Improving Quality of Patient Data for Treatment of Multidrug- or Rifampin-Resistant Tuberculosis

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International policy for treatment of multidrug- and rifampin-resistant tuberculosis (MDR/RR TB) relies largely on individual patient data (IPD) from observational studies of patients treated under routine conditions. We prepared guidance on which data to collect and what measures could improve consistency and utility for future evidence-based recommendations. We highlight critical stages in data collection at which improvements to uniformity, accuracy, and completeness could add value to IPD quality. Through a repetitive development process, we suggest essential patient- and treatment-related characteristics that should be collected by prospective contributors of observational IPD in MDR/RR TB.

The treatment of multidrug- and rifampin-resistant tuberculosis (MDR/RR TB) is complex. Treatment requires a combination of multiple agents and often needs to be individualized, taking numerous considerations into account (*1*,*2*). Patients may have different concurrent conditions, such as HIV infection or diabetes; furthermore, the disease may vary in terms of extent, both in the lungs themselves (i.e., through presence of lung cavitation, bilateral disease, or both) and in other extrapulmonary sites (*2*). The pattern of additional resistances to other key agents used in second-line TB regimens may differ, depending on previous treatment received by the individual patient (either first-line or second-line medicines) and the epidemiologic setting (*3*,*4*). In different centers, the protocol for microbiologic monitoring may vary from none to monthly sputum smear microscopy and cultures with periodic drug-susceptibility testing during treatment, which, at times, continues after successful treatment to detect recurrence (*2*). The treatment given may be affected by the experience and expertise of the healthcare providers, as well as the cost of medicines and their availability (*5*). The use of adjunct therapies such as surgery (*6*), hospitalization, and patient support for treatment adherence (*7*), such as patient-centered directly observed therapy (DOT), also varies by program. The occurrence of adverse drug reactions to second-line TB drugs is common (*1*,*8*) and may be managed differently in different settings, particularly the permanent withdrawal of certain agents. All those factors result in wide variation in patient management and outcomes.

There is a shortage of high-quality randomized controlled trial (RCT) data for MDR/RR TB drugs (*9*), and currently available evidence is not adequately powered for patient outcomes *(10–14*). Although several notable RCTs evaluating standardized treatments are in the pipeline (*15*), no single regimen is likely to address the entire spectrum of clinical features that patients with MDR/RR TB have. This disease will largely require different treatment approaches individualized to the specific characteristics of the patient and the drug susceptibility profile of the strain.

Until the results of RCTs become available, new evidence for treatment of MDR/RR TB must be derived largely from observational studies. More than 150,000 MDR/RR TB patients initiate therapy each year worldwide, representing a wealth of potential data (*16*). These patients have an enormous diversity of clinical characteristics, many (e.g., pregnant women) are underrepresented in RCTs, and they are treated with widely varying regimens within health systems with different resources and capacities (*17*). This reflects the various scenarios in which global recommendations made by the World Health Orga-

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nization (WHO) are expected to be applied and thus observational data can play a critical role in recommendation development.

Still, potential problems exist with use of observational data. The greatest are the potential for different forms of confounding and bias (*18*,*19*). This can be mitigated, at least partially, by careful adjustment for the many potential confounding factors, including age, prior treatment history, extent of drug resistance and disease, concurrent conditions, and treatment response (*2*). Adequate adjustment for confounders necessitates that information is accurately recorded for all patients treated, which is often not the case; missing data represents a second major potential limitation of observational data. Certain information may be missing for all patients in some centers, which could be the result of lack of capacity (e.g., radiography findings are missing because chest radiographs are not accessible) or the required information never being gathered or reported. Alternatively, other key data on determinants of patient outcomes, such as frequency and timing of regimen change, may be variably collected across studies. This may be caused by differences in the monitoring schedules, the data collection systems, and the medications used between studies and over time. At times, data collection may be directly related to determinants of outcome (e.g., length of QT-interval is more carefully measured and recorded in patients with multiple risks for cardiotoxicity) and can lead to measurement or ascertainment biases that are difficult to detect or mitigate appropriately.

Despite those problems, various studies have collected and pooled observational data, enabling individual patient meta-analyses (IPD-MAs). Since 2010, when WHO and other organizations started using GRADE for drug-resistant TB treatment guidelines (*20*), WHO recommendations on the type, composition, and duration of second-line TB regimens have been based largely on evidence from observational studies of patients treated under field conditions (*21*–*25*). Ahead of the WHO MDR/RR TB guideline update in 2018, a public call was made for contributors to report IPD conforming to certain criteria and a specific data dictionary (*26*). This call permitted including more recent programmatic data that may have never been published, increasing the breadth and relevance of the information available for study.

Overall, well-gathered, carefully documented, and complete observational datasets represent a valuable resource for assessing treatment regimens in MDR/RR TB. If efforts are made to safeguard the uniformity and quality of these data in terms of accuracy, consistency, and completeness, it is possible to accrue sufficient information for large numbers patients treated for MDR/RR TB each year, and to generate evidence within 1–2 years to address critical questions, such as the optimal duration of the newly recommended all-oral MDR/RR TB regimen and the safety profile of new drugs (*1*). In response to our experiences with IPD management and analysis, most recently to update the WHO MDR/RR TB treatment recommendations in 2018 and 2019, and recognizing the urgent need for guidance, this article highlights how to improve the quality and completeness of future IPD for MDR/RR TB and provide guidance for researchers in other disease areas facing similar problems (*27*–*30*).

Aim and Scope of Guidance

Improving the completeness and quality of routinely collected data represents a relatively small marginal cost after all other expenditures incurred during care of patients with MDR/RR TB (*31*). Consolidating routinely reported data into high quality observational datasets and pooling these to perform multicentric IPD-MAs is a very attractive option to inform future MDR/RR TB treatment guidelines in the coming years, building on a proven track record (*2*,*21*–*23*,*32*–*34*).

The content of this guidance is meant for coordinators of MDR/RR TB treatment who intend to share their experience in patient care to the benefit of national and global treatment policy following several data-sharing principles (Table 1). This guidance is intended to instruct potential contributors on the utility of their potential observational IPD and aid them in subscribing to key quality and completeness measures to create a database with high quality IPD composed of key variables on patient demographics, clinical characteristics, treatment details and covariates, as well as treatment outcomes in MDR/RR TB patients, and contributing the IPD to a pooled data repository that can be shared internationally to allow for analysis that will inform future evidence-based treatment guidelines.

The guidance in this article was developed by 3 staff members of the WHO Global TB Programme (D.F., E.J., F.M.) involved in numerous iterations of the WHO MDR/RR TB guidelines and 5 methodologists, TB clinicians, and evidence reviewers (J.R.C., G.B.M., C.D.M., N.N., D.M.) involved in these and other guidelines. Four cycles of revisions took place, with successive discussions on key variables to collect, standardization of variable collection, and practical measures to suggest for completeness and quality. Although no one else was involved in writing the guidance, we acknowledge that we have benefited from the contribution and collective experience of

Table 1. Data-sharing principles for contributors of IPD for MDR/RR TB*

Principle	Additional notes
Data contributed to the IPD should be coded to remove identifying information.	• All names, the date of birth, address, telephone number, and other easily identifying personal information must be removed (e.g., national identification or health insurance numbers). • Each participant contributed should be recoded with a new IPD identification number that is mapped to the original identification number retained by the contributing investigator, group, or program. • Dates of events (e.g., treatment start, cultures, medication changes) should be retained in the sent participant data file. • Other local rules for encoding and other data protection measures should be followed.
The contributing investigator, group, or program retains ownership of the data and should have permission to share them.	• The transfer of data for use in guideline development or other projects does not constitute transfer of ownership. • Data contributors are free to withdraw their data at any time. • Data must be contributed only if they are permitted by programs or donor agencies. • A data-sharing agreement will specify the details of the transfer of data; an example of a starting point for these data-sharing agreements is contained in the Appendix (https://wwwnc.cdc.gov/EID/article/26/3/19-0997-App1.pdf).
All transfers of data must clear ethics review.	• The institutional review board responsible for the bioethics of each contributed dataset should approve that the data can be shared. • All anticipated uses of the data should be reviewed and approved by the institutional review board.
All uses of data are subject to oversight by the collaborative group.	• Ideally 1 individual is designated to liaise with the rest of the contributors of IPD to approve or deny use of their data for current or future analyses and be part of the oversight committee. • The oversight committee reviews proposals for data use and sharing of data.
All data are held centrally in a secure data repository.	• The IPD used for the development of MDR/RR TB treatment guidelines for the WHO and other entities has been held securely by the MUHC under Dick Menzies since 2010. • The MUHC (now a WHO Collaborating Center) is expected to retain these responsibilities, pending approval of the oversight committee. • Use of data held in this repository follows these principles, with bioethics approval and conforming to the current data sharing agreements signed.

*IPD, individual patient data; MDR, multidrug-resistant; MUHC, McGill University Health Centre; RR, rifampin-resistant; TB, tuberculosis; WHO, World Health Organization.

many data contributors who provided data in the past and are acknowledged in publications of IPD-MA (*2*,*21*–*23*,*26*,*32*–*34*).

The Requirements for Observational Data

Several requirements exist to contributions of patient data. The first requirement is that the data are collected at centers that have the capacity to adequately gather the key information on all patients treated for MDR/RR TB. Centers should also have access to quality-assured medications in sufficient variety that they can treat patients with different drug susceptibility patterns. The centers should have adequate laboratory facilities to enable repeated microbiological testing throughout treatment, including initial and repeated drug susceptibility testing (DST) for all second-line TB medicines used at that center. Center staff should develop internal quality assurance protocols and participate in external laboratory assessment programs to uphold the validity of their laboratory testing (*35*,*36*). These measures limit spurious conclusions being drawn about the influence of a medicine on outcomes resulting from exposure to ineffectual medication. The second requirement is that the program treats a relatively large number of patients with diverse demographic, clinical, and treatment characteristics. This policy avoids having patient series that are extreme outliers to the usual practice in a given setting. Nationwide representativeness is not to be expected, but reports of small patient series (e.g., <25) may be extreme outliers and may present challenges to pooling with other records for IPD-MA. However, we encourage reports of any size on subpopulations with limited available data, such as persons with extrapulmonary MDR/RR TB, pregnant women, children, and vulnerable populations. Finally, the

Table 2. Suggested steps to improve the accuracy and completeness of observational IPD*

Suggested steps	Additional notes
Persons responsible for capture and entry of data into electronic databases should be appropriately trained.	• This includes obtaining a certificate in good clinical practice and training around the importance of confidentiality. • This also includes training on the basics of MDR/RR TB, relevant national guidelines, what to collect, how to collect it, and the importance of accuracy in the capture of data. • These principles can be reinforced with detailed guidance for data capture and the definitions of the variables collected at the point of capture (e.g., within the electronic system or within a document kept where data are captured).
Quality control measures (e.g., data safeguards) should be implemented to prevent implausible or "out-of-range" entries.	• A warning can be implemented for continuous variables falling outside plausible ranges (e.g., age outside 0–99 y). • Drop-down lists can be created to reduce/remove need for free form data entry (e.g., including the most common extrapulmonary TB sites within the dropdown or limiting responses for HIV co-infection status to positive, negative, or not tested). • Safeguards can be logical, which prevents certain data from being entered without a specific response in another section (e.g., CD4 and viral load cannot be filled in unless HIV co-infection status is positive).
Supervisors should have a standard quality assurance routine (e.g., perform routine follow-up for data accuracy of collected information).	• Supervisors should have simple algorithms developed to detect implausible information that defies inbuilt measures (e.g., patients reported to be receiving a medicine to which results from drug susceptibility testing show resistance). • Complete checks should be run on at least 10% of records independently via dual extraction. These checks should be performed regularly and assessed by a supervisor with the goal of 95% accuracy. • Corrective steps should be taken (e.g., further training, more comprehensive or routine checks of variables) when accuracy of data collection is an issue.
Concurrent checks for data completeness should be performed with assessments of accuracy.	• Reminders can be developed that automatically signal that certain variables are not completed each time a patient record is updated. • In addition, preventing the "finalization" of a patient file until all variables are entered can be implemented—however, files should still be permitted to be saved, and other files opened and populated while patient files await finalization. • Completeness of data is of utmost importance—high frequency of absence of certain information may necessitate exclusion of entire datasets from particular analyses for which these data are required.

*IPD, individual patient data; MDR, multidrug-resistant; RR, rifampin-resistant; TB, tuberculosis.

center must adopt a quality-assured methodology for the study parameters and organization of data and respect ethics norms and standards for data collection, management, and use of data for research. This necessitates that the clinical data be entered in electronic format. Infrastructure must be in place to support electronic data collection, and personnel who are motivated and trained in data collection must be available. When possible, cross-checks should be performed between this electronic system and national vital statistics and laboratory registries, which provide information on long-term patient disposition.

Data Capture: Ensuring Accuracy and Completeness

Several practical measures should be undertaken to ensure that data are captured optimally. Upstream of the collection of data, efforts should be made to ensure the quality of these data, including quality assurance of diagnostic work and verification of patient demographic and clinical information with medical histories.

Transcription of data between systems (e.g., from a paper treatment card to an electronic database) is an eminent source of error. Many settings now have the capability to create an electronic medical record at the first encounter with the patient and access it again to prospectively update the details, either at subsequent patient visits or directly from the laboratory. The widespread availability of internet and desktop computers, laptops, tablets, or smartphones makes this feasible in many settings. This practice would have the advantages of improved completeness of patient files and avoidance of transcription and recall errors

when compared with other retrospective practices in data collection, such as periodic transfer of data from a paper treatment record during treatment, or after the treatment episode is completed. Within the electronic record system, anonymization procedures to limit the accidental disclosure of sensitive data are necessary. Various quality control measures can be built in to alert the user when implausible, inconsistent, or "out-of-range"/nonstandardized values are entered, or if data are missing, prompting checks and corrections as necessary (Table 2). Finally, the database architecture of the health information system needs to allow for information from patient follow-up encounters to link up seamlessly to those of the initial record of the patient. A unique key in an electronic dataset limits the risk of duplicate records and avoids the need to re-enter identifiers of the patient and health center at each review. Many different packages have been successfully employed for this purpose, including open-source packages that bear no license fees for use and allow customization (*37*).

Description of Data Elements

This section highlights key items to capture within an electronic register (or database) for use in national or global analyses. The electronic medical record may contain other valuable information for programmatic management and policy making, such as health-related quality of life measurements, which may be of interest to programs, but which have not traditionally been used in analyses to date. The variables to be collected are those that are necessary to assess exposure (e.g., drugs, duration), potential confounders (e.g., concurrent conditions, resistance), response to treatment (e.g., microbiology, molecular biology, clinical signs and symptoms, and radiograph results), and adverse events (AEs). They also need to gather information that will be used to adjust observed effects by patient strata (e.g., by age, previous treatment history, or disease extent). A data dictionary defining variables and their preferred coding format is contained in the Appendix (http://wwwnc.cdc.gov/EID/article/26/3/19-0997-App1.pdf; the most up-to-date version of this data dictionary and accompanying tools and explanations are held at https://www.mcgill.ca/tb/projects/mdr-tb-ipd-project). This list of variables is what is optimally preferred and what contributors should strive for; however, if certain data elements are missing from a patient series, the records may still be useful for specific analyses of safety or effectiveness. Further included in the Appendix are standard abbreviations for TB and antiretroviral drugs, standard system organ classes for AEs (*38*), and standardized definitions for patient outcomes (*39*,*40*). We discuss variables that require further elaboration in the subsequent sections.

Initial (Baseline/Pretreatment)

Several baseline/pretreatment factors exist that affect the prognosis of patients with MDR/RR TB. Apart from typical demographic characteristics, complete collection of information on patients' habits and concurrent conditions is essential, as the true effect that many of these factors have on treatment outcomes is uncertain. Collection of CD4 counts, viral load, and antiretroviral therapy regimens in HIV-infected persons is essential; additional information on hepatitis B/C status, diabetes mellitus, and mental health disorders may also be useful. Although universally accepted definitions for smoking exist (*41*), this is not the case for alcohol consumption; contributors are encouraged to closely collect the alcohol-related variables in the data dictionary. The occurrence of cavitation and bilateral pulmonary disease is key to a better understanding of their effect on patient outcomes and to the classification of extent of disease. However, recording of radiologic findings in pulmonary MDR/RR TB is not standardized between reporting centers and at times data are missing. For microbiological and DST results, several factors may compromise a program's ability to collect a sample exactly at treatment start. We suggest that baseline tests should be included only if they are performed on samples collected within 3 months before, or 1 month after, start of treatment. DST results should be reported for rifampin and for every medicine used in the regimen for which a WHO-approved laboratory method exists.

Treatment and Follow-Up Information

All measures that are repeated throughout treatment to inform treatment decisions and those that could affect treatment outcomes should be collected. It is perhaps most crucial to completely and accurately collect information regarding treatment type, duration, and composition. According to current standards, shorter MDR/RR TB regimens are those intended to last for $\leq$12 months, whereas longer regimens are intended to last for $\geq$18 months (*1*). Details for patients who had to transition from shorter to longer regimens must be reported. For each drug used in the regimen, ideally the day the drug was introduced into the regimen and the day the drug was permanently withdrawn (e.g., because of provider or patient decision or an adverse event) should be recorded. In programs in which this is not possible, new data elements can be added to the dictionary that would capture the patient's regimen

every 1–2 months, using standard abbreviations (Appendix). Adherence support, either in the form of in-person observation or with digital tools, is a common component of MDR/RR TB treatment. Data should be collected regarding its use and frequency. The data dictionary contains variables to record monthly follow-up sputum samples for smear microscopy and culture, with collection of culture results prioritized (*1*,*42*). Programs may also opt to simply report the date when each sputum sample was taken and the accompanying smear and culture result. Regardless of reporting choice, all results obtained should be recorded. Reporting of repeated DST is essential to detect acquired resistances; changes in the resistance patterns must be reported. Only thoracic surgery performed as an adjunctive therapy for MDR/RR TB should be reported.

The reporting of AEs in TB patients is highly valuable, but is often difficult to standardize. AEs of mild and moderate severity are very frequent in patients on TB treatment (*1*,*8*); including all of them in the IPD would be excessive. The AEs that should be entered and reported are drug-related AEs that are considered serious (*43*) or cases in which an agent is stopped for >48 hours by the provider because of a suspected or confirmed drug-related AE. In addition, information about whether the suspected or responsible agent is subsequently stopped permanently should be provided. Data in the "adverse event information" section should also be completed in the case of death that is suspected or confirmed to be drug-related. Characteristics of the AE that should be reported include the system or organ class affected, the agent(s) considered responsible, the severity, and the outcome. The severity should be graded using international standards, such as those of the National Cancer Institute (*44*) or other recommended scales (*43*,*45*). Centers may develop their own resources for the investigation and management of common AEs (e.g., by adapting the contents of manuals [*46*]).

Treatment Outcomes

End-of-treatment outcomes must be specified according to WHO standards to ensure uniformity. The set of definitions used must be specified, with preference currently given to 2013 criteria (*1*). Ideally, endpoint assignment would be systematically verified. Culture conversion (defined as the date of the first negative culture, when ≥2 consecutive cultures, ≥28 days apart, are negative) and culture reversion (defined as the date of the first positive culture, when ≥2 consecutive cultures, ≥28 days apart, are positive after culture conversion) should be reported (*1*). Recurrence (because of true relapse or reinfection) information is valuable but scarce and difficult to collect because it requires follow-up after completion of treatment. The possibility to distinguish true relapses from a new infection among recurrences requires genotyping or sequencing that, to date, is done only in specialized laboratories, limiting its use in routine care (*47*). Monitoring patients for ≥12 months after successful completion of treatment would provide valuable information. If recurrence is monitored and reported, the exact duration of follow-up must be specified.

Discussion

We present a framework for observational data collection outlining key variables to collect to ensure uniformity in global MDR/RR TB patient data and provide practical measures to be taken to ensure data quality and completeness. National or regional TB programs, as well as operational research projects, patient series from a tertiary hospital, and other projects, could contribute their observational data through adoption of this guidance. However, wholesale adoption, especially by underresourced programs, will require support, in the form of funding and training, from donors, funding agencies, national programs, and others. The demonstrable value of IPD for developing WHO MDR/RR TB treatment guidelines (*1*,*48*,*49*) and continued need for quality IPD to tackle the MDR/RR TB epidemic underscore the importance of providing this support.

The strengths of this guidance are that it draws from our extensive experience in guideline revisions, IPD collection, and IPD-MA. Furthermore, our first-hand experience receiving retrospectively collected data conforming to the data dictionary (*26*) issued during the 2018 revision of the WHO MDR/RR TB guidelines provided valuable insight into barriers to data contribution. These barriers ranged from absence of crucial clinical and patient characteristics that were never recorded (and thus could not be retrospectively obtained) to difficulty in transcribing paper records of already-collected patient data into an electronic format. This guidance should provide motivation to programs to begin prospective data collection in a standardized electronic format, which is conducive to improvements in data completeness and quality. In addition, our experiences during guideline development highlighted key areas in which data were not routinely being collected (e.g., recurrence, acquired drug resistance) and populations for whom data were scarce. This guidance should encourage the collection of such data to help answer pressing questions in these domains and populations.

The primary limitation of this guidance is that it is an initial attempt to improve practices based on experience accumulated for a very particular subtype of patients with TB. The contents of the guidance will necessarily need to evolve to the ever-changing nature of MDR/RR TB treatment and the capacities of programs to adhere to it. Successive revisions will be informed as national TB programs and other end users begin to adopt this guidance and we gain experience receiving the outputs. Finally, certain variables, such as out-of-pocket costs, lost wages, specific toxicity-related measurements (e.g., electrocardiogram, brief peripheral neuropathy screens, audiometry, liver enzymes), emergence of mental health disorders, improvement or deterioration of quality of life, and emergence of AE that are not serious or do not result in medication termination, are not listed within our list of data elements. This information could be useful to patients, clinicians, and programs for specific studies, and thus could be added to local databases with care to avoid overloading data management.

Observational data will continue to play a critical role in the development of global MDR/RR TB treatment guidelines for the foreseeable future. Coordinating efforts to maximize the utility of provider experiences in MDR/RR TB is vital to improve the currently suboptimal outcomes of MDR/RR TB patients. This guidance is one key element toward achieving high-quality, comprehensive observational IPD moving forward.

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Improving Quality of Patient Data for Treatment of Multidrug- or Rifampin-Resistant Tuberculosis

Appendix

Data Dictionary for MDR/RR TB IPD

The tables within this section pertain to the data elements optimally preferred for collection during the conduct of observational studies or in routinely collected programmatic data, along with their requested coding to ensure uniformity across studies. Caveats and additional information on specific elements are contained within the main text of the online report.

Facility Information					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
COUNTRY	Country	Country of the primary source	Char		
TREATING_SITE	Treating Site Name	Name of the primary source	Char		
SITE_ID	Treating Site Identifier	Site ID number	Char		

Patient Identifier and Demographics					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
PATIENT_ID	Patient Identifier	Patient ID number in country database	Char		
YEAR	Year	Year of treatment start for this episode	Num ###		
AGE	Age	Age of the patient in years	Num ###		
SEX	Sex	Patient's biologic sex at birth	Category	F	Female
				M	Male
				U	Unknown
WEIGHT	Weight	Patient's weight in kilograms	Num ###		
HEIGHT	Height	Patient's height in centimeters	Num ###		
BMI	Body Mass Index	Patient's body mass index in kilograms per meters-squared	Num ###		

Patient Baseline Characteristics					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
SMOKINGSTATUS	Smoking Status	The patient's smoking status at start of treatment	Category	Current	Current Smoker
				Ex	Ex-Smoker
				Never	Never Smoker
				U	Unknown
SMOKINGPACKPERDAY	Packs Smoked Per Day	Total number of packs per day smoked at start of treatment (if current smoker)	Num ###		
SMOKINGTOTALPACKYEAR	Total Pack Years	Total number of pack years smoked (if current- or ex-smoker)	Num ###		
ALCOHOL	Alcohol Use	Does the patient drink (defined as ≥1 drink per week in men or women)	Category	Y	Yes
				N	No
				U	Unknown
ALCOHOLABUSE	Alcohol Abuse Disorder	If the patient drinks, do they meet the definition of alcohol abuse (≥14 drinks per week in men or ≥7 drinks per week in women)	Category	Y	Yes
				N	No
				U	Unknown
DM	Diabetes Mellitus	Is the patient diagnosed with diabetes?	Category	Y	Yes
				N	No
				U	Unknown
INSULINDEPENDENT	Type 1 Diabetes Mellitus	Is the patient insulin dependent (if having diabetes)?	Category	Y	Yes
				N	No
				U	Unknown
HBA1C	Hemoglobin A1c Level	Patients HbA1c measure defined in percent (%)	Num ###		
RENALFAILURE	Presence of Renal Failure	Does the patient have renal failure?	Category	Y	Yes
				N	No
				U	Unknown
HEPB	Hepatitis B	Does the patient have hepatitis B?	Category	Y	Yes
				N	No
				U	Unknown
HEPC	Hepatitis C	Does the patient have hepatitis C?	Category	Y	Yes
				N	No
				U	Unknown
OTHERLIVER	Other Liver Condition	Does the patient have liver conditions other than hepatitis B or hepatitis C?	Category	Y	Yes
				N	No
				U	Unknown
HIV	HIV	What is the patient's HIV status?	Category	Pos	Positive
				Neg	Negative
				U	Unknown
HIV_DIAGNOSISYEAR	Year HIV Diagnosed	If the patient is HIV-positive, the year HIV was diagnosed	Num ###		
CD4	CD4 Count	If the patient is HIV-positive, what is their CD4 count at treatment start (cells/μL)?	Num ###		
VIRALLOAD	Viral Load	If the patient is HIV-positive, what is their viral load at treatment start (copies/ml)	Num ###		
ART	Use of Antiretroviral Treatment	If the patient is HIV-positive, are they on antiretroviral treatment?	Category	Y	Yes
				N	No
				U	Unknown
ART_STARTYEAR	Year Antiretroviral Treatment Started	If the patient is on antiretroviral treatment, what year did they start?	Num ###		
ART_REGIMEN	Antiretroviral Treatment Regimen	What is the antiretroviral treatment regimen? List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		

Previous Treatment Information					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
PASTTX	Previous Treatment	Has the patient ever received tuberculosis treatment for >30 d?	Category	Y	Yes
				N	No
RECEIVEDFLD	Previous Treatment with First-Line Drugs	If the patient has received previous tuberculosis treatment, was treatment with first-line drugs given for >30 d?	Category	Y	Yes
				N	No
RECEIVEDSLD	Previous Treatment with Second-Line Drugs	If the patient has received previous tuberculosis treatment, was treatment with second-line drugs given for >30 d?	Category	Y	Yes
				N	No
YEARPASTTX1*	Year of Most Recent Previous Treatment	The year the patient most recently received previous tuberculosis treatment	Num ###		
REGIMENPASTTX1*	Regimen Used for Most Recent Previous Treatment	The drug-regimen given to the patient during the most recent previous tuberculosis treatment. List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
OUTPASTTX1*	End-of-Treatment Outcome for Most Recent Previous Treatment	The end-of-treatment outcome recorded for the patient at the end of their most recent previous tuberculosis treatment.	Category	Cure	Cure
				Complete	Completed Treatment
				Fail	Treatment Failure
				Lost	Lost to Follow-up
				U	Unknown
YEARPASTTX2*	Year of Second-Most Recent Previous Treatment	The year the patient received previous tuberculosis treatment for their second-most recent treatment episode.	Num ###		
REGIMENPASTTX2*	Regimen Used for Second-Most Recent Previous Treatment	The drug-regimen given to the patient during the second-most recent previous tuberculosis treatment. List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
OUTPASTTX2*	End-of-Treatment Outcome for Second-Most Recent Previous Treatment	The end-of-treatment outcome recorded for the patient at the end of their second-most recent previous tuberculosis treatment.	Category	Cure	Cure
				Complete	Completed Treatment
				Fail	Treatment Failure
				Lost	Lost to Follow-up
				U	Unknown
*Fields need to be completed only if previous treatment has been administered.					

Disease Characteristics					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
DISEASE_SITE	Site of Tuberculosis Disease	The site of tuberculosis disease diagnosed in the patient	Category	PTB	Pulmonary TB
				EPTB	Extrapulmonary TB
				Both	Both
EXTRAPULM_SITE	Primary Site of Extrapulmonary Tuberculosis	If extrapulmonary tuberculosis is diagnosed, the primary site affected	Category	Miliary	Miliary TB
				Genital	Genitourinary TB
				CNS	Central Nervous System TB
				Periton	TB Peritonitis
				Pericar	TB Pericarditis
				Lymph	TB Lymphadenitis
				Pleural	Pleural TB
				GI	Gastrointestinal TB
				Bone	Bone TB
				Joint	Joint TB
				Other	Other
CAVITATION_BASE*	Lung Cavitation	Was there presence of lung cavitation on chest x-ray at treatment start?	Category	Y	Yes
				N	No
				U	Unknown
BILATERAL_BASE*	Bilateral Disease	Was there presence of bilateral disease on chest X-ray at treatment start?	Category	Y	Yes
				N	No
				U	Unknown
AFB_BASE	Acid-Fast Bacilli Smear Result	What was the patient's acid-fast bacilli smear result (taken ≤1 mo after treatment start)? Consider all samples taken over this time frame and consider positive if any were positive (i.e., scanty or greater).	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_BASE	Sputum Culture Result	What was the patient's sputum culture result (taken ≤1 mo after treatment start)? Consider all samples taken over this frame and consider positive if any were positive.	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTUREMEDIA	Culture Media Used	If culture was done, what media was used for the result reported?	Category	Solid	Solid Media
				Liquid	Liquid Media
*Baseline refers to any evidence of cavitation or bilateral disease within 30 d of treatment start.					

Genotypic DST					
Field*	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
GENOTYPIC_USED	Genotypic DST Used	Were genotypic DST techniques used?	Category	Y	Yes
				N	No
XPERT_BASE	Gene Xpert Used	Was Gene Xpert used for diagnosis?	Category	Y	Yes
				N	No
DATE_XPERT	Date of Gene Xpert	Date of Gene Xpert used for diagnosis <mm/dd/yy>	Date		
XPERT_MTBRESULT_BASE	Gene Xpert MTB Result	What was the result for MTB on Gene Xpert?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
XPERT_RIFRESULT_BASE	Gene Xpert Rifampin Resistance Result	What was the result for rifampin resistance on Gene Xpert?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
FIRSTLINE_LPA_BASE	First-Line LPA Used	Was first-line LPA used after TB diagnosis?	Category	Y	Yes
				N	No
DATE_FIRSTLINE_LPA	Date of First-Line LPA	Date of first-line LPA used after TB diagnosis <mm/dd/yy>	Date		
FIRSTLINE_LPA_MTB_BASE	First-Line LPA MTB Result	What was the result for MTB on first-line LPA?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
FIRSTLINE_LPA_H_BASE	First-Line LPA Isoniazid Resistance Result	What was the result for isoniazid resistance on first-line LPA?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
FIRSTLINE_LPA_R_BASE	First-Line LPA Rifampin Resistance Result	What was the result for rifampin resistance on first-line LPA?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
SECONDLINE_LPA_BASE	Second-Line LPA Used	Was second-line LPA performed after TB diagnosis?	Category	Y	Yes
				N	No
DATE_SECONDLINE_LPA	Date of Second-Line LPA	Date of second-line LPA used after TB diagnosis <mm/dd/yy>	Date		
SECONDLINE_LPA_MTB_BASE	Second-Line LPA MTB Result	What was the result for MTB on second-line LPA?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
SECONDLINE_LPA_SLI_BASE	Second-Line LPA Second-Line Injectable Resistance Result	What was the result for second-line injectable resistance on second-line LPA?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
SECONDLINE_LPA_FQ_BASE	Second-Line LPA Fluoroquinolone Resistance Result	What was the result for fluoroquinolone resistance on second-line LPA?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated

*Baseline DST refers to any sample taken within 90 d of treatment start, up to 30 d after treatment start. Every effort should be made to have reliable DST results; if genotypic tests are not used, phenotypic tests should be performed. If genotypic techniques for detection other than those listed in this table are in use (e.g., *pncA* for pyrazinamide), they may be appended to this section in a similar format (e.g., Test Done, Date of Test, Results of Test).

Phenotypic DST					
Field*	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
PHENODST	Phenotypic DST Done	Was phenotypic DST performed?	Category	Y	Yes
				N	No
DATE_PHENODST	Date of Phenotypic DST	Date of phenotypic DST done after TB diagnosis <mm/dd/yy>	Date		
DST_H_BASE	Isoniazid Resistance Result	What was the result for isoniazid resistance (MIC >0.1–0.2 μg/ml on MGIT) on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_HIGHH_BASE	High-Level Isoniazid Resistance Result	What was the result for high-level isoniazid resistance (MIC >1–2 μg/ml on MGIT) on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_R_BASE	Rifampin Resistance Result	What was the result for rifampin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_E_BASE	Ethambutol Resistance Result	What was the result for ethambutol resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_Z_BASE	Pyrazinamide Resistance Result	What was the result for pyrazinamide resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_AM_BASE	Amikacin Resistance Result	What was the result for amikacin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_KM_BASE	Kanamycin Resistance Result	What was the result for kanamycin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_CM_BASE	Capreomycin Resistance Result	What was the result for capreomycin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_OFX_BASE	Ofloxacin Resistance Result	What was the result for ofloxacin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_CFX_BASE	Ciprofloxacin Resistance Result	What was the result for ciprofloxacin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_MFX_BASE	Moxifloxacin Resistance Result	What was the result for moxifloxacin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_LFX_BASE	Levofloxacin Resistance Result	What was the result for levofloxacin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_S_BASE	Streptomycin Resistance Result	What was the result for streptomycin resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_ETO_BASE	Ethionamide Resistance Result	What was the result for ethionamide resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_PTO_BASE	Prothionamide Resistance Result	What was the result for prothionamide resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated

Phenotypic DST					
Field*	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
				ND	Not Done
DST_CS_BASE	Cycloserine Resistance Result	What was the result for cycloserine resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_TRD_BASE	Terizidone Resistance Result	What was the result for terizidone resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_PAS_BASE	Para-Amino-Salicylic Acid Resistance Result	What was the result for para-amino-salicylic acid resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_LZD_BASE	Linezolid Resistance Result	What was the result for linezolid resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_CFZ_BASE	Clofazimine Resistance Result	What was the result for clofazimine resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_BDQ_BASE	Bedaquiline Resistance Result	What was the result for bedaquiline resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
DST_DLM_BASE	Delamanid Resistance Result	What was the result for delamanid resistance on phenotypic DST?	Category	R	Resistant
				S	Susceptible
				Contam	Contaminated
				ND	Not Done
*Baseline DST refers to any sample taken within 90 d of treatment start, up to 30 d after treatment start. Additional drugs for which phenotypic DST is available can be reported (e.g., Pretomanid). Within all shared data, the method and critical concentration used for each drug must be recorded.					

Follow-Up DST and Acquired Drug Resistance					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
FOLLOWUP_DST	Follow-up DST Performed	Was there follow-up DST performed?	Category	Y	Yes
				N	No
FOLLOWUPDST1_DATE*	Date of First Follow-up DST	Date of first follow-up DST <mm/dd/yy>	Date		
FOLLOWUPDST_RES1	Resistant Isolates on First Follow-up DST	List newly discovered resistances not found on baseline DST, due to missingness or baseline susceptibility. If none discovered, list "no change in DST." List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
FOLLOWUPDST_SUS1	Susceptible Isolates on First Follow-up DST	List newly discovered susceptible drugs not found on baseline DST, due to missingness or baseline resistance. If none discovered, list "no change in DST." List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
ACQUIRED_RESISTANCE†	Acquired Drug Resistance	List the drugs that the strain was shown to acquire resistance to during any follow-up DST (defined as previously identified susceptibility and subsequent resistance on follow-up DST). List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		

*Additional follow-up DST results can be entered following a similar format.
†Acquired resistance can be reported in a separate row but is not necessary as it can be calculated by the data analyst with the above collected data.

Regimen Information*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
STARTINGREGIMENTYPE	Regimen Type at Start of Treatment	List the starting regimen type: short (intended duration ≤12 mo) or long (intended duration ≥18 mo)	Category	Short	Short Regimen
				Long	Long Regimen
TXSTART_DATE	Treatment Start Date	Date of second-line drug initiation in this treatment episode <mm/dd/yy>	Date		
INITIAL_REGIMEN	Starting Treatment Regimen	List the drugs the patient is on at the start of treatment. List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
H_START	Isoniazid Start Date	Date standard-dose isoniazid was introduced into the patient's regimen. <mm/dd/yy>	Date		
H_STOP	Isoniazid End Date	Date standard-dose isoniazid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
HIGHH_START	High-Dose Isoniazid Start Date	Date high-dose isoniazid was introduced into the patient's regimen. <mm/dd/yy>	Date		
HIGHH_STOP	High-Dose Isoniazid End Date	Date high-dose isoniazid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
E_START	Ethambutol Start Date	Date ethambutol was introduced into the patient's regimen. <mm/dd/yy>	Date		
E_STOP	Ethambutol End Date	Date ethambutol was permanently removed from the patient's regimen <mm/dd/yy>	Date		
Z_START	Pyrazinamide Start Date	Date pyrazinamide was introduced into the patient's regimen. <mm/dd/yy>	Date		
Z_STOP	Pyrazinamide End Date	Date pyrazinamide was permanently removed from the patient's regimen <mm/dd/yy>	Date		
S_START	Streptomycin Start Date	Date streptomycin isoniazid was introduced into the patient's regimen. <mm/dd/yy>	Date		
S_STOP	Streptomycin End Date	Date streptomycin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
RFB_START	Rifabutin Start Date	Date rifabutin was introduced into the patient's regimen. <mm/dd/yy>	Date		
RFB_STOP	Rifabutin End Date	Date rifabutin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
AM_START	Amikacin Start Date	Date amikacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
AM_STOP	Amikacin End Date	Date amikacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
KM_START	Kanamycin Start Date	Date kanamycin was introduced into the patient's regimen. <mm/dd/yy>	Date		
KM_STOP	Kanamycin End Date	Date kanamycin was permanently removed from the patient's regimen	Date		

Regimen Information*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
		<mm/dd/yy>			
CM_START	Capreomycin Start Date	Date capreomycin was introduced into the patient's regimen. <mm/dd/yy>	Date		
CM_STOP	Capreomycin End Date	Date capreomycin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
OFX_START	Ofloxacin Start Date	Date ofloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
OFX_STOP	Ofloxacin End Date	Date ofloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
CFX_START	Ciprofloxacin Start Date	Date ciprofloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
CFX_STOP	Ciprofloxacin End Date	Date ciprofloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
MFX_START	Moxifloxacin Start Date	Date moxifloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
MFX_STOP	Moxifloxacin End Date	Date moxifloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
LFX_START	Levofloxacin Start Date	Date levofloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
LFX_STOP	Levofloxacin End Date	Date levofloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
GFX_START	Gatifloxacin Start Date	Date gatifloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
GFX_STOP	Gatifloxacin End Date	Date gatifloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
SFX_START	Sparfloxacin Start Date	Date sparfloxacin was introduced into the patient's regimen. <mm/dd/yy>	Date		
SFX_STOP	Sparfloxacin End Date	Date sparfloxacin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
ETO_START	Ethionamide Start Date	Date ethionamide was introduced into the patient's regimen. <mm/dd/yy>	Date		
ETO_STOP	Ethionamide End Date	Date ethionamide was permanently removed from the patient's regimen <mm/dd/yy>	Date		
PTO_START	Prothionamide Start Date	Date prothionamide was introduced into the patient's regimen. <mm/dd/yy>	Date		
PTO_STOP	Prothionamide End Date	Date prothionamide was permanently removed from the patient's regimen <mm/dd/yy>	Date		
CS_START	Cycloserine Start Date	Date cycloserine was introduced into the patient's regimen. <mm/dd/yy>	Date		
CS_STOP	Cycloserine End Date	Date cycloserine was permanently removed from the patient's regimen <mm/dd/yy>	Date		
TRD_START	Terizidone Start Date	Date terizidone was introduced into the patient's regimen. <mm/dd/yy>	Date		

Regimen Information*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
TRD_STOP	Terizidone End Date	Date terizidone was permanently removed from the patient's regimen <mm/dd/yy>	Date		
PAS_START	Para-Aminosalicylic Acid Start Date	Date para-aminosalicylic acid was introduced into the patient's regimen. <mm/dd/yy>	Date		
PAS_STOP	Para-Aminosalicylic Acid End Date	Date para-aminosalicylic acid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
LZD_START	Linezolid Start Date	Date linezolid was introduced into the patient's regimen. <mm/dd/yy>	Date		
LZD_STOP	Linezolid End Date	Date linezolid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
CFZ_START	Clofazimine Start Date	Date clofazimine was introduced into the patient's regimen. <mm/dd/yy>	Date		
CFZ_STOP	Clofazimine End Date	Date clofazimine was permanently removed from the patient's regimen <mm/dd/yy>	Date		
AMXCLV_START	Amoxicillin and Clavulanic Acid Start Date	Date amoxicillin and clavulanic acid was introduced into the patient's regimen. <mm/dd/yy>	Date		
AMXCLV_STOP	Amoxicillin and Clavulanic Acid End Date	Date amoxicillin and clavulanic acid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
IPM_START	Imipenem-Cilastatin Start Date	Date imipenem-cilastatin was introduced into the patient's regimen. <mm/dd/yy>	Date		
IPM_STOP	Imipenem-Cilastatin End Date	Date imipenem-cilastatin was permanently removed from the patient's regimen <mm/dd/yy>	Date		
MPM_START	Meropenem Start Date	Date meropenem was introduced into the patient's regimen. <mm/dd/yy>	Date		
MPM_STOP	Meropenem End Date	Date meropenem was permanently removed from the patient's regimen <mm/dd/yy>	Date		
BDQ_START	Bedaquiline Start Date	Date bedaquiline was introduced into the patient's regimen. <mm/dd/yy>	Date		
BDQ_STOP	Bedaquiline End Date	Date bedaquiline was permanently removed from the patient's regimen <mm/dd/yy>	Date		
DLM_START	Delamanid Start Date	Date delamanid was introduced into the patient's regimen. <mm/dd/yy>	Date		
DLM_STOP	Delamanid End Date	Date delamanid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
PA_START	Pretomanid Start Date	Date pretomanid was introduced into the patient's regimen. <mm/dd/yy>	Date		
PA_STOP	Pretomanid End Date	Date pretomanid was permanently removed from the patient's regimen <mm/dd/yy>	Date		
PCZ_START	Perchlozone Start Date	Date perchlozone was introduced into the patient's regimen. <mm/dd/yy>	Date		

Regimen Information*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
PCZ_STOP	Perchlozone End Date	Date perchlozone was permanently removed from the patient's regimen <mm/dd/yy>	Date		
TXEND_DATE	Treatment End Date	Date treatment ended in this treatment episode <mm/dd/yy>	Date		
DURATION_CHANGE	Intended Duration of Regimen Changed	If the patient started on a short regimen, did they switch to a long regimen?	Category	Y	Yes
				N	No
CHANGE_DATE	Date of Regimen Duration Change	The date the patient changed from a short regimen to a long regimen <mm/dd/yy>	Date		
CHANGE_REASON	Reason the Regimen Duration Changed	What was the reason the regimen duration changed? This may include: in response to drug susceptibility testing, treatment non-response, drug availability, drug tolerability, or other.	Category	DST	Drug Resistance
				NoResp	Non-Response
				AE	Tolerability
				Avail	Drug Availability
				Other	Other
*For drugs not used in the regimen, their coding can remain blank. Stop dates must refer to the date that the drug was permanently withdrawn from the regimen. New rows can be added to accommodate drugs not contained in this table.					

Treatment Information					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
TXDUR_DAYS	Treatment Duration	Total number of days of treatment, from first to last dose taken	Num ###		
DOT	Directly Observed Therapy	Was directly observed therapy used?	Category	Y	Yes
				N	No
DOT_TYPE	Type of Directly Observed Therapy	State the type of directly observed therapy used. Virtual includes methods such as video, mobile text, or medication monitoring, among others.	Category	Comm	Community
				Hosp	Hospital
				Pharm	Pharmacy
				Virtual	Virtual
DOT_FREQUENCY	Frequency of DOT Visits	How many days per week is DOT provided to the patient (range 0–7 d)	Num ###		
SUPPORT	Patient Support Provided	What form of patient support was provided to patients? This may include support from employers (job security), nutritional support, financial support, or others. If more than one form, please select multiple.	Category	Employ	Employment
				Nutri	Nutritional
				Finance	Financial
				Other	Other
				Multi	Multiple
				None	None

Surgery and Hospitalization Information					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
SURGERY	Lung Resection Surgery	Did the patient have lung resection surgery related to MDR/RR-TB?	Category	Y	Yes
				N	No
				U	Unknown
SURGTYPE	Type of Lung Resection Surgery	What was the type of lung resection surgery?		Lobe	Lobectomy
				Pneu	Pneumonectomy
				Wedge	Wedge Resection
				Other	Other
				U	Unknown
SURG_DATE	Date of Surgery	What was the date of surgery?	Date		
HOSP	Hospitalization	Was the patient hospitalized at any point during treatment?	Category	Y	Yes
				N	No
				U	Unknown
HOSPEPISODES	Number of Hospitalization Episodes	What is the total number of hospitalization episodes during treatment?	Num ###		
HOSPDUR_DAYS	Total Hospitalization Duration	What is the total duration of hospitalization during treatment?	Num ###		

Adverse Event Information					
Field*	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
AE1	First Adverse Event	Did the patient experience a serious adverse event and/or permanently stop the drug	Category	SAE	Serious Adverse Event
				Perm	Permanent Stop
				Both	Both
AE1_DATE	Date of First Adverse event	What was the date of the permanent discontinuation of the drug(s)?	Date		
AE1_DRUG	Drug Responsible for First Adverse Event	List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
AE1_GRADE	Grade of First Adverse Event	What was the grade of the first adverse event?	Num ###		
AE1_SYSTEMORGAN	System / Organ Class Affected by First Adverse Event	Which system / organ classes were affected by the first adverse event? List each system / organ class, separated by a comma, using the list provided with this dictionary.	Char		
AE1_OUTCOME	Outcome of First Adverse Event	What was the outcome of the first adverse event?	Category	Recov	Recovered
				NoRecov	Not Recovered
				Died	Died
				U	Unknown
AE2	Second Adverse Event	Did the patient experience a serious adverse event and/or permanently stop the drug	Category	SAE	Serious Adverse Event
				Perm	Permanent Stop
				Both	Both
AE2_DATE	Date of Second Adverse event	What was the date of the permanent discontinuation of the drug(s)?	Date		
AE2_DRUG	Drug Responsible for Second Adverse Event	List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
AE2_GRADE	Grade of Second Adverse Event	What was the grade of the second adverse event?	Num ###		
AE2_SYSTEMORGAN	System / Organ Class Affected by Second Adverse Event	Which system / organ classes were affected by the second adverse event? List each system / organ class, separated by a comma, using the list provided with this dictionary.	Char		
AE2_OUTCOME	Outcome of Second Adverse Event	What was the outcome of the second adverse event?	Category	Recov	Recovered
				NoRecov	Not Recovered
				Died	Died
				U	Unknown
AE3	Third Adverse Event	Did the patient experience a serious adverse event and/or permanently stop the drug	Category	SAE	Serious Adverse Event
				Perm	Permanent Stop
				Both	Both
AE3_DATE	Date of Third Adverse event	What was the date of the permanent discontinuation of the drug(s)?	Date		
AE3_DRUG	Drug Responsible for Third Adverse Event	List each drug, separated by a comma, using the provided abbreviations with this dictionary.	Char		
AE3_GRADE	Grade of Third Adverse Event	What was the grade of the third adverse event?	Num ###		
AE3_SYSTEMORGAN	System / Organ Class Affected by Third Adverse Event	Which system / organ classes were affected by the third adverse event? List each system / organ class, separated by a comma, using the list provided with this dictionary.	Char		
AE3_OUTCOME	Outcome of Third Adverse Event	What was the outcome of the third adverse event?	Category	Recov	Recovered
				NoRecov	Not Recovered
				Died	Died
				U	Unknown
*Additional adverse event entries can be entered following the same format.					

Follow-Up Culture Results*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
CULTURE_MONTH1	Culture Result Month 1	What is the culture result for the sputum sample tested during month 1?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH2	Culture Result Month 2	What is the culture result for the sputum sample tested during month 2?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH3	Culture Result Month 3	What is the culture result for the sputum sample tested during month 3?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH4	Culture Result Month 4	What is the culture result for the sputum sample tested during month 4?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH5	Culture Result Month 5	What is the culture result for the sputum sample tested during month 5?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH6	Culture Result Month 6	What is the culture result for the sputum sample tested during month 6?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH7	Culture Result Month 7	What is the culture result for the sputum sample tested during month 7?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH8	Culture Result Month 8	What is the culture result for the sputum sample tested during month 8?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH9	Culture Result Month 9	What is the culture result for the sputum sample tested during month 9?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH10	Culture Result Month 10	What is the culture result for the sputum sample tested during month 10?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH11	Culture Result Month 11	What is the culture result for the sputum sample tested during month 11?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH12	Culture Result Month 12	What is the culture result for the sputum sample tested during month 12?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH13	Culture Result Month 13	What is the culture result for the sputum sample tested during month 13?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH14	Culture Result Month 14	What is the culture result for the sputum sample tested during month 14?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH15	Culture Result Month 15	What is the culture result for the sputum sample tested during month 15?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH16	Culture Result Month 16	What is the culture result for the sputum sample tested during month 16?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated

Follow-Up Culture Results*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
				ND	Not Done
CULTURE_MONTH17	Culture Result Month 17	What is the culture result for the sputum sample tested during month 17?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH18	Culture Result Month 18	What is the culture result for the sputum sample tested during month 18?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH19	Culture Result Month 19	What is the culture result for the sputum sample tested during month 19?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH20	Culture Result Month 20	What is the culture result for the sputum sample tested during month 20?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH21	Culture Result Month 21	What is the culture result for the sputum sample tested during month 21?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH22	Culture Result Month 22	What is the culture result for the sputum sample tested during month 22?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH23	Culture Result Month 23	What is the culture result for the sputum sample tested during month 23?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
CULTURE_MONTH24	Culture Result Month 24	What is the culture result for the sputum sample tested during month 24?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done

*Month 1 refers to the result of the sample taken between day 31 and 60 that is closest to day 31 and valid (i.e., Positive or Negative); Month 2 refers to the sample taken between day 61 and 90 that is closest to day 61 and valid (i.e., Positive or Negative); the remaining months follow the same pattern. Any MTB colonies seen should be considered positive. If multiple samples are taken on a given day, a positive-dominant approach should be taken, whereby a patient is positive if a single positive sample is found. A patient sample should only be classified as contaminated if all samples from that month were contaminated.

Follow-Up Smear Microscopy Results*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
SMEAR_MONTH1	Smear Result Month 1	What is the smear result for the sputum sample tested during month 1?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH2	Smear Result Month 2	What is the smear result for the sputum sample tested during month 2?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH3	Smear Result Month 3	What is the smear result for the sputum sample tested during month 3?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH4	Smear Result Month 4	What is the smear result for the sputum sample tested during month 4?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH5	Smear Result Month 5	What is the smear result for the sputum sample tested during month 5?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH6	Smear Result Month 6	What is the smear result for the sputum sample tested during month 6?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH7	Smear Result Month 7	What is the smear result for the sputum sample tested during month 7?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH8	Smear Result Month 8	What is the smear result for the sputum sample tested during month 8?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH9	Smear Result Month 9	What is the smear result for the sputum sample tested during month 9?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH10	Smear Result Month 10	What is the smear result for the sputum sample tested during month 10?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH11	Smear Result Month 11	What is the smear result for the sputum sample tested during month 11?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH12	Smear Result Month 12	What is the smear result for the sputum sample tested during month 12?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH13	Smear Result Month 13	What is the smear result for the sputum sample tested during month 13?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH14	Smear Result Month 14	What is the smear result for the sputum sample tested during month 14?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH15	Smear Result Month 15	What is the smear result for the sputum sample tested during month 15?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH16	Smear Result Month 16		Category	Pos	Positive
				Neg	Negative

Follow-Up Smear Microscopy Results*					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
		What is the smear result for the sputum sample tested during month 16?		Contam	Contaminated
				ND	Not Done
SMEAR_MONTH17	Smear Result Month 17	What is the smear result for the sputum sample tested during month 17?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH18	Smear Result Month 18	What is the smear result for the sputum sample tested during month 18?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH19	Smear Result Month 19	What is the smear result for the sputum sample tested during month 19?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH20	Smear Result Month 20	What is the smear result for the sputum sample tested during month 20?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH21	Smear Result Month 21	What is the smear result for the sputum sample tested during month 21?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH22	Smear Result Month 22	What is the smear result for the sputum sample tested during month 22?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH23	Smear Result Month 23	What is the smear result for the sputum sample tested during month 23?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done
SMEAR_MONTH24	Smear Result Month 24	What is the smear result for the sputum sample tested during month 24?	Category	Pos	Positive
				Neg	Negative
				Contam	Contaminated
				ND	Not Done

*Any acid-fast bacilli seen should be considered positive. Month 1 refers to the result of the sample taken between day 31 and 60 that is closest to day 31 and valid (i.e., Positive or Negative); Month 2 refers to the sample taken between day 61 and 90 that is closest to day 61 and valid (i.e., Positive or Negative); the remaining months follow the same pattern. If multiple samples are taken within a given day, a positive-dominant approach should be taken, whereby a patient is positive if a single positive sample is found. A patient sample should be classified as contaminated only if all samples from that month were contaminated.

Treatment Outcome Information					
Field	**Variable**	**Additional Information**	**Format**	**Category Coding**	**Category Labeling**
OUTCOME_DEFINITION	End-of-Treatment Outcome Definition	Specify the guideline year the outcome definition follows—this is preferably the 2013 guidelines but can follow 2005 guidelines if not available.	Category	WHO2013	2013 Definitions
				WHO2005	2005 Definitions
OUTCOME	End-of-Treatment Outcome	End of treatment outcome assigned to the patient, following the outcome year specified above.	Category	Cure	Cure
				Complete	Treatment Complete
				Fail	Treatment Failure
				Death	Death
				LTFU	Loss to Follow-Up
CULTURECONV*	Culture Conversion	Did the patient culture convert (defined as two consecutive negative cultures taken at least 28 d apart)? If the patient was culture negative at baseline, list as BaseNeg.	Category	Y	Yes
				N	No
				BaseNeg	Baseline Negative
CULTURECONV_DATE	Date of Culture Conversion	If the patient culture converted, what was the date of conversion (defined as the date of the first of the two consecutive negative cultures)?	Date		
TWOCONV	Culture Conversion by Month Two	If exact date of conversion is unknown, did culture conversion occur before the end of month two?	Category	Y	Yes
				N	No
				U	Unknown
SIXCONV	Culture Conversion by Month Six	If exact date of conversion is unknown, did culture conversion occur before the end of month six?	Category	Y	Yes
				N	No
				U	Unknown
CULTUREREV*	Culture Reversion	If patient converted or was culture negative at baseline, was there culture reversion (defined as two consecutive positive cultures taken at least 28 d apart)?	Category	Y	Yes
				N	No
				U	Unknown
CULTUREREV_DATE	Date of Culture Reversion	If patient had culture reversion, what was the date of reversion (defined as the date of the first of the two consecutive positive cultures)?	Date		
RECURRENCE_MONITORING	Post-Treatment Recurrence Monitoring	Was post-treatment monitoring for recurrence performed?	Category	Y	Yes
				N	No
RECURRENCE_FOLLOWUP_DUR	Duration of Recurrence Monitoring	What was the duration of recurrence monitoring, in months?	Num ###		
RECURRENCE_OUTCOME	Occurrence of Recurrence	Did the patient experience recurrence?	Category	Y	Yes
				N	No
RECURRENCE_DATE	Date of Recurrence	What was the date of the recurrence episode?	Date		
RELAPSE_REINFECT	Relapse or Reinfection	If resources permitted, was the recurrence classified as a true relapse or as a reinfection?	Category	Relapse	Relapse
				Reinfect	Reinfection
				U	Unknown
*These can be reported by the individual providing data or calculated by an analyst. In the instance of multiple cultures taken at the same time, a positive dominant approach should be taken, i.e., the result should be considered positive if any of the samples are positive. In the case of contaminated results, these should be discarded when calculating time to culture conversion or reversion.					

Drug Abbreviations, System/Organ Classes, and End-of-Treatment Outcome Definitions

The tables contained within this section are intended to promote standardization in coding of drugs, outcomes, and adverse events.

Tuberculosis Drug Name / Drug Class	Abbreviation
Isoniazid	H
Rifampin	R
Ethambutol	E
Pyrazinamide	Z
High Dose Isoniazid	HighH
Streptomycin	S
Rifabutin	Rfb
Amikacin	Am
Capreomycin	Cm
Kanamycin	Km
Ofloxacin	Ofx
Ciprofloxacin	Cfx
Moxifloxacin	Mfx
Levofloxacin	Lfx
Gatifloxacin	Gfx
Sparfloxacin	Sfx
Ethionamide	Eto
Prothionamide	Pto
Cycloserine	Cs
Terizidone	Trd
Para-Aminosalicylic Acid	PAS
Linezolid	Lzd
Clofazimine	Cfz
Amoxicillin and Clavulanic Acid	AmxClv
Imipenem-Cilastatin	Ipm
Meropenem	Mpm
Bedaquiline	Bdq
Delamanid	Dlm
Pretomanid	Pa
Perchlozone	Pcz
Thioacetazone	T
Rifapentine	Rpt
Second Line Injectables	SLI
Fluoroquinolones	FQ

Drug Name / Drug Class of Antiretroviral Therapy	Abbreviation
Nucleoside/Nucleotide Reverse transcription Inhibitor	NRTI
Abacavir	ABC
Didanosine	ddl
Emtricitabine	FTC
Lamivudine	3TC
Stavudine	d4T
Tenofovir alafenamide	TAF
Tenofovir disoproxil fumarate	TDF
Zidovudine	AZT or ZDV
Non-nucleoside Reverse transcription Inhibitor	NNRTI
Delaviridine	DLV
Efavirenz	EFV
Etavirine	ETR
Nevirapine	NVP
Rilpivirine	RPV
Protease Inhibitor	PI
Amprenavir	AMV
Atazanavir	ATV
Darunavir	DRV
Fosamprenavir	FPV
Indinavir	IDV
Lopinavir + ritonavir	LPV/r
Nelfinavir	NFV
Saquinavir	SQV
Tipranavir	TPV
Fusion Inhibitor	FI
Enfuviritide	ENF or T-20
CCR5 Antagonist	CCR5
Maraviroc	MVC
Integrase Inhibitor	II
Bictegravir	BIC
Dolutegravir	DTG
Elvitegravir	EVG
Raltegravir	RAL

SYSTEM/ORGAN CLASS
Blood and lymphatic system disorders
Cardiac disorders
Congenital, familial and genetic disorders
Ear and labyrinth disorders
Endocrine disorders
Eye disorders
Gastrointestinal disorders
General disorders and administration site conditions
Hepatobiliary disorders
Immune system disorders
Infections and infestations
Injury, poisoning and procedural complications
Investigations
Metabolism and nutrition disorders
Musculoskeletal and connective tissue disorders
Neoplasms benign, malignant and unspecified (incl cysts and polyps)
Nervous system disorders
Pregnancy, puerperium and perinatal conditions
Psychiatric disorders
Renal and urinary disorders
Reproductive system and breast disorders
Respiratory, thoracic and mediastinal disorders
Skin and subcutaneous tissue disorders
Social circumstances
Surgical and medical procedures
Vascular disorders

WHO 2013 Outcome Definitions (Preferred)	
Outcome	**Definition**
Cure	Treatment completed as recommended by the national policy without evidence of failure AND three or more consecutive cultures taken at least 30 d apart are negative after the intensive phase (or Month 8 if no intensive phase).
Complete	Treatment completed as recommended by the national policy without evidence of failure BUT no record that three or more consecutive cultures taken at least 30 d apart are negative after the intensive phase (or Month 8 if no intensive phase).
Failure*	Treatment terminated or need for permanent regimen change of at least two anti-TB drugs because of: (1) lack of conversion by the end of the intensive phase, or (2) bacteriological reversion in the continuation phase after conversion to negative, or (3) evidence of additional acquired resistance to fluoroquinolones or second-line injectable drugs, or (4) adverse drug reactions.
Death	A patient who dies for any reason during the course of treatment
Lost to Follow-up	A patient whose treatment was interrupted for 2 consecutive months or more.

WHO 2005 (Laserson) Outcome Definitions (if 2013 not possible)	
Outcome	**Definition**
Cure	Completed treatment according to program protocol and has at least five consecutive negative cultures from samples collected at least 30 d apart in the final 12 mo of treatment. If only one positive culture is reported during that time, and there is no concomitant clinical evidence of deterioration, a patient may still be considered cured, provided that this positive culture is followed by a minimum of three consecutive negative cultures taken at least 30 d apart.
Complete	Completed treatment according to program protocol but does not meet the definition for cure because of lack of bacteriological results (i.e., fewer than five cultures were performed in the final 12 mo of treatment).
Failure	Treatment will be considered to have failed if two or more of the five cultures recorded in the final 12 mo of therapy are positive, or if any one of the final three cultures is positive. (Treatment will also be considered to have failed if a clinical decision has been made to terminate treatment early because of poor clinical or radiological response or adverse events).
Death	A patient who dies for any reason during the course of MDR/RR-TB treatment
Lost to Follow-up	A patient whose treatment was interrupted for two or more consecutive months for any reason without medical approval.

Example of an Initial Data Sharing Agreement (Can Be Modified on a Case-By-Case Basis)

LETTER OF AGREEMENT for IPD in MDR/RR TB

This letter of agreement is between the McGill University group (hereafter referred to as the McGill group) for an Individual Patient Data (IPD) meta-analysis in multidrug-resistant tuberculosis TB (MDR-TB), and [INSERT NAME OF INVESTIGATOR AND INSTITUTION] (hereafter referred to as the investigator), regarding the transfer and use of data collected by the investigator. The McGill group and the investigator agree to collaborate on [INSERT NAME OF PROJECT] according to the terms in this letter and those set out in the full project protocol, which is attached as Annex 1.

The McGill group agrees to:

- Obtain approval from the Research Ethics Board of the Montreal Chest Institute, McGill University Health Center for this research.
- Respect the confidentiality of all data received. They will not attempt to identify patients, nor contact patients directly.
- Respect the principle that the investigator continues to 'own' the data sent for inclusion in this analysis. When the data set is "cleaned" and preliminary analyses completed, a copy of the data set will be returned to the investigator.
- Perform data analysis that addresses the objectives specified in the attached study protocol only. Any additional analysis will be performed only after it has been approved by the investigator. For additional analyses that are closely related to these objectives, the investigator will be informed; approval will be assumed if the investigator does not reply within a specified interval. If the investigator has concerns or objections to any new analyses, these will be addressed and resolved before proceeding. Analyses to address completely novel objectives that have not been foreseen in the current study protocol must be actively approved by the investigator before these analyses are undertaken.
- Finish analyses and return the data to the investigator by the sunset date. This date will be the date by which the analyses must be completed, and any manuscript(s)

prepared. The tentative sunset date to complete analyses, and prepare related manuscripts is [INSERT DATE]. If a manuscript is submitted, the data must be held until peer review is completed, and then up to 1 year after publication – to allow time for responses to the findings (e.g., letters to the editor). However, after the sunset date no further new analysis can begin without agreement to the extension of the sunset date by the investigator.

• Share results of analyses with the investigator, and all members of the IPD group at intervals described in the study protocol.

• Prepare draft and final reports of results for the project and prepare manuscript(s) of results for publication. All draft reports and manuscripts will be reviewed and approved by the investigator, and all members of the IPD group before submission. The authorship of these reports will be "The Collaborative Group for Meta-Analysis of Updated Individual Patient Data in MDR-TB", followed by a listing of all members – in alphabetic order. The corresponding author will be Dr. Menzies of McGill.

The investigator agrees to:

• Verify whether they require approval from their local Research Ethics Board, depending on their institution's policy. If so, the investigator will obtain this approval before sending the data to the McGill group. No additional data will be collected from the patients, thus investigator will not need to obtain patients' consent for this analysis.

• Transfer a data file of information on all patients who were members of a cohort of MDR-TB patients which the investigator reported in earlier publications. This patient dataset will be rendered completely anonymous before forwarding this to the Montreal Chest Institute by removing all personal identifiers.

• Become a member of The Collaborative Group for Meta-Analysis of Updated Individual Patient Data in MDR-TB. This Collaborative Group will review all preliminary and final results of analyses performed by the McGill group, as well

as all reports of results – for the guideline groups, for public presentation, and for publication.

• Treat these preliminary results confidentially. The investigator will not publish (including posting on the Internet), present in any public forum, nor disseminate through any media these results without approval from the McGill Group and other members of the IPD Collaborative Group.

Dr. Dick Menzies (for the McGill University Group)	Date
[Insert name and institution]	Date