐

3. Drugs ever used for MDR TB treatment, from MDR start date (select one option for each drug)

Drug	Length of Time Administered (Not Used, <1 Month, ≥1 Month)
Isoniazid	
Rifampin	
Pyrazinamide	
Ethambutol	
Streptomycin	
Rifabutin	
Rifapentine	
Amikacin	
Kanamycin	
Capreomycin	
Ethionamide	
Levofloxacin	
Moxifloxacin	
Cycloserine	
Para-Amino Salicylic Acid	
Linezolid	
Bedaquiline	
Delamanid	
Clofazimine	
Pretomanid	
Other (Specify: _____)	

4. Date injectable medication was stopped Month ☐☐ Day ☐☐ Year ☐☐☐☐ ☐Not applicable

5. Was surgery performed to treat MDR TB? ☐Yes ☐No Date:_____

Side Effects

6. Side Effects?*	Experienced? (Yes, No, Unknown)	When? (During Treatment, At End of Treatment, Both)
Depression		

Suicide Attempt or Ideation		
Cardiac Abnormalities		
Hearing Loss		
Tinnitus		
Vestibular Dysfunction		
Peripheral Neuropathy		
Renal Dysfunction		
Vision Change/Loss		
Liver Toxicity		
Myalgia		
Arthralgia		
Other (Specify: _____)		
Other (Specify: _____)		

*See page 95 for definitions.

Appendix H —
Instructions For Multidrug-Resistant (MDR) TB Supplemental Form

To be completed for all cases treated with MDR TB medications, regardless of DST results

To be completed for all cases treated with MDR TB medications, regardless of DST results. This will include patients:

- Confirmed to have MDR TB through laboratory evidence (growth-based DST or molecular sequencing tests) of resistance to at least isoniazid and rifampin**, or**
- Presumed to have MDR TB, such as patients whom clinicians believe to have MDR TB despite lack of laboratory evidence (e.g., patients with a clinical diagnosis of TB who are known contacts to an MDR TB case), **or**
- Not thought to have MDR TB but are treated with second-line TB drugs for other reasons (e.g., drug shortage, drug intolerance, interactions, adverse events).

Note: this form should also be completed for patients with XDR TB (an organism that is resistant to isoniazid, rifampin, a fluroquinolone, and a second-line injectable [amikacin, capreomycin, and kanamycin] OR by an organism that is resistant to isoniazid, rifampin, a fluroquinolone, and bedaquiline or linezolid) and pre-XDR TB (an organism that is resistant to isoniazid, rifampin, and a fluroquinolone OR by an organism that is resistant to isoniazid, rifampin, and a second-line injectable [amikacin, capreomycin, and kanamycin]).

1. HISTORY OF TREATMENT BEFORE CURRENT EPISODE WITH SECOND-LINE TB DRUGS FOR THE TREATMENT OF TB DISEASE (NOT LTBI)?

Primary Purpose: Case management and surveillance. Data are used to determine if the patient has been previously exposed to second-line TB drugs.

Option (*select one*)	Description
Yes	Patient was treated with second-line TB medications.
No	Patient has **not** been treated in the past with second-line TB medications.
Unknown	It is **not known** whether the patient was previously treated with second-line TB medications.

Second-line TB drugs include all drugs used to treat TB that is resistant to first-line TB drugs (e.g., capreomycin, ethionamide, cycloserine, ciprofloxacin, amikacin).

Note: Often there is no documentation of the patient having been treated in the past if they were treated before arriving in a U.S. reporting area. When documentation is not available, self-report of treatment for a previous episode of MDR TB disease is acceptable. Do not enter a previous diagnosis of, or treatment course for, latent TB infection (LTBI).

2. DATE MDR TB TREATMENT STARTED FOR CURRENT EPISODE

Primary Purpose: Programmatic function. Data are used for calculating time from TB diagnosis to start of MDR treatment regimen, overall duration of MDR treatment, and time from MDR treatment start date to culture conversion.

Date Format	Description	Comment

Month, day, year (e.g., 01/15/2020)	Date the patient first began a drug regimen containing at least 2 second-line drugs.	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date MDR treatment started (e.g., if MDR treatment was started in March 2020, enter 03/01/2020 as the date MDR treatment started). • If the month and day are unknown, enter the first day of the known year as the date MDR treatment started (e.g., if treatment was started in 2020, enter 01/01/2020 as the date MDR treatment started.

3. DRUGS EVER USED FOR MDR TB TREATMENT, FROM MDR START DATE (SELECT ONE OPTION FOR EACH DRUG)

Primary Purpose: Programmatic function. Data are used for assessing medications that were used as part of a patient's MDR treatment regimen.

Select an option for each drug listed. Medications should be recorded as part of the regimen for the current episode beginning with the MDR TB treatment start date. Duration of therapy is a **cumulative** time period and does not have to be consecutively given. This accounts for treatment interruptions and temporary or short stoppages in treatment.

Drug	Length of Time Administered (Not Used, <1 Month, ≥1 Month)
Isoniazid	
Rifampin	
Pyrazinamide	
Ethambutol	
Streptomycin	
Rifabutin	
Rifapentine	
Amikacin	
Kanamycin	
Capreomycin	
Ethionamide	
Levofloxacin	
Moxifloxacin	
Cycloserine	
Para-Amino Salicylic Acid*	
Linezolid	
Bedaquiline	
Delamanid	
Clofazimine	
Pretomanid	
Other (Specify:)	

Length of Time Administered

Option (*select one*)	Description
Not Used	Drug is/was **not** part of the MDR TB treatment regimen. If a drug was recommended, but never prescribed or taken by the patient, this category should be marked.
<1 month	Drug is/was part of the MDR TB treatment regimen and was taken for less than one month.
≥1 month	Drug is/was part of the MDR TB treatment regimen and was taken for greater than or equal to one month

4. DATE INJECTABLE MEDICATION WAS STOPPED

Primary purpose: Programmatic function. Data will be used to determine the duration of injectable medication use in situations where injectables were administered and estimate the intensive phase in situations where applicable.

Date Format	Description	Comment
Month, day, year (e.g., 01/15/2020)	Date the patient ended the injectable medication.	If an injectable was started, stopped, and restarted, indicate the last day the injectable was stopped. If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date injectable stopped (e.g., if an injectable was stopped in March 2020, enter 03/01/2020 as the date injectable stopped). • If the month and day are unknown, enter the first day of the known year as the date injectable stopped (e.g., if an injectable was stopped in 2020, enter 01/01/2020 as the date injectable stopped. If patient did not receive any injectable medications, mark N/A.

5. WAS SURGERY PERFORMED TO TREAT MDR TB?

Primary purpose: Case management and surveillance function. Data will be used to determine the number of patients needing surgery for MDR TB treatment.

Option (*select one*)	Description	Comment
Yes	Surgery was performed as part of MDR TB treatment for the current episode of MDR TB.	Biopsy done to diagnose MDR TB is not considered surgery to treat MDR TB. However, excisional biopsy for the treatment of extrapulmonary TB is considered surgical treatment for MDR TB.
No	Surgery was not done for the purpose of MDR TB treatment for the current episode of MDR TB.	None.

Date of Surgery

Date Format	Description	Comment
Month, day, year (e.g., 01/15/2020)	Date the patient had surgery for MDR TB.	If the month and/or day is unknown, enter your best estimate or do the following: • If the day is unknown, enter the first day of the known month as the date of surgery (e.g., if surgery was performed in March 2020, enter 03/01/2020 as the date of surgery). • If the month and day are unknown, enter the first day of the known year as the date of surgery (e.g., if surgery was performed in 2020, enter 01/01/2020 as the date of surgery.

6. SIDE EFFECTS?

Primary purpose: Case management and surveillance function. Data will be used to determine the nature and number of patients experiencing side effects due to MDR TB treatment.

Side effects potentially related to medications is defined as **not existing** before MDR TB medication start, but having occurred during treatment.

Side Effect	Description
Depression	• Prolonged feelings of sadness or dejection, or documentation of depression by provider
Suicide attempt or ideation	• Suicidal attempt or ideation (thoughts or attempt to hurt oneself)
Cardiac abnormalities	• QTc >500 ms (confirmed by repeat ECG or documented "prolonged QTc") • Clinically significant ventricular arrhythmia
Hearing loss	• Subjective hearing loss or noticing the need to turn up the volume on phones or TVs • Requiring the needs for a hearing aid or intervention • Adults: If enrolled in Monitoring Program (on a 1, 2, 3, 4, 6 and 8 kHz audiogram): Threshold shift of 15-25 dB averaged at 3 contiguous test frequencies in at least one ear • Pediatric (on a 1, 2, 3, 4, 6 and 8 kHz audiogram): hearing loss sufficient to indicate therapeutic intervention, including hearing aids; threshold shift >20 dB at 3 kHz and above in at least one ear • Speech-language related services indicated
Tinnitus	• Subjective ringing, buzzing, roaring or clicking sounds in the ears

Vestibular dysfunction	• Feeling that the world is revolving around the patient (objective vertigo) or the patient is revolving in space (subjective vertigo) • Dizziness or imbalance
Peripheral neuropathy	• Feeling of tingling, numbness, pressure, cold, and warmth that are experienced in the absence of a stimulus • Usually limited to the extremities
Renal dysfunction	• Change in baseline renal function or proteinuria
Vision change/loss	• Can involve one eye or both eyes • Change of baseline of vision acuity or color vision • Optic nerve damage resulting in worsening vision or blindness not present at baseline
Liver toxicity	• Liver enzyme concentrations exceeding three times the upper limit of normal if associated with symptoms, *or* • Liver enzyme concentrations exceeding five times the upper limit of normal if the patient is asymptomatic
Myalgia	• Muscle pain
Arthralgia	• Joint pain. Reports of gout, tendonitis, or tendon rupture may also be marked here
Other	• Any additional side effects not included above

Experienced?

Option (*select one*)	Description
Yes	Side effect reported. Side effects should have been reported by the patient or documented in the medical record. Side effect that <u>existed</u> before MDR TB medication start but <u>exacerbated</u> by MDR TB treatment leading to a MDR TB medication discontinuation should be recorded as **"Yes."**
No	Side effect not reported.
Unknown	It is unknown whether the side effect was reported.

When?

Option (*select one*)	Description
During treatment	Patient reported side effect only during treatment, (i.e., the side effect resolved when treatment was stopped).
At the end of treatment	Patient reported report side effect only at the end of treatment, (i.e., after the treatment was stopped).
Both	Patient reported side effect during treatment and at the end.

Example Case Study – "Manas"

On February 1, 2020, Manas was admitted to the hospital with night sweats, fever, chills and hemoptysis. He said he was treated for TB in India 10 years ago with some medication that turned his urine red but no injectable medication. His sputum smear was positive and he was started on isoniazid, rifampin, pyrazinamide, and ethambutol on February 2, 2020.

He remained on this therapy for 3 weeks, until growth-based drug susceptibility testing returned showing the isolate was resistant to isoniazid and rifampin. On February 23, 2020, after consultation with a regional TB expert and hospital infectious disease specialists, he was started on moxifloxacin, ethambutol, pyrazinamide, and linezolid. He was started on capreomycin on March 3, 2020. Because of the cost of capreomycin, he was changed to amikacin April 15, 2020.

The patient developed progressive high-frequency hearing loss, and his amikacin was discontinued June 6, 2020. He was then started on ethionamide on June 8, 2020. He experienced muscle aches, and his moxifloxacin was changed to levofloxacin on November 10, 2020. His muscle aches continued to progress, and his levofloxacin was changed to cycloserine instead on November 20, 2020.

In February of 2021 his muscle aches had improved, but he developed numbness and tingling of his fingers and toes. Linezolid was stopped, and he was started on para-amino salicylic acid. He began having joint pains in April of 2021 and his pyrazinamide was discontinued. He finished his treatment on August 10, 2021 on cycloserine, ethambutol, para-amino salicylic acid, and ethionamide. At the last visit, he continued to complain of hearing loss and stable numbness and tingling in his fingers and toes. His muscle and joint pains had resolved.

See example of the MDR Form completed based on this case study on the next page.

1. History of treatment before current episode with second-line TB drugs for the treatment of TB disease (not LTBI)?	☐Yes ☒No ☐Unknown

Treatment Course

2. Date MDR TB treatment started for current episode	Month: 02 Day: 23 Year: 2020

3. Drugs ever used for MDR TB treatment, from MDR start date (select one option for each drug)

Drug	Length of Time Administered (Not Used, <1 Month, ≥1 Month)
Isoniazid	Not used
Rifampin	Not used
Pyrazinamide	≥ 1month
Ethambutol	≥ 1month
Streptomycin	Not used
Rifabutin	Not used
Rifapentine	Not used
Amikacin	≥ 1month
Kanamycin	Not used
Capreomycin	≥ 1month
Ethionamide	≥ 1month
Levofloxacin	<1 month
Moxifloxacin	≥ 1month
Cycloserine	≥ 1month
Para-Amino Salicylic Acid	≥ 1month
Linezolid	≥ 1month
Bedaquiline	Not used
Delamanid	Not used
Clofazimine	Not used
Pretomanid	Not used
Other (Specify: _____)	

4. Date injectable medication was stopped	Month: 06 Day: 06 Year: 2020 ☐Not applicable
5. Was surgery performed to treat MDR TB?	☐Yes ☒No Date:_____

Side Effects

6. Side Effects?*	Experienced? (Yes, No, Unknown)	When? (During Treatment, At End of Treatment, Both)
Depression	No	
Suicide Attempt or Ideation	No	
Cardiac Abnormalities	No	
Hearing Loss	Yes	Both
Tinnitus	No	
Vestibular Dysfunction	No	

Peripheral Neuropathy	Yes	Both
Renal Dysfunction	No	
Vision Change/Loss	No	
Liver Toxicity	No	
Myalgia	Yes	During Treatment
Arthralgia	Yes	During Treatment
Other (Specify: _____)	No	
Other (Specify: _____)		

Appendix I —
Anatomic Sites

Site of Disease

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Accessory sinus	AC	120228005	Paranasal sinus part (body structure)
Adrenal gland	AD	23451007	Adrenal structure (body structure)
Anus	AN	53505006	Anal structure (body structure)
Appendix	AP	66754008	Appendix structure (body structure)
Blood	BL	87612001	Blood (substance)
Blood vessel	BV	59820001	Blood vessel structure (body structure)
Bone and/or joint	BO	110522009	Bone and joint (combined site) (body structure)
Bone marrow	BM	14016003	Bone marrow structure (body structure)
Brain	BA	12738006	Brain structure (body structure)
Breast	BR	76752008	Breast structure (body structure)
Cardiac valve	CA	17401000	Cardiac valve structure (body structure)
Colon	CO	71854001	Colon structure (body structure)
Cranial spinal & peripheral nerve	CR	25087005	Structure of nervous system (body structure)
Ear and mastoid cells	EA	110708006	Middle ear and mastoid cells (body structure)
Esophagus	ES	32849002	Esophageal structure (body structure)
Extrahepatic bile duct	EX	16014003	Extrahepatic duct structure (body structure)
Eye and ear appendages	EY	PHC4	Eye and ear appendages
Fetus and embryo	FE	C0230999	Fetus and embryo
Gallbladder	GA	28231008	Gallbladder structure (body structure)
Genitourinary	GU	21514008	Structure of genitourinary system (body structure)
Heart	HE	80891009	Heart structure (body structure)
Laryngeal	LX	110547006	Epiglottis and larynx (combined site) (body structure)
Lip	LP	48477009	Lip structure (body structure)
Liver	LV	10200004	Liver structure (body structure)
Lymphatic axillary	LA	281777001	Structure of lymphatic system of axilla (body structure)
Lymphatic cervical	LC	69831007	Structure of lymphatic system of neck (body structure)
Lymphatic intrathoracic	LI	281778006	Intrathoracic lymphatic structure (body structure)
Lymphatic other	LO	PHC2	Lymphatic Other

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Lymphatic unknown	LU	PHC3	Lymphatic Unknown
Meningeal	ME	1231004	Meninges structure (body structure)
Mouth	MO	123851003	Mouth region structure (body structure)
Nasopharynx	NA	71836000	Nasopharyngeal structure (body structure)
Nose	NO	45206002	Nasal structure (body structure)
Other	OT	OTH	other
Pancreas	PA	15776009	Pancreatic structure (body structure)
Pericardium	PE	76848001	Pericardial structure (body structure)
Peritoneal	PT	83670000	Peritoneal cavity structure (body structure)
Pharynx, oropharynx, and hypopharynx	PH	54066008	Pharyngeal structure (body structure)
Pituitary gland	PI	56329008	Pituitary structure (body structure)
Placenta umbilical cord and implantation site	PC	110973009	Placenta, umbilical cord and implantation site (combined site) (body structure)
Pleura	PL	3120008	Pleural membrane structure (body structure)
Pulmonary	PU	39607008	Lung structure (body structure)
Rectum	RE	34402009	Rectum structure (body structure)
Salivary gland	SA	385294005	Salivary gland structure (body structure)
Site not stated	NS	PHC5	Body Site not Stated
Skin and skin appendages	SK	39937001	Skin structure (body structure)
Small intestine - duodenum	SD	38848004	Duodenal structure (body structure)
Small intestine - jejunum & ileum	SJ	110611003	Jejunum and ileum (combined site) (body structure)
Spinal cord	SC	2748008	Spinal cord structure (body structure)
Spleen	SP	78961009	Splenic structure (body structure)
Stomach	ST	69695003	Stomach structure (body structure)
Subcutaneous tissue	SU	71966008	Subcutaneous tissue structure (body structure)
Thymus	TM	9875009	Thymus gland structure (body structure)
Thyroid or parathyroid gland(s)	TY	297261005	Thyroid and/or parathyroid structures (body structure)
Tongue	TO	21974007	Tongue structure (body structure)
Tonsils and adenoids	TS	303337002	Tonsil and adenoid structure (body structure)
Tooth gum and supporting structures of the tooth	TH	362102006	All teeth, gums and supporting structures (body structure)
Trachea	TR	44567001	Tracheal structure (body structure)

Specimen Source Sites

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Accessory sinus	19	120228005	Paranasal sinus part (body structure)
Adrenal gland	83	23451007	Adrenal structure (body structure)
Anus	55	53505006	Anal structure (body structure)
Appendix	52	66754008	Appendix structure (body structure)
Bile and pancreatic fluid	45	C0541696	Bile and pancreatic fluid
Blood	6	87612001	Blood (substance)
Blood vessel	34	59820001	Blood vessel structure (body structure)
Bone	8	272673000	Bone structure (body structure)
Bone marrow	4	14016003	Bone marrow structure (body structure)
Brain	88	12738006	Brain structure (body structure)
Breast	2	76752008	Breast structure (body structure)
Bronchial fluid	28	258446004	Bronchial fluid sample (specimen)
Bronchiole	24	55214000	Bronchiole structure (body structure)
Bronchus	23	955009	Bronchial structure (body structure)
Cardiac valve	32	17401000	Cardiac valve structure (body structure)
Cervix	74	71252005	Cervix uteri structure (body structure)
Colon	53	71854001	Colon structure (body structure)
Cranial spinal & peripheral nerve	90	25087005	Structure of nervous system (body structure)
CSF (cerebrospinal fluid)	86	65216001	Cerebrospinal fluid (substance)
Ear and mastoid cells	92	110708006	Middle ear and mastoid cells (body structure)
Endometrium	75	2739003	Endometrial structure (body structure)
Epididymis vas deferens spermatic cord and scrotum	68	110887005	Epididymis, vas deferens, spermatic cord and scrotum (combined site) (body structure)
Epiglottis and larynx	21	110547006	Epiglottis and larynx (combined site) (body structure)
Esophagus	48	32849002	Esophageal structure (body structure)
Extrahepatic bile duct	42	16014003	Extrahepatic duct structure (body structure)
Eye and ear appendages	91	PHC4	Eye and ear appendages
Fallopian tube broad ligament parametrium and paraovarian region	77	110850002	Fallopian tube, broad ligament, parametrium and paraovarian region (combined site) (body structure)
Female genital fluids	79	50473004	Female genital fluid (substance)
Fetus and embryo	81	C0230999	Fetus and embryo

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Gallbladder	41	28231008	Gallbladder structure (body structure)
Gastric aspirate	56	168137004	Gastric aspirate sample (specimen)
Gastrointestinal contents (feces)	57	39477002	Feces (substance)
Heart	31	80891009	Heart structure (body structure)
Joints (synovial tissue)	16	88928006	Structure of synovial tissue of joint (body structure)
Kidney	60	64033007	Kidney structure (body structure)
Ligament and fascia	15	91684004	Structure of ligament AND/OR fascia (body structure)
Lip	36	48477009	Lip structure (body structure)
Liver	40	10200004	Liver structure (body structure)
Lung	25	39607008	Lung structure (body structure)
Lymph node	7	59441001	Structure of lymph node (body structure)
Male genital fluids	70	23378005	Male genital fluid (substance)
Meninges dural sinus choroid plexus	87	PHC8	Meninges, dural sinus, choroid plexus
Milk	3	226789007	Breast milk (substance)
Mouth	35	123851003	Mouth region structure (body structure)
Multiple Sites	95	PHC6	Multiple Body Sites
Myometrium	76	27232003	Myometrial structure (body structure)
Nasopharynx	20	71836000	Nasopharyngeal structure (body structure)
Nose	18	45206002	Nasal structure (body structure)
Omentum and peritoneum	58	PHC7	Omentum and peritoneum
Other	94	OTH	Other anatomic site
Ovary	78	15497006	Ovarian structure (body structure)
Pancreas	43	15776009	Pancreatic structure (body structure)
Penis	65	18911002	Penile structure (body structure)
Pericardial fluid	33	34429004	Pericardial fluid (substance)
Pericardium	30	76848001	Pericardial structure (body structure)
Peritoneal fluid	59	409614007	Peritoneal fluid (substance)
Pharynx oropharynx and hypopharynx	46	54066008	Pharyngeal structure (body structure)
Pituitary gland	82	56329008	Pituitary structure (body structure)
Placenta umbilical cord and implantation site	80	110973009	Placenta, umbilical cord and implantation site (combined site) (body structure)
Pleura	26	3120008	Pleural membrane structure (body structure)

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Pleural fluid	29	2778004	Pleural fluid (substance)
Prostate and seminal vesicle	66	110651000	Prostate and seminal vesicle (combined site) (body structure)
Pus	93	11311000	Pus (substance)
Rectum	54	34402009	Rectum structure (body structure)
Renal pelvis	61	25990002	Renal pelvis structure (body structure)
Saliva	44	256897009	Saliva (substance)
Salivary gland	39	385294005	Salivary gland structure (body structure)
Skeletal system (bones of head rib cage and vertebral column)	9	PHC12	Skeletal system - Bones of head, rib cage and vertebral column
Skeletal system (bones of shoulder girdle pelvis and extremities)	10	PHC11	Skeletal system - Bones of shoulder, girdle, pelvis and extremities
Skin and skin appendages	0	39937001	Skin structure (body structure)
Small intestine - duodenum	50	38848004	Duodenal structure (body structure)
Small intestine - jejunum & ileum	51	110611003	Jejunum and ileum (combined site) (body structure)
Soft tissue	11	181607009	Soft tissue (navigational concept)
Soft tissue (muscles of head neck mouth and upper extremity)	12	PHC10	Soft tissue - Muscles of head, neck, mouth and upper extremity
Soft tissue (muscles of trunk perineum and lower extremity)	13	PHC9	Soft tissue - Muscles of trunk, perineum and lower extremity
Spinal cord	89	2748008	Spinal cord structure (body structure)
Spleen	5	78961009	Splenic structure (body structure)
Sputum	96	119334006	Sputum specimen (specimen)
Stomach	49	69695003	Stomach structure (body structure)
Subcutaneous tissue	1	71966008	Subcutaneous tissue structure (body structure)
Synovial fluid	17	6085005	Synovial fluid (substance)
Tendon and tendon sheath	14	59863003	Tendon and/or tendon sheath structure (body structure)
Testis	67	40689003	Testis structure (body structure)
Thymus	85	9875009	Thymus gland structure (body structure)
Thyroid or parathyroid gland(s)	84	297261005	Thyroid and/or parathyroid structures (body structure)
Tongue	37	21974007	Tongue structure (body structure)
Tonsils and adenoids	47	303337002	Tonsil and adenoid structure (body structure)

NTSS Concept Name	NTSS Alternate Code	HL7 Concept Code	HL7 Concept Name
Tooth gum and supporting structures of the tooth	38	362102006	All teeth, gums and supporting structures (body structure)
Trachea	22	44567001	Tracheal structure (body structure)
Unknown	99	UNK	unknown
Upper respiratory fluids	27	72869002	Upper respiratory fluids (substance)
Ureter	62	87953007	Ureteric structure (body structure)
Urethra	64	13648007	Urethral structure (body structure)
Urinary bladder	63	89837001	Urinary bladder structure (body structure)
Urine	69	78014005	Urine (substance)
Uterus	73	35039007	Uterine structure (body structure)
Vagina	72	76784001	Vaginal structure (body structure)
Vulva labia clitoris and Bartholin's gland	71	110888000	Vulva, labia, clitoris and Bartholin's gland (combined site) (body structure)

Appendix J —
Glossary

Term	Definition
Acid-fast bacilli (AFB)	Microorganisms that when stained, retain color even after they have been washed in an acid solution; may be detected under a microscope in a stained smear.
Active case finding	Looking for undiagnosed cases by screening a population.
Adherence to treatment	Following the recommended course of treatment by taking all the prescribed medications for the entire length of time necessary.
Adverse effect	Negative side effect resulting from the use of a drug (for example, hepatitis, nausea, rash).
Bronchoscopy	A procedure used to obtain pulmonary secretions or lung tissue with an instrument called a bronchoscope.
Case management	A system in which a specific health department employee is assigned primary responsibility for the patient, systematic regular review of patient progress is conducted, and plans are made to address any barriers to adherence.
Case rate	The number of cases that occur during a certain time period, divided by the size of the population during that time period; the case rate is often expressed in terms of a population size of 100,000 persons.
Case reporting	Informing the state or local health department when a new possible or confirmed case (an occurrence) of TB disease has been diagnosed.
Cavity	A hollow space within the lung, visible on a chest radiograph or CT scan.
Clinical evaluation	An evaluation done to find out whether a patient has symptoms of TB disease or is responding to treatment; also done to check for adverse reaction to TB medications.
Clinician	A physician, physician's assistant, or nurse/nurse practitioner.
Congregate setting	A setting in which a group of usually unrelated persons reside in close physical proximity. These settings may include long-term care facilities, assisted living facilities, correctional facilities, or homeless shelters (see residential facilities).
Contact investigation	A procedure for interviewing a person who has TB disease to determine who may have been exposed to TB. People who have been exposed to a person with TB are located and tested for TB infection and TB disease, and treated if indicated.
Contacts	People exposed to someone with TB disease, generally including family members, roommates or housemates, close friends, coworkers, classmates, and others.
Country of birth	The country where a person was born.
Culture	To grow organisms in or on media (substances containing nutrients) so that they can be identified.
Daily regimen	A treatment schedule in which the patient takes a dose of each prescribed medication every day.

Term	Definition
Diabetes mellitus	A disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood and urine. See detailed diagnostic criteria for diabetes elsewhere in this manual.
Diagnostic evaluation	An evaluation used to diagnose TB disease; includes a medical history, a chest radiograph, the collection of specimens for bacteriologic examination, and possibly a tuberculin skin test or an interferon-gamma release assay.
Directly observed therapy (DOT)	Where a designated health care worker watches the person with TB swallow each dose of the prescribed drugs.
Drug susceptibility test	A laboratory method for detecting drug-resistant microorganisms.
Drug-resistant TB	TB caused by organisms that are able to grow in the presence of a particular drug; TB that is resistant to at least one first-line antituberculosis drug.
End-stage renal disease (ESRD)	A condition when chronic kidney failure has progressed to the point where kidney function is less than 10% of normal; requires dialysis or transplantation; also known as stage 5 chronic kidney disease. The most common cause of ESRD in the United States is diabetes.
Epidemiologically linked	The patient has had contact with one or more persons who have/had TB disease or have been exposed to a point source of infection (i.e., a single source of infection, such as an event or location where one or more patients had a confirmed case of TB disease). Transmission of *M. tuberculosis* complex by the usual modes of transmission, e.g., aerosol, is plausible. A case may be considered epidemiologically linked to a laboratory-confirmed case if at least one case in the chain of transmission is laboratory confirmed.
Ethambutol (EMB)	A drug used to treat TB disease; may cause vision problems. Ethambutol should be used cautiously in children who are too young to be monitored for changes in their vision.
Extrapulmonary TB	TB disease that occurs in places other than the lungs, such as the lymph nodes, the pleura, the brain, the kidneys, or the bones; most types of extrapulmonary TB are not infectious.
First-line TB drugs	The initial drugs typically used for treating TB disease. Includes isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB).
HIV	Human immunodeficiency virus, the virus that causes AIDS.
Immunosuppressive therapy	Therapy that suppresses or weakens the immune system.
Interferon-gamma (IFN-γ)	Protein that is normally produced by the body in response to infection.
Interferon-gamma release assay (IGRA)	A type of blood test that measures a person's immune reactivity to *M. tuberculosis* by measuring release of IFN-γ. In the U.S., QuantiFERON®-TB Gold, QuantiFERON®-TB Gold In-Tube, QuantiFERON®-TB Plus and T-SPOT®.TB are currently available IGRAs.
Isolate	A sample from a specimen that was identified as a certain organism such as *M. tuberculosis* complex.
Isoniazid (INH)	A drug that is used for treating LTBI and one of the drugs used to treat TB disease; although relatively safe, it may cause hepatitis and other severe adverse reaction in some patients.

Term	Definition
Latent TB infection (LTBI)	Refers to the condition when a person is infected with tubercle bacilli, but TB disease has not developed. Persons with LTBI do not have TB disease symptoms and they cannot spread TB to others. Persons with LTBI usually have a positive result to the Mantoux tuberculin skin test or an interferon-gamma release assay.
LTBI treatment	Medication that is given to people who have latent TB infection to prevent them from developing TB disease.
Mantoux tuberculin skin test (TST)	A method of testing for TB infection; a needle and syringe are used to inject 0.1 ml of 5 tuberculin units of liquid tuberculin between the layers of the skin (intradermally), usually on the forearm; the reaction to this test, sometimes a palpable swollen area (induration), is measured 48 to 72 hours after TST placement and is interpreted as positive or negative depending on the size of the induration in millimeters (mm) and the patient's risk factors for TB.
Miliary TB	Miliary TB is a serious type of tuberculosis infection. It is a histological or radiologic finding, rather than a site of disease. It appears on radiographs as a great number of small, well-defined nodules that look like millet seeds scattered throughout the lungs, hence the name "miliary."
Multidrug-resistant TB (MDR TB)	Resistant to at least the drugs isoniazid and rifampin; MDR TB is more difficult to treat than drug-susceptible TB.
Mycobacterium tuberculosis	One of the organisms causing TB in humans, and sometimes called the tubercle bacillus; belongs to a group of bacteria called mycobacteria.
***Mycobacterium tuberculosis* complex**	A group of closely related mycobacteria that can cause TB (e.g., *M. tuberculosis*, *M. bovis*, *M. africanum*). Most TB in the United States is caused by *M. tuberculosis*.
NEDSS/HL-7	National Electronic Disease Surveillance System (NEDSS)/Health Level 7 (HL-7)
Non-U.S.–born persons	Persons who are not eligible for U.S. citizenship at birth, regardless of the actual country of birth (formerly called "foreign-born").
Nucleic acid amplification (NAA)	A technique that amplifies (copies) DNA or RNA segments, in order to directly identify microorganisms in clinical specimens.
Possible TB case	A high index of suspicion for active TB (e.g., a known contact to an active TB case or to a person with signs or symptoms consistent with TB) who is currently under evaluation for TB disease. Also referred to as "Suspected" in some surveillance data systems.
pre-XDR TB	Pre-extensively drug-resistant TB. The occurrence of TB in persons whose *M. tuberculosis* isolates are resistant to isoniazid, rifampin, and a fluroquinolone OR whose *M. tuberculosis* isolates are resistant to isoniazid, rifampin, and a second-line injectable (amikacin, capreomycin, and kanamycin).
Pulmonary TB	TB disease that occurs in the lungs, typically causing a cough and an abnormal chest radiograph. Pulmonary TB is usually infectious if untreated. Most TB cases reported in the United States are pulmonary TB.

Term	Definition
Pyridoxine	Another name for vitamin B6; it is given to prevent peripheral neuropathy; should always be given to pregnant and breastfeeding women on isoniazid.
Recurrence	A patient who has either a • Negative culture result while receiving TB treatment, but at some point after therapy is completed, either the culture result becomes positive for *M. tuberculosis* again or the patient has clinical or radiologic deterioration that is consistent with TB disease, **or**
	• Negative smear and culture result (e.g., clinical case) at diagnosis and while receiving TB treatment, but at some point after therapy is completed, either the patient has a culture result that is positive for *M. tuberculosis* or has clinical or radiologic deterioration that is consistent with TB disease.
Rifamate	A combination of isoniazid (INH) and rifampin (RIF); used to treat TB disease or LTBI
Rifater	A combination of isoniazid (INH), rifampin (RIF), and pyrazinamide (PZA); used to treat TB disease or LTBI
Rifabutin	A drug used as a substitute for rifampin (RIF) in the treatment of TB disease and LTBI.
Rifampin (RIF)	A drug used to treat TB disease and LTBI.
Rifapentine	A drug used to treat TB disease and LTBI.
Second-line TB drugs	Drugs used to treat TB that is resistant to first-line TB drugs (e.g., capreomycin, ethionamide, cycloserine, ciprofloxacin, amikacin).
Smear	A specimen that has been smeared onto a glass slide, stained, washed in an acid solution, and then placed under the microscope for examination; used to detect acid-fast bacilli in a specimen.
Specimen	A sample collected from a person for testing.
Sputum	Phlegm from deep in the lungs, collected in a sterile container for processing and examination.
Susceptibility	An organism's ability to be killed by a particular drug.
TB disease	An illness, caused by bacteria called *Mycobacterium tuberculosis*, in which tuberculosis (TB) bacteria are multiplying and attacking parts of the body, most commonly the lungs. A person with TB disease is capable of spreading the disease to others if the TB bacteria are active in the lungs or throat. The symptoms of TB disease include weakness, weight loss, fever, no appetite, chills, and sweating at night. Other symptoms may include a bad cough, pain in the chest, and coughing up blood.
XDR TB	Extensively drug-resistant TB. The occurrence of TB in persons whose *M. tuberculosis* isolates are resistant to isoniazid, rifampin, a fluroquinolone, and a second-line injectable (amikacin, capreomycin, and kanamycin) OR whose *M. tuberculosis* isolates are resistant to isoniazid, rifampin, a fluroquinolone, and bedaquiline or linezolid.