Prevention and Control of Tuberculosis in Correctional and Detention Facilities: Recommendations from CDC

Endorsed by the Advisory Council for the Elimination of Tuberculosis, the National Commission on Correctional Health Care, and the American Correctional Association

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Summary

Tuberculosis (TB) control can be particularly problematic in correctional and detention facilities, in which persons from diverse backgrounds and communities are housed in close proximity for varying periods. This report provides a framework and general guidelines for TB in jails, prisons, and other correctional and detention facilities. Recommendations were developed on the basis of published scientific literature. Effective TB-prevention and -control measures in correctional facilities include early identification of people with TB disease and latent TB infection; appropriate use of airborne precautions (e.g., airborne infection isolation, environmental controls, and respiratory protection); comprehensive discharge planning; and thorough contact investigation. These measures should be instituted in close collaboration with local or state health department TB-control programs and other key partners. Continuing education of inmates, detainees, and correctional facility staff is necessary to maximize cooperation and participation. To ensure TB-prevention and -control measures are effective, periodic program evaluation should be conducted.

Introduction

Tuberculosis (TB) is a disease caused by Mycobacterium tuberculosis that adversely affects public health around the world (1). In the United States, TB control remains a substantial public health challenge in multiple settings. TB can be particularly problematic in correctional and detention facilities due to close quarters and diverse inmate populations (2). Effective TB prevention and control measures in correctional facilities are needed to reduce TB rates among inmates and the general U.S. population.

The recommendations provided in this report for the control of TB in correctional facilities expand on, update, and supersede recommendations issued by the Advisory Council for the Elimination of Tuberculosis (ACET) in 1996 (3). This report provides a framework and general guidelines for TB in jails, prisons, and other correctional and detention facilities. In addition, on the basis of existing scientific knowledge and applied experience of correctional and public health officials, this report defines the essential activities necessary for preventing transmission of M. tuberculosis in correctional facilities. These fundamental activities can be categorized as 1) screening (finding persons with TB disease and latent TB infection); 2) containment (preventing transmission of TB and treating patients with TB disease and LTBI); 3) assessment (monitoring and evaluating treatment outcomes); and 4) collaboration between correctional facilities and public health departments in TB control. These overarching activities are best achieved when correctional facility and public health department staff are provided with clear roles of shared responsibility.

The recommendations in this report can assist officials of federal, state, and local correctional facilities in preventing transmission of TB among inmates and facility employees. The target audience for this report includes public health department personnel, correctional administrators, private correctional health vendors, staff in federal and state agencies, staff in professional organizations, and policymakers in reaching informed decisions regarding the prevention and control of TB in correctional facilities.
To update the existing guidelines, with assistance from ACET, CDC organized and convened the Tuberculosis in Correction of persons with expertise in public health and health care in correctional facilities. Organizations represented in the Working National Commission on Correctional Health Care, the American Correctional Association, the American Jail Association, and Physicians. The Working Group reviewed published guidelines and recommendations, published and unpublished policies at studies discussing overall TB prevention and control and aspects of TB prevention and control specific to correctional and detention guidelines, recommendations, policies, protocols, and studies form the basis for the Working Group's recommendations. Bec for TB prevention and control activities and interventions specific to correctional and detention facilities, the recommendatio quality and quantity of the evidence. The recommendations reflect the expert opinion of the Working Group members with their experience and their review of the literature.

Summary of Changes from Previous Recommendations

These guidelines are intended for short- and long-term confinement facilities (e.g., prisons, jails, and juvenile detention centers) as correctional facilities throughout this report. These recommendations differ as follows from those made in 1996:

- The target audience has been broadened to include persons working in jails and other detention facilities.
- The need for correctional and detention facilities to base screening procedures for inmates and detainees on assessment emphasized. A description of how TB risk should be assessed is included.
- The need for institutions to conduct a review of symptoms of TB for all inmates and detainees at entry is discussed.
- The need for all inmates and detainees with suspected TB to be placed in airborne infection isolation (AII) immediately.
- Testing recommendations have been updated to reflect the development of the QuantiFERON®-TB Gold test (QFT-
- M. tuberculosis®-TB (QFT) diagnostic test for M. tuberculosis infection.
- The section on environmental controls has been expanded to cover local exhaust ventilation, general ventilation, air environmental control program. Ventilation recommendations for selected areas in new or renovated correctional facilities.
- A section on respiratory protection has been added, including information on implementing respiratory protection programs.
- Treatment recommendations for TB and LTBI have been updated on the basis of the most recent treatment statements from the American Thoracic Society (ATS), and the Infectious Diseases Society of America.
- Emphasis is placed on case management of inmates with TB disease and LTBI.
- The need for early discharge planning coordinated with local public health staff is emphasized.
- A section has been included on U.S. Immigration and Customs Enforcement detainees.
- The importance of collaboration between correctional facility and public health staff is emphasized, particularly with contact investigation.
- The need for corrections staff to work closely with public health staff to tailor an appropriately comprehensive training in TB control in a correctional facility is emphasized.
- The need for public health workers to receive education regarding the correctional environment is emphasized.
- Program evaluation is emphasized. Recommended areas of evaluation include assessment of TB risk in the facility, quality improvement, collaboration, information infrastructure, and using evaluation information to improve the TB program.

Background

During 1980–2003, the number of incarcerated persons in the United States increased fourfold, from approximately 500,000 million in 2003 (4,5). A disproportionately high percentage of TB cases occur among persons incarcerated in U.S. correctional facilities although 0.7% of the total US population was confined in prisons and jails, 3.2% of all TB cases nationwide occurred among (6). Although overall incidence of new TB cases among the U.S. population has remained at <10 cases per 100,000 persons: case rates have been reported in correctional populations (2). For example, the incidence of TB among inmates in New Jersey 100,000 inmates, compared with 11.0 cases per 100,000 persons among all New Jersey residents (3). In 1991, a TB case rate was 184 cases per 100,000 persons, which was 10 times greater than the statewide rate (2). In addition, in 1993, the TB rate per 100,000 persons was 139.3 cases per 100,000 persons, an increase from the rate of 15.4 during 1976–1978 (3,4). In California from an urban jail in a high-prevalence area was 72.1 cases per 100,000 inmates in 1998, representing 10% of the county's cases; demonstrated the prevalence of LTBI among inmates to be as high as 25% (10–14). Other studies have demonstrated a correlation between incarceration and positive tuberculin skin test (TST) response, indicating that transmission might have occurred in these facilities. At least three factors contribute to the high rate of TB in correctional and detention facilities. First, disparate numbers of inmates and incarcerated persons are at high risk for TB (e.g., users of illicit substances [e.g., injection drugs], persons of low socioeconomic status, and persons with human immunodeficiency infection). These persons often have not received standard public health interventions or nonemergency medical care before structure of the facilities contributes to disease transmission, as facilities often provide close living quarters, might have inadequate ventilation (9,17–19). Third, movement of inmates into and out of overcrowded and inadequately ventilated facilities, combination of factors of the inmates, combine to make correctional and detention facilities a high-risk environment for the transmission of TB. Implementation of TB-control measures particularly difficult (19). Despite recent efforts to improve TB-control measures in facilities, outbreaks of TB continue to occur in these settings, and TB disease has been transmitted to persons living in nearby...
Consequently, correctional and detention facilities are critical settings in which to provide interventions for detecting and treating persons with TB disease. The rationale for updating and strengthening TB control and prevention guidelines are multifaceted, including: 1) the high prevalence of TB in the world's prison populations, 2) the high rate of new cases of TB infection among populations arriving in the United States within the previous 5 years from areas countries with a high prevalence of TB (e.g., Mexico, the Philippines, and Vietnam) and therefore press elimination of TB in the United States (31). Social and legal barriers often make standard testing and treatment intervention undetermined immigrants (31). In certain instances, these patients have become resistant to first-line anti-TB drugs because received in their countries of origin (22). However, undocumented immigrants placed in detention and correctional facilities screening and begin treatment for TB disease (33).

**Rationale for Updating and Strengthening TB Control and Prevention Guidelines**

Transmission of *M. tuberculosis* continues to be documented within correctional facilities, primarily as a result of undiagnosed TB disease place other inmates and correctional staff at risk for TB, and when released, these persons also can infect persons communities (16,17,20,21,22,34,35). Despite the continued transmission of TB in correctional settings, few comprehensive evaluations of the implementation of I procedures in correctional facilities have been performed (36--38). Nevertheless, correctional facilities are increasingly basic procedures on studies and data that support judicious interventions, including screening, case finding, case management, olt and treatment for LTBI (7,9,14,21,28,33,34,39--46). Improving TB prevention and control practices within these settings is t and eventually eliminate TB. TB prevention and control practices within correctional facilities should be strengthened for m

- *M. tuberculosis* is spread through the air. One highly infectious person can infect inmates, correctional staff, and vis
- Immediate isolation of infectious patients can interrupt transmission of *M. tuberculosis* in the facility.
- Prompt initiation of an adequate regimen of directly observed therapy (DOT) helps ensure adherence to treatment t a specially trained correctional officer, or a health department employee observes the patient swallowing each dose treatment can diminish infectiousness, reduce the risk for relapse, and help prevent the development of drug-resistant TB.
- Inmates of correctional facilities have been reported to have relatively high rates of HIV infection; persons who are tuberculosis are at high risk for progressing from LTBI to TB disease.
- A completed regimen of treatment for LTBI can prevent the development of TB disease in persons who are infected.
- Correctional facility officials have an opportunity to treat inmates who have TB disease or LTBI before such inmate
- Because a substantial proportion of inmates do not have any other access to the health-care system, the correctional health information, intervention, and maintenance.

**Screening**

Early identification and successful treatment of persons with TB disease remains the most effective means of preventing disease. Screening programs in the correctional setting also allow for the detection of substandard who are at high risk for progressing to TB disease and would likely benefit from a course of treatment. This secondary benefit limited by inability to initiate and ensure completion of LTBI treatment, particularly in short-term correctional facilities. In a routine (i.e., at least annual) screening of long-term inmates and correctional facility staff (e.g., custody and medical) should control program (48,49).

How screening activities should be implemented depends on multiple factors, including 1) the type of facility, 2) the prevalence the facility, 3) the prevalence of TB in the inmates' communities, 4) the prevalence of other risk factors for TB (e.g., HIV) in average length of stay of inmates in the facility. The type of screening recommended for a particular facility is determined by transmission within that facility. The risk assessment should be performed at least annually and should be made in collaboration with the corrections department. A facility's TB risk can be defined as being minimal or nonminimal. A facility has minimal TB risk if

- no cases of infectious TB have occurred in the facility in the last year,
- the facility does not house substantial numbers of inmates with risk factors for TB (e.g., HIV infection and injection
- the facility does not house substantial numbers of new immigrants (i.e., persons arriving in the United States within the world with high rates of TB, and
• employees of the facility are not otherwise at risk for TB.

Any facility that does not meet these criteria should be categorized as a nonminimal TB risk facility.

Screening Methods

Symptom Screening
Whenever possible, health-care professionals should perform the initial screening. However, correctional officers in jails (pa numbers of inmates) frequently administer health intake questionnaires. If custody staff members conduct the intake screenin periodic training in taking a medical history, making necessary observations, and determining the appropriate disposition of possible medical problems. Staff conducting medical intake should receive appropriate counseling and education regarding D During their initial medical screening, inmates should be asked if they have a history of TB disease or if they have been treat previously. Documentation of any such history should be obtained from medical records, if possible. Inmates should be obse evidence of significant weight loss. All incoming inmates in any size jail, prison, or other detention facility (e.g., immigration immediately screened for symptoms of pulmonary TB by being asked if they have had a prolonged cough (i.e., one lasting ≥ sputum), or chest pain. The index of suspicion should be high when pulmonary symptoms are accompanied by general, syste chills, night sweats, easy fatigability, loss of appetite, and weight loss). Inmates should be interviewed systematically (i.e., us to determine whether they have experienced symptoms in recent weeks. Inmates who have symptoms suggestive of TB dise thorough medical evaluation, including a TST or QFT-G, a chest radiograph, and, if indicated, sputum examinations.

Persons with symptoms suggestive of TB disease or with a history of inadequate treatment for TB disease should be immedi they have undergone a thorough medical evaluation. If deemed infectious, such persons should remain in isolation until treat noninfectious. Facilities without an on-site AII room should have a written plan for referring patients with suspected or confi equipped to isolate, evaluate, and treat TB patients.

Symptom screening alone is an unsatisfactory screening mechanism for TB, except in facilities with a minimal risk for TB tr screening alone often will fail to detect pulmonary TB in inmates.

Chest-Radiograph Screening
Screening with chest radiographs can be an effective means of detecting new cases of unsuspected TB disease at intake to a radiographic screening requires fewer subsequent visits than a TST (i.e., only those inmates with suspicious radiographs or I However, such screening will not identify inmates with LTBI. One study demonstrated that screening inmates with a chest r finding rate and reduced the time from intake into the correctional facility to isolation substantially compared with TST testin respectively), thereby reducing the risk for TB exposure for other inmates and staff (50). Digital radiographs (miniature or f and improved storage and readability. A miniature radiograph can be performed in <1 minute and exposes the patient to appi dose of a conventional radiograph. One cost-effectiveness analysis of miniature chest radiography for TB screening on adm cases were detected with this method than either TST or symptom screening, and the cost of radiograph screening was less p which radiologic screening is used in a given institution should be dictated by multiple factors, including 1) local epidemiolo 2) inmate length of stay; 3) the ability of the health-care professionals within the facility to conduct careful histories, tubercu cross-matches with state TB registries; and 4) timeliness of the radiographic study and its reading. Screening with chest radiac certain jails and detention facilities that house substantial numbers of inmates for short periods and serve populations at high prevalence of HIV infection or history of injection-drug use and foreign-born persons from countries in which TB prevalence Inmates who are infected with HIV might be anergic and consequently might have false-negative TST results. However, rou recommended because it has not been demonstrated to assist in diagnosing or excluding LTBI (52). In facilities that do not p screening for all inmates, a chest radiograph should be part of the initial screening of HIV-infected patients and those who ar whose status is unknown.

In facilities with on-site radiographic screening, the chest radiograph should be performed as part of intake screening and rea preferably within 24 hours. Persons who have radiographs suggestive of TB should be isolated immediately and evaluated fu examinations should be performed for inmates whose chest radiographs are consistent with TB disease and might be indicate are symptomatic, regardless of their TST, QFT-G, or chest radiograph results because persons with HIV and TB disease mig radiographs in addition to false-negative TST or QFT-G results.

Mantoux TST Screening
Tuberculin skin testing using 0.1 mL of 5 tuberculin units (TU) of purified protein derivative (PPD) is the most common met Multiple-puncture tests (e.g., the tine test) should not be used to determine whether a person is infected. Persons who have a TST result (with a millimeter [mm] reading), a documented history of TB disease, or a reported history of a severe necrotic r exempt from a routine TST. For persons with a history of severe necrotic reactions and without a documented positive result G may be substituted for the TST. Otherwise, such persons should be screened for symptoms of TB and receive a chest radi recently (i.e., within 6 months) and are not symptomatic. Pregnancy, lactation, or previous vaccination with Bacillus Calm intrinsic for tuberculosis skin testing. The TST is not completely sensitive for TB disease; its sensitivity ranges from >> limitation, skin testing, along with use of a symptom review, frequently constitutes the most practical approach to screening.
A trained health-care professional should place the TST and interpret the reaction 48–72 hours after the injection by measuring palpable swelling at the injection site. The diameter of the indurated area should be measured across the width of the forearm (the skin) should not be measured. All reactions, even those classified as negative, should be recorded in millimeters of induration.

In the majority of cases, a TST reaction of ≥10 mm induration is considered a positive result in inmates and correctional facility patients (i.e., persons who are recent contacts of patients with TB disease, persons with fibrotic changes on chest radiograph consistent with previous TB disease, organ transplant recipients and patients with other immunocompromising conditions (e.g., persons receiving ≥15 mg and persons suspected of having TB disease). Persons who have a positive TST result and no symptoms suggestive of TB disease should be evaluated with a chest radiographic test.

Persons who have symptoms suggestive of TB disease should be evaluated immediately and placed in an isolation screening. Persons who have symptoms suggestive of TB disease should be evaluated immediately and placed in an isolation screening.

The use of two-step testing can reduce the number of positive TSTs that would otherwise be misclassified as recent skin-test screenings. Certain persons who were infected with M. tuberculosis years earlier exhibit waning delayed-type hypersensitivity skin tested years after infection, they might have a false-negative TST result (even though they are truly infected). However, infection might stimulate the ability to react to subsequent tests, resulting in a "booster" reaction. When the test is repeated, it is misinterpreted as a new infection (recent conversion) rather than a boosted reaction.

For two-step testing, persons whose bas are retested 1–3 weeks after the initial test. If the second test result is negative, they are considered not infected. If the second test result is positive, they are considered infected. Two-step testing should be considered for the baseline testing of persons who are recent contacts of patients with TB disease. Two-step testing should be considered for the baseline testing of persons who are recent contacts of patients with TB disease.

In the past, a panel of other common antigens was often applied with the TST to obtain information regarding the competent system and to identify anergy. More recently, however, anergy testing has been demonstrated to be of limited usefulness because of the short average length of stay of inmates.

Intracutaneous inoculation with BCG is currently used worldwide as a vaccine against TB. BCG is a live attenuated Mycobacteria the immune system to protect against TB. No reliable method has been developed to distinguish TB reactions caused by BCG (52). Persons who have been vaccinated with BCG, and the TST results of such persons are used to support or exclude the diagnosis of M. tuberculosis infection and treatment for LTBI should be considered for any BCG-vaccinated person who has criteria for interpretation of TST results are used for both BCG-vaccinated and nonvaccinated persons (56).

**Quantiferon®-TB Gold Test**

In May 2005, the U.S. Food and Drug Administration (FDA) licensed QFT-G. This in-vitro diagnostic test measures the amount of interferon gamma produced by cells in whole blood that have been stimulated by mycobacterial peptides. The peptides used in the test mimic proteins that are present in M. tuberculosis but absent from all BCG strains and from the majority of commonly encountered non-TB intended for use as a diagnostic tool for M. tuberculosis infection, including both TB disease and LTBI. As with a TST, QFT-LTB and TB disease and should be used in conjunction with risk assessment, radiography, and other diagnostic evaluations.

Compared with TST are that 1) results can be obtained after a single patient visit, 2) the variability associated with skin-test reading is performed in a qualified laboratory, and 3) QFT-G is not affected by previous BCG vaccination and eliminates t persons with false-positive results. QFT-G does not affect the result of future TST-G tests (i.e., no "boosting" occurs). Limit. for phlebotomy, the need to process blood specimens within 12 hours of collection for the most recent version of the test, the that process the test, and a lack of clinical experience in interpreting test results. The elimination of the second visit for readi render the QFT-G competitive in cost-benefit considerations.

Although the performance of QFT-G has not been evaluated sufficiently in select populations of interest (e.g., HIV-infected that QFT-G is as sensitive as TST for detection of TB disease and more specific than TST for detection of LTBI (57, 58). CD recommend that QFT-G can be used in place of TST in all circumstances in which TST is currently used (58). This includes for correctional facility inmates and employees and testing of exposed persons in contact investigations. Because data are ins QFT-G in certain clinical situations, as with a negative TST result, a negative QFT-G result alone might not be sufficient to rule out infection.

Examples of such clinical scenarios include those involving patients with severe immunosuppression who patient with TB and patients being treated or about to undergo treatment with potent tumor necrosis factor alpha (TNF-α) and...
A substantial proportion of detainees who are incarcerated long enough to begin LTBI therapy will be released before completion of treatment. A San, a county jail in Illinois who had a positive TST result were released or transferred before their evaluation could be conducted. The jail for a long term is difficult. Nationwide, approximately half of persons detained in local jails are released within 48 hours of admission. Thus, even if all inmates suspected of having TB infection. A readily accessible record of previous TB history, drug-susceptibility patterns, is useful in determining the disposition of a given patient with suspected TB.

**Initial Screening**

The following procedures should be used for the initial screening of inmates and detainees (depending on their length of stay facility) and for all correctional facility employees, regardless of the type of facility.

**Inmates in Minimal TB Risk Facilities**

Inmates in all minimal TB risk correctional and detention facilities should be evaluated on entry for symptoms of TB. Persons evaluated immediately to rule out the presence of infectious disease and kept in an AII room until they are evaluated. If the inmate should be transported to a facility that has one. In addition, all newly arrived inmates should be evaluated for clinical conditions and other factors that increase the risk for infection or the risk for progressing to TB disease, including the following:

- HIV infection,
- recent immigration,
- history of TB,
- recent close contact with a person with TB disease,
- injection-drug use,
- diabetes mellitus,
- immunosuppressive therapy,
- hematologic malignancy or lymphoma,
- chronic renal failure,
- medical conditions associated with substantial weight loss or malnutrition, or
- history of gastrectomy or jejunoileal bypass.

Persons with any of these conditions require further screening with a TST, a QFT-G, or a chest radiograph within 7 days of a TST-G result, inmates known to have HIV infection or other severe immunosuppression, and those who are at risk for HIV infection, should have a chest radiograph taken as part of the initial screening. Persons who have an abnormal chest radiograph rule out TB disease; if TB disease is excluded as a diagnosis, LTBI therapy should be considered if the TST or QFT-G result is positive.

**Inmates in Nonminimal TB Risk Facilities**

Immediately on arrival, all new inmates should be screened for symptoms, and any inmate with symptoms suggestive of TB disease and evaluated promptly for TB disease. If the facility does not have an AII room, the inmate should be transported to a facility that has one. Those who have the TST or QFT-G result are available. Of the inmates know to have HIV infection or other severe immunosuppression, and those who are at risk for HIV infection, should have a chest radiograph taken as part of the initial screening. Persons who have an abnormal chest radiograph should be further evaluated. Disease is excluded as a diagnosis, LTBI therapy should be considered if the TST or QFT-G result is positive. As the rate of TB disease in the United States has decreased, identification and treatment of persons with LTBI who are at high risk for progressing to TB disease have become essential components of the TB elimination strategy promoted by ACET (59). Targeted testing using the TST or QFT for TB disease who would benefit from treatment for LTBI. Prisons offer an excellent public health opportunity for identifying individuals who can be screened for TB infection and placed on LTBI therapy, if indicated. If the TST is used, a two-step testing procedure should be strongly considered when obtaining a baseline reading. A single step QFT-G is an adequate baseline. Inmates with a positive test should be evaluated further and LTBI therapy should be considered if the TST or QFT-G result is positive.

**Inmates in Nonminimal TB Risk Jails and Other Short-Term Detention Facilities**

As in prisons, all new detainees in nonminimal TB risk jails should be screened on entry for symptoms, and any detainee who should be placed immediately in an AII room and evaluated promptly for TB disease. If the facility does not have an AII room, detainees who have the TST or QFT-G result, detainees known to have HIV infection, and those who are at risk for TB disease should be placed immediately in an AII room and evaluated promptly for TB disease. Detainees without symptoms require further screening with a TST, a QFT-G, or a chest radiograph within 7 days of arrival. Regardless of the TST result or QFT-G result, detainees known to have HIV infection, and those who are at risk for TB disease should be placed immediately in an AII room and evaluated promptly for TB disease. Persons who have a positive result should be placed immediately in an AII room and evaluated promptly for TB disease. The primary purpose of screening in correctional settings is to detect TB disease. TST or QFT-G screening in jails to initiate LTBI therapy with the high rate of turnover and short lengths of stay. Although not all jail detainees have short lengths of stay, delinquent the jail for a long term is difficult. Nationwide, approximately half of persons detained in local jails are released within 48 hours of arrival. Detainees can be tested at intake, a large proportion will be unavailable to have their TSTs read or to be evaluated when QFT screening in jails to initiate LTBI therapy with the high rate of turnover and short lengths of stay. Although not all jail detainees have short lengths of stay, delinquents remain in custody, a substantial percentage will be released before the radiographic and medical evaluation is completed. At a county jail in Illinois who had a positive TST result were released or transferred before their evaluation could be completed. A substantial proportion of detainees who are incarcerated long enough to begin LTBI therapy will be released before completion.
Francisco study indicated that approximately 62% of detainees who were started on LTBI treatment were released before completion of therapy. A targeted approach of performing TSTs only on new detainees who are at high risk for TB disease (e.g., detainees with known LTBI or TB disease if their HIV infection status is unknown at the time of their LTBI or TB disease diagnosis) can be more effective within the jail setting if resources dedicated to discharge planning and reliable access to treatment facilities. Modest interventions (e.g., education and incentives [see Glossary]) in the jail setting can lead to improvements in postrelease medical care and increase the likelihood that therapy will be completed.

**Persons in Holding or Booking Facilities**

City, county, and other law enforcement authorities frequently have facilities that hold arrestees and detainees for short periods of time. TB symptom screening is recommended for all persons at the time of entry into these facilities. Any detainee with a positive test result should be immediately isolated and transferred to a facility or hospital in which the detainee can be placed in an Airborne Infectious Disease Unit (AIDU).

**Employees in All Correctional and Detention Facilities**

A medical history relating to TB should be obtained from and recorded for all new employees at the time of hiring, and a physical examination should be required. The results of the screening and examination should be kept confidential; access should be granted to pulmonologists only when necessary. In addition, a TST or QFT-G should be mandatory for all employees who do not have a positive result. To improve the accuracy of the baseline result, a two-step TST or a single-step QFT-G should be used for the first test. Persons who have a positive TST or QFT-G result should have a chest radiograph interpreted and should be required to have a thorough medical evaluation; if TB disease is excluded as a diagnosis, such persons should be isolated and transferred to a facility that can provide the necessary care. All employees should be informed that they should seek appropriate follow-up and testing for TB if they have HIV infection. Any employee who has symptoms suggestive of TB should not return to the workplace until a clinician determines that they are not infected with MTB. Inmates who have a negative TST or QFT-G result should follow the same procedures as those outlined for employees.

**Other Persons Who Might Need to be Screened**

Certain persons who are neither inmates nor employees but who visit high-risk facilities on a regular basis also should be considered for screening. Persons who might include contractors (e.g., food handlers and service workers), volunteers, and those providing religious ministries. Screening of these persons should follow the same procedures as those outlined for employees.

**Periodic Screening**

Long-term inmates and all employees who have a negative TST or QFT-G result should have follow-up testing at least annually. A positive test result should be screened for symptoms of TB disease. Annual chest radiographs are unnecessary for the follow-up period. Persons who have a history of TB disease should have a chest radiograph performed annually. Persons who have a history of TB disease should be required. The results of the screening and examination should be kept confidential; access should be granted to pulmonologists only when necessary. In addition, a TST or QFT-G should be mandatory for all employees who do not have a positive result. To improve the accuracy of the baseline result, a two-step TST or a single-step QFT-G should be used for the first test. Persons who have a positive TST or QFT-G result should have a chest radiograph interpreted and should be required to have a thorough medical evaluation; if TB disease is excluded as a diagnosis, such persons should be isolated and transferred to a facility that can provide the necessary care. All employees should be informed that they should seek appropriate follow-up and testing for TB if they have HIV infection. Any employee who has symptoms suggestive of TB should not return to the workplace until a clinician determines that they are not infected with MTB. Inmates who have a negative TST or QFT-G result should follow the same procedures as those outlined for employees.

**HIV Counseling, Testing, and Referral**

HIV counseling, testing, and referral (CTR) should be routinely offered to all persons in settings in which the population is at increased risk for acquiring or transmitting HIV infection, regardless of setting prevalence. Because correctional facilities are considered settings in which the population is at increased risk for acquiring or transmitting HIV, routine HIV CTR is recommended for inmates. Further risk factor for progression from LTBI to TB disease is the person's age. Therefore, HIV CTR should be routinely offered to all inmates with LTBI or TB disease if their HIV infection status is unknown at the time of their LTBI or TB disease diagnosis. Corr particularly aware of the need for preventing transmission of M. tuberculosis in settings in which persons infected with HIV...
Use of Data to Refine Policies and Procedures
Correctional and detention facilities are strongly encouraged to collect and analyze data on the effectiveness of their TB screening and treatment programs. Working in conjunction with their state or local TB-control program, correctional and detention facilities should refine their policies and procedures as indicated by such data. In the absence of local data that justify revision, correctional and detention facilities should adhere to the state or local policies and procedures as indicated by such data. In the absence of local data that justify revision, correctional and detention facilities should adhere to the state or local policies and procedures.

Case Reporting
All states require designated health-care professionals to report suspected and confirmed cases of TB to their local or state health department for use in monitoring the rates of drug resistance in the health department's jurisdiction. Drug-susceptibility testing and drug susceptibility results are used to help determine the best treatment options and to ensure that patients receive the appropriate treatment. Health departments are responsible for ensuring that TB cases are reported to the appropriate health department for use in monitoring the rates of drug resistance in the health department's jurisdiction.

Isolation in an Airborne Infection Isolation Room
TB airborne precautions should be initiated for any patient who has signs or symptoms of TB disease or who has documented TB disease who has negative AFB sputum smear results. These guidelines and this report can be used to educate correctional facility staff regarding use of airborne precautions.

Discontinuation
For patients placed in an AII room because of suspected infectious TB disease of the lungs, airways, or larynx, airborne precautions can be discontinued after the patient has had three consecutive negative AFB sputum-smear results collected 24 hours apart. If the patient has received standard multidrug anti-TB treatment and has made significant clinical improvement, then the patient can be released from airborne precautions.

Environmental Controls
Guidelines for preventing transmission of M. tuberculosis in health-care settings and for environmental infection control in health-care settings were published previously (21,72). These guidelines and this report can be used to educate correctional facility staff regarding use of environmental controls.

Environmental controls should be implemented when the risk for TB transmission persists despite efforts to screen and treat infected inmates. Environmental controls are used to remove or inactivate M. tuberculosis in areas in which the organism could be transmitted. Primary environmental controls include controlling the source of infection by using local exhaust ventilation (e.g., hoods, tents, or booths) and diluting and removing airborne infectious droplet nuclei (see Glossary). Environmental controls should help prevent the spread and reduce the concentration of airborne infectious droplet nuclei.
work in conjunction with administrative controls such as isolation of inmates with suspected TB disease detected through sct environmental controls consist of controlling the airflow to prevent contamination of air in areas adjacent to the source (AII i a HEPA filter or ultraviolet germicidal irradiation [UVGI]) to increase the number of equivalent ACH. The efficiency of dif environmental controls varies; details concerning the application of these controls to prevent transmission of M. tuberculosis published previously (71). To be effective, secondary environmental controls should be used and maintained properly, and th should be recognized. The engineering design and operational efficacy parameters for UVGI as a secondary control measure room air UVGI, and in-duct UVGI) continue to evolve and require special attention in their design, selection, and maintenance Exposure to M. tuberculosis within correctional facilities can be reduced through the effective use of environmental controls infectious inmate) or in general areas. Source-control techniques can prevent or reduce the spread of infectious droplet nucle the source has been identified and the generation of the contaminant is localized by collecting infectious particles as they are is particularly prudent during procedures that are likely to generate infectious aerosols (e.g., bronchoscopy and sputum induc infectious TB disease are coughing or sneezing.

Unsuspected and undiagnosed cases of infectious TB disease contribute substantially to disease transmission within corrective attempting to control this type of transmission, source control is not a feasible option. Instead, general ventilation and air cle: environmental control. General ventilation can be used to dilute the air and remove air contaminants and to control airflow p. correctional facility settings. Air-cleaning technologies include mechanical air filtration to reduce the concentration of M. tul to kill or inactivate microorganisms so they no longer pose a risk for infection. Ventilation systems for correctional facility settings should be designed, and modified when necessary, by ventilation engine control practitioners and occupational health staff. Recommendations for designing and operating ventilation systems in cor published (48,49,74--76). The multiple types of and conditions for use of ventilation systems in correctional-facility settings settings preclude provision of extensive guidance in this report.

Incremental improvements in environmental controls (e.g., increasing the removal efficiency of an existing filtration system potential for TB transmission from persons with unsuspected or undiagnosed TB. This information should not be used in pla who can advise on ventilation system and air handling design, selection, installation, and maintenance. Because environment properly operated and maintained, routine training and education of infection-control and maintenance staff are key components control program.

Airborne Infection Isolation Rooms

Inmates known or suspected of having TB disease should be placed in an AII room or AII cell that meets the design and open infection isolation described previously (71). Inmates deemed infectious should remain in isolation until treatment or further are noninfectious. Facilities without an on-site AII room should have a written plan for referring patients with suspected or c equipped to isolate, evaluate, and treat TB patients.

New or renovated facilities should ensure that a sufficient number of AII rooms are available consistent with the facility risk circumstances, if an AII room is not available and the immediate transfer of the inmate with suspected infectious TB is not p housed temporarily in a room that has been modified to prevent the escape of infectious aerosols outside the TB holding area conditioning (HVAC) system in this temporary TB holding area might have to be manipulated or augmented with auxiliary e flow of air that reduces the potential escape of infectious aerosols. If possible, air from these areas should be exhausted dire feasible, the highest filtration efficiency compatible with the installed HVAC system should be used. Because TB droplet nu micrometers in size, filtration efficiency should be evaluated for particles in that size range. Filter selection based on the Am Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 52.2 Minimum Efficiency Reporting Value (MERV)--ra this evaluation (77). Secondary air cleaning techniques (portable air cleaners and UVGI) also can be used in these areas to in Local Exhaust Ventilation

Aerosol-producing procedures should be performed in an area with a type of local exhaust ventilation that captures and remo near their source without exposing persons in the area to infectious agents. Local exhaust devices typically use hoods. Two t devices, in which the hood either partially or fully encloses the infectious source, and exterior devices, in which the infectious hoo. Fully enclosed hoods, booths, or tents are always preferable to exterior devices because of their superior ability to pre Enclosing devices should have sufficient airflow to remove ≥99% of airborne particles during the interval between the depar of the next. The time required to remove a given percentage of airborne particles from an enclosed space depends on 1) the l ventilation inlet and outlet, and 3) the physical configuration of the room or booth. The time interval required to ensure the p contaminant removal from enclosing devices varies according to ACH (Table 1). For example, if an enclosing device operates exhaust locations allow for good air mixing, approximately 46 minutes would be required to remove 99% of the contaminat procedure has ended. Similarly, an additional 23 minutes (total time: 69 minutes) would be required to increase the removal ventilation rate decreases the waiting time by half.

General Ventilation

General ventilation is used to 1) dilute and remove contaminated air, 2) control the direction of airflow in a correctional facil patterns in rooms. Recommended ventilation rates for correctional facility settings are typically expressed in ACH. Ventilati
areas in new or renovated correctional facility settings should be followed (Table 2). The feasibility of achieving a specific ventilation rate might be reasonable for new construction but not as feasible when retrofitting an existing ventilation system. 

Ventilation design guidance for correctional facilities and related areas has been published (78). This design guidance includes recommendations regarding total ventilation, filtration efficiency, and environmental design parameters. For minimum outdoor air supply rates, the guidance refers to ASHRAE Standard 62, Ventilation for Acceptable Indoor Air Quality. In 2004, ASHRAE revised and ANSI/ASHRAE Standard 62.1 (74). For areas within correctional facilities that are not intended to contain persons with infectious TB, minimum outdoor air supply rates should meet or exceed those recommended in ANSI/ASHRAE Standard 62.1-2004 (74). 

Air Cleaning Methods

Detailed information has been published regarding the selection, design, maintenance, and safety considerations associated with air cleaning devices in use. Performance monitoring should include measurement of airflow rates, operation of ventilation systems, and routine inspection and maintenance of ventilation system components (e.g., ducts, fans, and filters). Performance monitoring should be conducted on a regular basis to ensure that 1) maintenance staff notify infection-control personnel when repairs are needed, 2) infection-control personnel are aware of the need for repairs, and 3) repairs are completed in a timely manner. Air flow (supply air and exhaust air) should be measured at air terminals and duct locations to ensure that the air flow is sufficient to remove the contaminant. Air flow paths should be identified and monitored to ensure that the air flow is directed to the intended area.
Respiratory Protection

Considerations for Selection of Respirators
Respiratory protection is used when administrative (i.e., identification and isolation of infectious TB patients) and environmental controls alone have not reduced the risk for infection with *M. tuberculosis* to an acceptable level. The use of respiratory protection is most appropriate within correctional facilities. For example, protection is warranted for inmates and facility staff when they enter AI1 rooms, participate in cough-inducing procedures.

Respirators should be selected from those approved by CDC/National Institute for Occupational Safety and Health (NIOSH) Part 84 of the Code of Federal Regulations (86). Decisions regarding which respirator is appropriate for a particular situation should be made on the basis of a risk assessment of the likelihood for TB transmission.** For correctional facilities, a CDC/NIOSH-approved N95 respirator should be used. Additional information on other classes of air-purifying respirators and powered air-purifying respirators (PAPRs) is available at the CDC website. Respiratory protection is affected by 1) the level of respiratory protection selected (i.e., the assigned protection factor), 2) the respirator model, 3) the care taken in donning the respirator, and 4) the effectiveness of the respiratory protection program, if training.

Implementing a Respiratory Protection Program
All facilities should develop, implement, and maintain a respiratory-protection program for health-care workers or other staff. Respiratory-protection programs are required for facilities covered by the U.S. Occupational Safety and Health Administration (OSHA) (71). The principles of diagnosis and treatment of LTBI and TB disease discussed in this section are guidelines and not meant to substitute for clinical experience and judgment. Medical providers not familiar with the management of LTBI and TB disease should consult a person with expertise. All facilities' local occupational health and safety plans for consultation with and referral to persons with expertise in TB and should include criteria delineating when consultation (i.e., minimal or nonminimal), should develop a policy on the use of respirators by visitors of patients.

Precautions for Transporting Patients Between Correctional or Detention Facilities
Recommended precautions to take when transporting patients between facilities have been published (71). Patients with suspected or confirmed infectious TB disease should be transported in an ambulance whenever possible. The ambulance ventilation system should be operated in the setting designed to provide adequate air exchange. If the vehicle has a rear exhaust fan, it should be used during transport. A supplemental recirculating ventilation unit that passes air through HEPA filters before returning it to the vehicle should be used to increase the number of air changes per hour (ACH). Airflow should be from the cab (i.e., front of vehicle) over the patient and out the rear exhaust. The ventilation system for the vehicle should bring in as much outdoor air as possible, and the system should not be set to nonrecirculation. The patient should be isolated from the rest of the vehicle, and the patient should be placed in the rear seat. Drivers or other personnel caring for the patient should wear respirators if at least an N95 disposable respirator is selected. Respiratory protection is used when administrative (i.e., identification and isolation of infectious TB patients) and environmental controls alone have not reduced the risk for infection with *M. tuberculosis* to an acceptable level. The use of respiratory protection is most appropriate in specific settings and situations.

Diagnosis and Treatment of Latent Tuberculosis Infection and Tuberculosis Disease
The principles of diagnosis and treatment of LTBI and TB disease discussed in this section are guidelines and not meant to substitute for clinical experience and judgment. Medical providers not familiar with the management of LTBI and TB disease should consult a person with expertise. All facilities' local occupational health and safety plans for consultation with and referral to persons with expertise in TB and should include criteria delineating when consultation (i.e., minimal or nonminimal), should develop a policy on the use of respirators by visitors of patients.

Interpreting TST Results
A baseline screening TST result of ≥10 mm induration is considered positive for the majority of correctional facility staff and should be referred for medical and diagnostic evaluation. However, for correctional facility staff and inmates who have had close contact with an inmate or staff member with infectious TB disease, a baseline TST mm should be considered positive and interpreted as a new infection. Correctional facility staff and inmates with a screening TST ≤10 mm, who are subsequently exposed to TB disease, should be considered newly infected if they have TST values ≥10 mm. For example, a baseline TST result with 8 mm induration and a repeat TST result 1 year later with 18 mm induration would indicate a new infection.
When decisions are made for the diagnosis and treatment of LTBI and choosing the cut-off value for a positive reaction, cert
immunocompromising conditions and known contact with a TB patient) should be assessed. Correctional facility staff and in
of 5–9 mm should be advised that their results might be an indication for treatment under certain conditions.

**Special Considerations in Interpreting the TST**

Interpretation of the TST might be complicated by previous vaccination with BCG, anergy, and the "boosting" effect. Details
how the TST should be interpreted in relation to these possible confounders have been published (64,93).

**Correctional Staff and Inmates who Refuse Testing for *M. tuberculosis* Infection**

A correctional facility member or inmate who refuses testing for *M. tuberculosis* infection should first be educated rega
screening of correctional facility staff and inmates. If the person continues to refuse to have a TST, the option may be offered
the QFT-G test (and vice versa). The decision to offer an alternative test depends on the reason for refusal and should be con
underlying wishes (e.g., offering QFT-G in place of TST is acceptable if the patient objects to having injection of a substance
drawn).

**Interpreting the QuantiFERON®-TB Gold Test Data**

Interpretation of QFT-G data is initially performed electronically; an approved interpretation method is automatically perfor
the manufacturer (Table 4) (38). A complete description of the test's interpretation is included in the product insert.

**Persons with Suspected Pulmonary TB**

Multiple types of abnormalities demonstrated on chest radiographs are strongly suggestive of pulmonary TB disease, includi
cavitation, and pleural effusion. Infiltrates can be patchy or nodular and observed in the apical or subapical posterior upper l
lower lobes. If radiographic or clinical findings are consistent with TB disease, further studies (e.g., medical evaluation, myc
sputa or tissue, and comparison of current and prior chest radiographs) should be performed (65). Persons with TB pleural ef
unsuspected pulmonary or laryngeal TB disease (94). These patients should be considered infectious until pulmonary and lar
Patients with suspected extrapulmonary TB disease also should be suspected of having pulmonary TB until concomitant pulh
The radiographic presentation of pulmonary TB in HIV-infected persons might be atypical. Apical cavitory disease is less co
HIV-negative patients. More common findings among HIV-infected persons are infiltrates in any lung zone, mediastinal or l
normal chest radiograph (65,95–97).

**Persons with LTBI**

To exclude pulmonary TB disease, a chest radiograph is indicated for all persons in whom LTBI is diagnosed. If chest radiog
TB, and no symptoms consistent with TB disease are present, persons with positive test results for TB infection should be co
Persons with LTBI typically have normal chest radiographs, although they might have abnormalities suggestive of previous’
conditions. In certain patients with TB symptoms, pulmonary infiltrates might be apparent on chest computed tomography sc
study but not on chest radiograph. Previous, healed TB disease typically produces radiographic findings that differ from thos
disease. These findings include nodules, fibrotic scars, calcified granulomas, and apical pleural thickening. Nevertheless, a c
used to distinguish between current and healed TB. Nodules and fibrotic scars might contain slowly multiplying tubercle bac
progression to TB disease. Calcified nodular lesions (i.e., calcified granulomas) and apical pleural thickening indicate lower
(65).

**Pregnant Women**

Because TB disease is dangerous to both the mother and the fetus, a pregnant woman who has a positive TST or QFT-G resu
TB disease should receive a chest radiograph (with shielding consistent with safety guidelines) as soon as feasible. If sympto
(e.g., HIV infection) are identified, a chest radiograph might have to be performed during the first trimester of pregnancy (64)

**Evaluation of Sputum Samples**

Sputum examination is a key diagnostic procedure for pulmonary TB disease (93) and is indicated for the following inmates
- persons suspected of having pulmonary TB disease because of a chest radiograph consistent with TB disease, partic
symptoms suggestive of TB disease;
- persons with chest radiographic findings suggestive of previous, healed TB disease;
- HIV-infected persons with any pulmonary symptoms (regardless of chest radiograph findings); or
- persons suspected of having pulmonary TB disease for which bronchoscopy is planned (all sputum specimens shoul
staining for AFB should have been reviewed before proceeding with bronchoscopy [67]).

**Specimen Collection**

Persons requiring smear- and culture-sputum examination should submit at least three sputum speci

hours apart, with at least one specimen collected in the early morning) (71,99). Specimens should be collected in an induction booth or in an AII room. In resource-limited settings without environmental containment, performed outdoors. Patients should be instructed how to produce an adequate sputum specimen. A health care professional should supervise and observe the collection of sputum, if possible (93). For patients with an adequate sputum specimen, expectoration might be induced by inhalation of an aerosol of warm, hypertonic saline (71).

Laboratory Examination

Detection of AFB in stained smears by microscopy can provide the first mycobacteriologic indication of TB disease. A positive result for AFB in a sputum smear is predictive of increased infectiousness; however, negative smear results do not exclude a diagnosis of TB disease if clinical suspicion is high. In 2002, only 63% of U.S. patients with reported positive sputum cultures had positive AFB sputum smears (100).

Although smears allow for the detection of mycobacteria, definitive identification, strain typing, and drug-susceptibility testing of M. tuberculosis can be performed only via culture (93). A culture of sputum or other clinical specimen that contains M. tuberculosis provides a definitive diagnosis of TB disease. In the majority of cases, identification of drug-susceptibility results are available within 28 days using recommended rapid methods (e.g., line probes). A negative culture result is obtained in approximately 14% of patients with confirmed PTB. Testing sputum with certain techniques (e.g., nucleic acid amplification [NAA]) facilitates the rapid identification of M. tuberculosis, but should not replace culture and drug-susceptibility testing in patients with suspected TB disease (88,101,102). Recommendations for use and interpretation of NAA tests in the diagnosis of TB disease have been published previously (101,102).

Laboratories should report positive smear results within 24 hours of collection and positive culture results within 7 days. Drug-susceptibility tests should be performed on initial isolates from all patients to assist in the identification of an effective anti-TB regimen. Drug-susceptibility tests should be repeated if 1) sputum specimens continue to be culture-positive 3 months after initiation of treatment or if 2) persons whose cultures had converted to negative subsequently revert to positive (65,93).

Treatment for LTBI

Treatment for LTBI is essential to controlling and eliminating TB disease in the United States because it substantially reduces the risk that TB infection will progress to TB disease (23). Certain persons are at high risk of developing TB disease once infected, and every effort should be made to begin these persons on a standard LTBI treatment regimen as soon as possible. Treatment for LTBI should be initiated for persons who have contact with an active case of TB, who were born in or have resided in an area with a high prevalence of TB disease, or who have other risk factors (e.g., HIV infection, organ transplantation). All other correctional facility staff and inmates should be considered for treatment of LTBI if their TST results are >10 mm induration. If QFT-G is used, any correctional facility staff member or inmate with a positive QFT-G result should be considered for LTBI treatment. Decisions regarding initiation of LTBI treatment should include a careful assessment of the likelihood of the patient continuing and completing LTBI treatment under supervision if released from the facility before the treatment regimen is completed.

Persons with previously positive TST results who have previously completed treatment for LTBI (4 months of rifampin, or another regimen) do not need to be treated again unless concern exists th
All patients should undergo clinical monitoring at least monthly. This monitoring should include:

1. A brief clinical disease evaluation.
2. Persons who use alcohol regularly.
3. Persons with a history of liver disease.
4. Women in the immediate postpartum period (typically within 3 months of delivery).
5. Persons at risk for hepatic disease.

Baseline laboratory tests are indicated for patients with abnormal baseline tests and for persons at risk for severe liver injury.

**Pretreatment Evaluation and Monitoring of Treatment**

Patient. Treatment should be guided by in vitro susceptibility test results from the isolate to which the patient was exposed.

**Contacts of Patients with Drug-Susceptible TB Disease**

Contacts of patients with drug-susceptible TB disease who have been previously treated should be evaluated for treatment of LTBI. The majority of persons who are infected result within 6 weeks of exposure; therefore, contacts of patients with drug-susceptible TB disease TSTs should be retested 8–10 weeks after the end of exposure to a patient with suspected or confirmed LTBI. Persons with TB infection should be advised that they can be re-infected with *M. tuberculosis* if they have not been treated previously, HIV-infected persons (regardless of TST result or previous LTBI), persons receiving immunosuppressive therapy (regardless of TST result or previous LTBI treatment), and persons with a previous history of liver disease are relative contraindications to the use of isoniazid or pyrazinamide for treatment of LTBI (64,103). If the decision is made to treat such persons, baseline and follow-up monitoring of serum aminotransaminases are recommended.

**Treatment Regimens for LTBI**

Standard regimens have been developed for the treatment of LTBI (Table 5). The preferred treatment of daily isoniazid or biweekly dosing administered by DOT. Although regimens are broadly applicable for certain populations (e.g., patients with HIV infection) and when drug resistance is demonstrated, risk for severe liver injury and death associated with the combination of rifampin and pyrazinamide LTBI prompted ATS and CDC to revise previous recommendations. These recommendations now typically should not be offered for the treatment of LTBI (64,103–107). If the potential benefits substantially outweigh the demonstrated risk for severe liver injury and death associated with this regimen and the patient has a regimen may be considered; a physician with experience treating LTBI and TB disease should be consulted. Clinicians should continue the appropriate use of rifampin and pyrazinamide in standard regimens for the treatment of TB disease (65).

For all LTBI treatment regimens, nonadherence to intermittent dosing results in a larger proportion of missed doses than daily dosing; therefore, all patients on intermittent treatment should receive DOT. In addition, DOT for LTBI is recommended for patients with the highest priority for DOT risk for progression from LTBI to TB disease, including persons with HIV infection and persons with infectious patients with pulmonary TB.

**Contacts of Patients with Drug-Resistant TB Disease**

Treatment for LTBI caused by drug-resistant *M. tuberculosis* organisms is complex and should be conducted in consultation with the local health department's TB control program and persons with expertise in the medical management of drug-resistant TB. Often this will require waiting for results of susceptibility testing of the isolate from the source of infection. Treatment for LTBI should not be initiated until a diagnosis of TB disease has been excluded. If the decision is made to treat such persons, baseline and follow-up monitoring of serum aminotransaminases are recommended.

**Pretreatment Evaluation and Monitoring of Treatment**

Routine laboratory monitoring during treatment of LTBI is indicated only for patients with abnormal laboratory tests. Baseline laboratory testing is indicated only for persons infected with *M. tuberculosis*.

All patients should undergo clinical monitoring at least monthly. This monitoring should include...
assessment regarding the signs of hepatitis (i.e., nausea, vomiting, abdominal pain, jaundice, and \( \gamma \) 2) education about the adverse effects of the drug(s) and the need for prompt cessation of treatment should adverse effects occur. All aspects of the clinical encounter should be conducted in private a language.

Severe adverse events associated with the administration of tuberculin antigen or treatment of LT those resulting in hospitalization or death) should be reported to MedWatch, FDA's Safety Inform Reporting Program at telephone 800-FDA-1088, by facsimile at 800-FDA-0178, or via the Internet 3500 (available at [http://www.fda.gov/medwatch/safety/3500.pdf](http://www.fda.gov/medwatch/safety/3500.pdf)). Instructions regarding the type should be reported are included on MedWatch report forms. In addition, severe adverse effects as treatment should be reported to CDC's Division of Tuberculosis Elimination at telephone 404-639

Treatment for TB Disease

A decision to initiate treatment (i.e., combination anti-TB chemotherapy) should be made on the l information; clinical, pathological, and radiographic findings; and the results of microscopic exam sputum smears and cultures for mycobacteria. A positive AFB-smear result provides strong inferi diagnosis of TB, and combination chemotherapy should be initiated promptly unless other strong diagnosis of TB disease is present (e.g., a negative NAA test). If the diagnosis is confirmed by isola positive NAA test, treatment should be continued until a standard course of therapy is completed.

patients with positive sputum culture results for *M. tuberculosis* will have negative sputum AFB-s initial AFB-smear results are negative, empiric therapy for TB is indicated if the clinical suspicion Regardless of the decision to begin anti-TB treatment, diagnoses other than TB should be consider evaluations undertaken in patients with negative AFB-smear results. A diagnosis of culture-negative made if sputum cultures are negative, the TST result is positive (in this circumstance, a reaction 0 considered positive), a clinical or radiographic response is observed 2 months after the initiation of diagnosis has been established. An adequate regimen for culture-negative pulmonary TB includes isoniazid and rifampin to complete 4 months of treatment (65). If no clinical or radiographic response months, treatment can be stopped, and other diagnoses (including inactive TB) should be consider are negative, and suspicion for TB disease is low, treatment can be deferred until the results of my known and a comparison chest radiograph is available (typically at 2 months). Among persons who treatment and in whom suspicion of TB is low, treatment of LTBI should be considered if 1) cultu result is positive (>5 mm induration), and 3) the chest radiograph is unchanged after 2 months. A should be consulted for unusual or complex situations.

Individualized case management should be provided for all patients with TB disease (114--116). It management should be coordinated with officials of the local or state health department; suspecte should be reported to the local or state health department in accordance with laws and regulation disease should contain multiple drugs to which the organisms are susceptible. For persons with TI single drug can lead to the development of mycobacterial resistance to that drug. Similarly, addin anti-TB regimen is not recommended because it can lead to resistance to the added drug (65).

For the majority of patients, the preferred regimen for treating TB disease consists of an initial 2-rifampin, pyrazinamide, and ethambutol, followed by a continuation phase of isoniazid and rifam minimum total treatment period of 6 months (Tables 6 and 7). The decision to stop therapy shoul the number of doses taken within a maximum period (not simply a 6-month period) (65). Persons TB disease and positive cultures of sputum specimens at the completion of 2 months of therapy sh month continuation phase of therapy (total duration: 9 months) because of the substantially highe persons with this type of TB disease (65).

If interruptions in TB therapy occur, the decision should be made whether to restart a complete c continue the regimen as originally intended. In the majority of instances, the earlier the break in t
duration, the more serious the effect and the greater the need to restart the treatment from the beginning of therapy, when the bacillary burden is highest and developing drug resistance is greatest. Although no evidence on which to base detailed recommendations on practical algorithms for managing interruptions in therapy have been described previously (65). For HIV-infected persons who are receiving antiretroviral therapy, TB treatment regimens might be adjusted accordingly (65).113,114,118,119

The primary determinant of treatment outcome is patient adherence to the drug regimen. Thus, care must be paid to measures designed to enable and foster adherence (65,119,120). DOT is the preferred treatment strategy for all persons with TB disease and high-risk (e.g., HIV infected) persons with LTBI. DOT should be used as the course of therapy whenever feasible. Practitioners providing treatment to inmates should coordinate with the local health department on an inmate's release. The local health department also may be involved in the care of persons who are receiving antiretroviral therapy, TB treatment regimens might need to be altered.

Challenges to Treatment Completion Achieving completion of treatment for LTBI or TB disease often is difficult, particularly in correctional systems that include discharge planning and coordination with health departments is needed to ensure completion of therapy for patients with TB disease. Multiple studies have demonstrated that inmates have relatively low LTBI treatment completion rates (14,28,40,122). For a substantial proportion of inmates, referrals for follow-up after release are not made; of inmates whose appointments are scheduled, 40% do not attend their first clinic visit (36,40). Multiple interventions have been attempted to improve completion rates for LTBI treatment (14,42).
Discharge Planning

Correctional facilities should plan for the discharge of inmates and other detainees who have confirmed or suspected TB disease and those with LTBI who are at high risk for TB disease. Such planning is crucial to effect within the community to which released inmates return. Facilities should ensure that their discharge and effective; the process should include 1) collaborating with public health and other community 2) ensuring continuity of case-management, and 3) evaluating discharge-planning procedures and needed to improve outcomes.

Collaboration Between Correction Facilities and Public Health Officials

Postconfinement follow-up is a necessary component of TB-control efforts (35,124). Effective discollaboration between corrections and medical staff (both intra- and inter-facility), and with publi based service organizations (37). Correctional facilities and public health departments should overcome multiple obstacles associated with postdetention follow-up (I25), including

• short length of stay in a facility;
• unscheduled release or transfer;
• poorly defined or implemented channels of communication between correctional and publi limited resources (i.e., staff, equipment, and medications) available to provide recommend screening, treatment, and discharge-planning services;
• limited resources of the patient to make or keep appointments;
• high prevalence of mental illness and substance abuse among correctional patients;
• mistrust among inmates, which might result in the provision of aliases or incorrect contact and
• reincarceration with disruption in treatment or termination of public benefits.

Collaboration is essential to ensure that TB-control efforts are undertaken in the most cost-effect between the correctional facility and the public health department maximizes the effectiveness of ; correctional facility (I26), and linking released detainees to the public health-care system might in adherence (35) and reduce recidivism (I27,128). The types of relationships forged will depend on t risk in the facility and the community.

Comprehensive Discharge Planning

Comprehensive discharge planning is an important component of case management and is essenti continuity of TB management and therapy among persons with TB disease and LTBI. Following housing, employment, and other crises concerning basic needs that often take priority over their h from the United States and other countries support the use of comprehensive discharge planning i (42,129,130). Comprehensive discharge planning should be implemented for inmates with confirm TB disease, and LTBI who also are at high risk for TB disease. Discharge planning for persons with LTBI who are considered at high risk for developing TB disc is begun in the correctional facility. Starting all inmates at high risk on LTBI therapy might not b the correctional facility, and the policy determining which risk groups to start on treatment shoul with public health personnel. Collaboration ensures appropriate communication and adequate re transfer to another facility or after release to the community. At minimum, all inmates who have a correctional facility should be given community contact information for follow-up and continuit inmates demonstrated to be infected with TB should be considered for therapy, and discharge pla should be comprehensive (I24). Because of high recidivism rates, discharge-planning efforts shoul phase and continue in the post-detention phase to ensure continuity of care as inmates move amon between correctional facilities and the community.

Components of Discharge Planning

...
Initiate Discharge Planning Early
To ensure uninterrupted treatment, discharge planning for inmates who receive a diagnosis of TB soon as possible after diagnosis (131). Corrections or health services administrators (or their designs notify the public health department of inmates receiving treatment for TB disease or LTBI. Inmates be interviewed while still incarcerated (ideally by public health staff) to enable facility administrators the appropriate support and referrals that will be needed after discharge (131). Such personnel will with other facilities in the event of transfers of inmates.

Provide Case Management
To ensure continuity of care, all correctional facilities should assign personnel (preferably health-care professionals) to serve as case managers. These managers should be responsible for conducting discharge planning in the coordinating follow-up and communicating treatment histories with public health department counterparts within the community (42). In addition, case managers should employ strategies (e.g., referral, substance-abuse assessment and treatment, and prerelease appointments for medical care) to meet basic survival needs on release. The role of case manager should be assigned to a facility staff establishing good rapport with inmates; an effective case manager might be capable of persuading released into the community to supply accurate information needed to ensure follow-up care.

The following factors should be considered when planning community discharge of an inmate receiving treatment for TB (132):
- Where will the ex-inmate reside after discharge (e.g., a permanent residence, a halfway house)?
- Will family or other support be available?
- Are cultural or language barriers present?
- What kind of assistance will be needed (e.g., housing, social services, substance abuse services, medical services, and HIV/AIDS services)?
- Does the inmate understand the importance of follow-up and know how to access health-care services?

Obtain Detailed Contact Information
To facilitate the process of locating former inmates, detailed information should be collected from disease or LTBI for whom release is anticipated, including 1) names, addresses, and telephone numbers of friends, relatives, and landlords; 2) anticipated place of residence; and 3) areas typically frequented (e.g., restaurants, community centers) (61,133). Inmates also should complete a release form authorizing health department contact worksites, family members, corrections staff (parole officers), and public and private treatment centers. Inmates might give aliases or incorrect contact information because of fear of incrimination or deportation, a barrier to continuity of care on reentry to a correctional facility.

Assess and Plan for Substance Abuse and Mental Health Treatment and for Other Social Services
Substance abuse and other comorbid mental health conditions should be considered when developing discharge plans. Addiction affects health care, medication adherence, housing opportunities, social employment, and might be the greatest barrier to continuity of care for TB (134). Mental illness community service providers have not been trained to interact with mentally ill patients. Persons have difficulties keeping medical appointments. Collaboration between corrections and health department personnel can facilitate the placement of former inmates in substance abuse or mental-health treatment programs to improve the likelihood of social stabilization and continuity of care (134,135).

Other social issues present barriers to released inmates. Loss of health insurance benefits while in former inmates might be required to wait 30-365 days after release to become re-eligible for benefits. Correctional facilities have agreements with local Social Security Administration field offices to facilitate the reactivation of these benefits (138); creation of and training in the use of such agreements are encouraged. Ideally, correctional system, public benefits would be suspended, rather than terminated, and reactivated
gaps in coverage. Application for public benefits and insurance should be incorporated into the di whenever possible. If the inmate is likely to have limited access to care because of inability to pay documentation should be made and another treatment mechanism identified (139).

Make Arrangements for Postrelease Follow-Up
Before release, the inmate should be introduced (preferably face to face) to the employee from the agency who is responsible for community-based treatment and care (139). When release dates are appointments has been demonstrated to improve compliance (128,134,140). Patients with TB disease; supply of medication at discharge adequate to last until their next medical appointment. Discharge advocacy groups or private or government-funded programs to facilitate a safe, supported transit (61).

Make Provisions for Unplanned Release and Unplanned Transfers
Administrative procedures should be in place for unscheduled discharge of inmates who are being TB (36,141). Reporting requirements for inmates with TB disease who are released or transferred among states and jurisdictions. Despite mandatory notification policies, notification of public health 87%—92% for inmates with TB disease (37,126) to only 17% for inmates with LTBI (36,37). Correctional responsible for health department notification should relay information about all scheduled and unscheduled release. All TB information concerning persons who are being transferred to other correctional facilities should be provided to the receiving facility. In addition, inmates should be given a written summary or discarding a treatment plan to ensure continuity of care in case of unplanned and unanticipated release (131,132) disease who are eligible for release or transfer to another medical or correctional facility but continue to be infectious during their time in prison.

Provide Education and Counseling
Patient education and documentation of education in the correctional facility is critical; multiple studies have shown that higher levels of patient education and documented counseling correlate with better treatment outcomes (143). Persons receiving treatment should be counseled about the importance of adhering to the treatment plan (131) as a measure to improve postrelease follow-up (61). Education should be provided in the inmate's preferred language and should be culturally sensitive with respect to ethnicity, sex, and age (131). Education should be actively involved in all education sessions to encourage communication regarding previous treatment experiences (e.g., the inmate's treatment motivations and any positive or negative experiences with specific providers) (141). LTBI who have not been started on therapy should be counseled on their risk factors, encouraged to visit the local health department, and provided with information about access to care after release.

DOT
DOT for TB disease or LTBI in the correctional setting provides an opportunity for educating and for establishing a routine of medication administration. The effect, if any, of DOT on postrelease treatment and care (122).

Community-Based Case Management after Release
Case-management strategies begun in the correctional facility should be continued after release for confirmed or suspected TB disease and those with LTBI who are at high risk for progression to TB disease. Enablers (see Glossary) have improved adherence in incarcerated (35,60,61) and nonincarcerated incentives combined with education and counseling optimize both short- and long-term adherence management that takes into account cultural differences and addresses not only TB-control needs (particularly among foreign-born persons) results in improved completion rates for LTBI treatment (141) management by health department personnel after release is critical for continuity of care in the community. The provision of follow-up information from local health departments and community-based organizations is helpful in determining whether discharge planning is effective.

Discharge Planning for Immigration and Customs Enforcement Detainees
Background

Persons with TB disease detained by ICE officers are a potential public health threat because they mobile, likely to leave and reenter the United States before completion of TB therapy, and at high treatment (151). Therefore, ensuring treatment of such detainees is important to the national strategy to eliminate TB in the United States (32,152).

In March 2003, the detention and removal functions of the former Immigration and Naturalization transferred from the U.S. Department of Justice (DOJ) to the U.S. Department of Homeland Security division of DHS and detains approximately 200,000 persons annually while enforcing immigration screened for TB disease at service processing centers, staging facilities, contract detention facilities, transfers of ICE detainees between detention facilities are common.

ICE detention provides an opportunity to identify persons with confirmed and suspected TB disease. ICE detainees with confirmed or suspected TB disease receive treatment while they are in custody. Presently, ICE does not deport detainees with known infectious TB, but such persons might be deported when noncontagious, even if treatment has not been completed or the final culture and susceptibility results are pending.

Discharge Planning for ICE Detainees

In May 2004, ICE approved a policy to implement a short-term medical hold of persons with suspected disease until continuity of care is arranged, which affords the ICE health services program the time to arrange continuity of TB therapy arrangements before the patient's release or removal. The ICE health services program all persons with confirmed or suspected TB disease in programs that facilitate the continuum of care. These programs (e.g., CureTB, TB Net, and the U.S.-Mexico Binational Tuberculosis R Management Project) facilitate TB referrals and follow-up for patients who move between the United States.

ICE field office directors may consider a stay of removal for persons with MDR TB or other complications who receive and complete treatment in the United States before removal. In detention settings in which facility staff who are responsible for TB communication should notify the ICE health services program of persons with confirmed or suspected TB disease. Collaboration with detention facilities and local and state health departments will facilitate enrollment in the appropriate continuity of care program before transfer, release, or repatriation. Correctional facility staff should identify these patients as ICE detainees when reporting TB cases to local and state health departments.

Evaluation of Discharge Planning Effectiveness

Evaluation of a discharge planning program is critical and should begin with an assessment of existing programs and activities. Program evaluation should be incorporated into the overall correctional quality improvement program (153). Data from program evaluation studies should be documented and published to ensure that public health department staff are informed regarding effective measures and the effective translation of research findings into practice (123). Evaluation of discharge planning should include measurements of

- adherence to therapy,
- cost savings (from unduplicated testing for persons with LTBI and completion of care with extensions),
- recidivism, and
- the effectiveness of the collaboration between medical and corrections staff (both within an facility and between correctional facilities and the public health department and other community agencies.

Contact Investigation

Overview

Multiple outbreaks of TB, including those involving MDR TB, have been reported in prisons and facilities. The identification of a potentially infectious case of TB in a confined setting can prevent a TB outbreak or contain one that has already begun (16,21,155).
The overall goal of a TB contact investigation is to interrupt transmission of \textit{M. tuberculosis}. Ongoing transmission is prevented by 1) identifying, isolating, and treating persons with TB disease (source and secondary identifying infected contacts of the source patient and secondary patients and providing them with treatment for LTBI. The contact investigation can serve to educate corrections staff and inmates and prevent of TB in correctional facilities; inform staff and inmates regarding the importance of recommended TB-control practices and procedures within the correctional system; and emphasize completion of therapy for persons with TB disease and LTBI.

Because decisions involved in planning and prioritizing contact investigations in correctional facilities is complex, a multidisciplinary team is preferable. Health departments often can help correctional facilities plan and evaluate a TB contact investigation.

Data collection and management is an essential component of a successful investigation (21, 36). It approach to collecting, organizing, and analyzing TB-associated data. As part of the contact investigation, personnel should adopt a uniform approach. Investigators should have a clear understanding of exposure definition and what constitutes an exposure (156--158).

Two correctional information systems are critical to the efficient conduct of a contact investigation: 1) an inmate medical record system containing TST results and other relevant information and 2) an inmate tracking system. The lack of either system can lead to the unnecessary use of costly personnel time and medical evaluation resources (e.g., TSTs and chest radiographs). Without these information systems, facilities also might be forced to implement costly lockdowns and mass screenings.

TB Transmission Factors

TB transmission is determined by the characteristics of the source patient and exposed contacts; the circumstances surrounding the exposure itself also determine whether ongoing transmission will occur. The following variables should be accounted for when planning each contact investigation.

Characteristics of the Source Patient

Source patients who have either cavitation on chest radiograph or AFB smear-positive respiratory specimens or who have both characteristics are substantially more likely to transmit TB than persons who have neither characteristic (159--163). Source patients have also been associated with an increased likelihood of transmission (164). None variability exists among the infectiousness of a given TB source patient. Although AFB smear status, cavitary disease, and delayed diagnosis increase the likelihood of transmission, certain persons with these characteristics might infect multiple persons, whereas others with none of these characteristics might infect few persons. The best measure of the infectiousness of source patients is the documented infection rate among their contacts.

Characteristics of Persons Who Have Been Identified as Contacts

Immunosuppression. HIV infection is the greatest single risk factor for progression to TB disease. Contacts should receive the highest priority for evaluation of TB infection, even if these persons have exposure than other contacts. Persons receiving prolonged therapy with corticosteroids, chemotherapeutic immunosuppressive agents (e.g., TNF-a antagonists) also should be considered high priority for investigation. Persons with end-stage renal disease and diabetes mellitus should be promptly evaluated, because these conditions are associated with compromised immune function.

Age. Young children (i.e., those aged <4 years) are at high risk for rapid development of TB disease, including TB meningitis. If an inmate with TB identifies a young child as a community contact, a health department should be notified immediately.

Exposure Characteristics

Air volume. The volume of air shared between an infectious TB patient and susceptible contacts is the likelihood of transmission. Infectious particles become more widely distributed as air space increases, making them less likely to be inhaled.

Ventilation. Ventilation is another key factor in the risk for airborne transmission of disease. Airb
Disburse throughout an entire enclosed space; thus, if air is allowed to circulate from the room occupied by an infectious patient into other rooms or central corridors, their occupants also will be exposed. Areas that have little or no ventilation or 2) recirculated air without HEPA filtration have been associated with transmission.

Duration of exposure. Although transmission of TB has occurred after brief exposure, the likelihood of infection after exposure to an infectious patient is associated with the frequency and duration of exposure. However, constituting a substantial duration of exposure for any given contact is difficult. When conducting a contact investigation, priority should be given first to inmates and employees who were most exposed to the source patient. 

Decision to Initiate a Contact Investigation

The decision to initiate a contact investigation for an inmate or detainee with possible TB is made based on each potential source patient's clinical presentation and opportunities for exposure should be evaluated. Contact investigations should be conducted in the following circumstances:

- Suspected or confirmed pulmonary, laryngeal, or pleural TB with cavitary disease on chest AFB smears (sputum or other respiratory specimens). If the sputum smear is positive and unlikely, and a contact investigation typically can be deferred. A negative NAA on an AFB smear, however, should not influence decisions about the contact investigation.
- Suspected or confirmed pulmonary (noncavitary) or pleural TB with negative AFB smears (respiratory specimens) and a decision has been made to initiate TB treatment. A more limited initial investigation may be conducted for smear-negative cases.

Contact investigations typically are not indicated for extrapulmonary TB cases (except for laryngeal or pleural involvement) is also diagnosed. The decision as to whether the facility should conduct a contact investigation should be guided by the following basic principles:

- Identified contacts should be stratified by their duration and intensity of exposure to the source patient.
- HIV-infected contacts should be classified as the highest priority group for screening and initiation of LTBI therapy, regardless of duration and intensity of exposure.
- Identified groups of contacts with the greatest degree of exposure should be screened immediately, followed by repeat testing at 8–10 weeks if the initial TST or QFT-G is negative.
- The infection rate should be calculated to assess the level of TB transmission.
- Decisions to expand the contact investigation to groups with less exposure should be made based on the calculated infection rate. If no evidence of transmission is observed, the investigation should be expanded incrementally to groups with less exposure. If transmission is occurring, the contact investigation should be expanded further.
- Corrections and medical staff should be included in the contact investigation depending on the level of risk.

Ideally, decisions about structuring the contact investigation should be made collaboratively with a team that includes input from the state or local health department. For certain investigations, screening a convenience sample before expanding the investigation is prudent. For example, in jail investigations, multiple contacts might already have been released, rendering those who remain incarcerated the only available group for screening.
of high priority contacts cannot be evaluated fully, a wider contact investigation should be considered. The investigation should focus on identifying the contacts at highest risk for transmission, screening all contacts at highest risk for transmission, and providing a full course of LTBI treatment for persons demonstrated to be infected. In general, broad investigations divert attention away from the high priority activities necessary to interrupt transmission in the facility. Mass screening of all persons who had any contact with the source patient should be avoided (166). Rarely is a person so infectious that wide-scale expansion of the contact investigation is necessary or beneficial.

Medical Evaluation of Contacts

Appropriate medical evaluation depends on both the immunologic status (e.g., HIV infection) of the contact and previous TST or QFT-G results. Adequate knowledge of these data is possible only through use of a medical record system that is complete, up-to-date, and reliable with regard to TST or QFT-G status, testing date, and documentation of the reading in millimeters (for TST). Without an adequate medical record system (and therefore definitive information regarding prior TST or QFT-G results), the true infection and transmission rates cannot be determined. The lack of such information is likely to lead to unnecessary expansion of the contact investigation.

All Contacts

All contacts should be interviewed for symptoms of TB disease using a standard symptom questionnaire. Symptomatic contacts should receive a chest radiograph and a complete medical evaluation by a physician, regardless of TST or QFT-G status; they also should be isolated appropriately (i.e., inmates should be placed in an AII room if by chest radiograph or clinical findings; staff should not be permitted to work).†† HIV testing should be considered for all contacts whose HIV status is unknown.

Inmates with Documented Previous Positive TST or QFT-G results

Inmates who are asymptomatic, HIV-negative, and have previous positive TST or QFT-G results other than consideration for "routine" treatment of LTBI, if not completed in the past. However, signs or symptoms suggestive of TB, further evaluation should be conducted (e.g., a chest radiograph or respiratory symptoms).

HIV-Infected Inmates

HIV-infected contacts should be interviewed for symptoms, have a TST or QFT-G and chest radiograph at baseline and again in 8--10 weeks. The results of the TST or QFT-G will not affect treatment decisions for the contact investigation. Anergy testing is not recommended (52).

Previous TST-Negative or QFT-G--Negative Inmates (HIV Negative)

Mandatory tuberculin skin or QFT-G testing of all previously TST-negative or QFT-G--negative inmate contacts should be conducted at baseline (unless previously tested within 1--3 months of exposure). Testing should be the most recent contact with the source patient (58,167).

TST and QFT-G Converters

Persons whose TSTs or QFT-Gs convert or those with newly documented, positive TST or QFT-G treatment for LTBI unless medically contraindicated. If inmate contacts refuse medically indicated treatment, they should be monitored regularly for symptoms. Certain facilities have chosen to monitor HIV-infected contacts with follow-up chest radiographs.

Contact Investigation Stepwise Procedures

The following steps are involved in conducting a contact investigation and might overlap in time. confirmed or suspected of having TB disease, the case should be reported to the appropriate local health authorities and contacts promptly evaluated.

- Notify correctional management officials. Identification of TB in an inmate or facility staff for other inmates, corrections staff, and the community. The administrator should be notified.
chain of command that a case of TB has been identified in the institution so that appropriate efforts can be initiated.

- Conduct a source patient chart review. The following data (with specific dates) should be collected: 1) previous exposure to TB, 2) history of TB symptoms (e.g., cough, fever, and night sweats), 3) (particularly unexplained weight loss), 4) chest radiograph reports, 5) previous TST or QFT mycobacteriology results (e.g., AFB smears, cultures, and susceptibilities), 6) NAA test results.

- Interview the source patient. A chart review and case interview should be accomplished within 1 working day for persons with AFB smear-positive respiratory specimens or cavitation on chest radiograph. Source patients should be asked concerning TB symptom history, with duration of cough. Source patients also should be asked about where they conduct their daily activities. Persons with confirmed or suspected TB who were detained during the course of the infectious period should be interviewed regarding potential community contacts, particularly HIV-infected persons and young children regarding the location of community contacts also should be obtained. Source patients should be questioned regarding contacts during a second interview conducted 7-14 days after the first.

- Define the infectious period. Defining the infectious period for a source patient helps investigators determine how far back to go when investigating potential contacts. The infectious period is typically defined as: diagnosis or onset of cough (whichever is longer). If a patient has no TB symptoms, is AFB smear-negative, and has a noncavitary chest radiograph, the presumed infectious period can be reduced to 4 weeks by positive finding consistent with TB. If the contact investigation reveals that TB transmission occurred throughout the identified infectious period, the period for contact investigation might need to be expanded.

- Convene the contact investigation team. After TB is diagnosed, a team of professionals (e.g., infection control, medical, nursing, custody, and local public health personnel) should be convened and charged with planning the contact investigation. A team leader should be identified and the roles and responsibilities defined, and a schedule of regular meetings (documented formally with written minutes) should be established. In addition, a communications plan and a plan for handling contact investigation data should be developed.

- Update correctional management officials. Administrative personnel should be kept apprised of the strategy, process, and action steps involved in conducting the contact investigation.

- Obtain source case inmate traffic history. The dates and locations of the source patient's housing during the infectious period and information regarding employment and education should be obtained. Groups categorized by duration of exposure and immune status should be prioritized.

- Tour exposure sites. A tour should be conducted of each place the source patient lived, worked, or went to school during the infectious period. In addition, information should be obtained regarding any correctional facility that has housed the source patient during the infectious period, including: 1) the number of inmates housed at one time, 2) the housing arrangement (e.g., cells versus dorms), 3) the general size of the air space, 4) the ventilation system (e.g., whether air is recirculated), 5) the pattern of daily inmate movement (e.g., eating, working, and recreating), and 6) the availability of data on other inmates housed at the same time as the source patient. The assistance of a facility engineer often is necessary to help characterize the ventilation system and airflow direction within a correctional facility.

- Prioritize contacts. Contacts should be grouped according to duration and intensity of exposure. Preventing the most exposure and HIV-infected or other immunosuppressed contacts (regardless of duration) should be considered highest priority. Because progression from exposure to death can be rapid among HIV-infected persons housed or congregated separately, the entire group should be given high priority.

- Develop contact lists. Rosters of inmate and employee contacts from each location should be current location investigated. Lists of exposed contacts should be generated and grouped ac...
location (e.g., still incarcerated, released, and transferred).

- Conduct a medical record review on each high-priority contact. TST or QFT-G status, the history of treatment for LTBI, HIV status, and other high-risk medical conditions should be documented to ensure that attention should be given to weight history and previous visits to facility health-care professionals. Dates should be carefully recorded.
- Evaluate HIV-infected contacts for TB disease and LTBI promptly. LTBI therapy should be provided for all persons who have been released or receiving their initial TST or QFT-G.
- Place and read initial TSTs or perform QFT-Gs on eligible contacts. Tuberculin skin or QFT-G results should be conducted at baseline (unlike 1-3 months of exposure). Referrals should be made for persons who have been released or receiving their initial TST or QFT-G.
- Place and read follow-up TSTs or perform follow-up QFT-Gs. Tuberculin skin or QFT-G results for contacts who had a negative TST result on initial testing should be placed on eligible contacts. Tuberculin skin or QFT-Gs for contacts who had a negative TST result on initial testing should be placed on eligible contacts. Follow-up TST or QFT-G results for a contact investigation team should analyze the infection/transmission rate. The infection rate from the second round of testing should be calculated by exposure site. In addition, if testing, separately calculating the rate for U.S.- versus foreign-born inmates might provide born contacts often have a history of BCG vaccination, and a TST "conversion" among these contacts might represent a vaccination-associated "booster" TST response (168). The contact investigation infection rate(s) and decide whether to expand the investigation.
- Place and read follow-up TSTs or perform follow-up QFT-Gs. Follow-up TSTs or QFT-Gs negative TST or QFT-G result on initial testing should be placed 8-10 weeks after exposure ended. Referrals should be made for persons who have been released or transferred and not QFT-G.
- Determine the infection/transmission rate. The infection rate from the second round of testing should be calculated by exposure site. In addition, if testing, separately calculating the rate for U.S.- versus foreign-born inmates might provide born contacts often have a history of BCG vaccination, and a TST "conversion" among the represent a vaccination-associated "booster" TST response (168). The contact investigation infection rate(s) and decide whether to expand the investigation.
- Write a summary report. The summary report should briefly describe the circumstances of the investigation, how it was conducted, the results of the investigation (e.g., the number of secondary cases identified, transmission rates), and any special interventions required (including follow-up plans). This report should be distributed to corrections administrators and the local health department.

**Tuberculosis Training and Education of Correctional Workers and Inmates**

TB training and education of correctional workers and other persons associated with any correctional volunteers and inmates) can help lower the risk for TB transmission and disease. To ensure the effectiveness of such training and education, multiple factors should be considered. First, correctional facilities and local or state health departments should collaborate when providing TB training and education to correctional workers; specifically, work with health department staff to provide them with corrections-specific training. Second, routine TB education should be provided for all persons who spend significant time in the facility, and additional training should be given to any employee who will interact with persons at risk for TB. The ideal amount of training time and information should be provided for all persons who spend significant time in the facility.
receive training and education regarding *M. tuberculosis* as part of in-facility, preservice training should be provided at least annually thereafter.

In-facility training and education efforts can build on existing sources of TB-related preservice education. Regional and national professional associations frequently provide ongoing education regarding TB and national correctional health-care conferences and courses for medical professionals working in facilities regularly include TB in their curricula.

TB-associated training should be designed to meet the needs of correctional workers with diverse job descriptions. Multiple facilities and for multiple categories of correctional workers, appropriate TB training might be accomplished through incorporation of the topic into other annual employee trainings (e.g., bloodborne pathogen or topic-specific training should be developed for persons who are specifically involved in TB control). Facilities that use inmates to provide peer-to-peer TB-education programs should provide similarly tailored training.

Inmates located in areas with a high TB prevalence or whose inmates have lived in such areas are likely to require increased time and resources dedicated to TB training.

The correctional facility health services director or designee (i.e., the staff member responsible for the TB control program) should collaborate with the local public health department to establish TB education and training activities. In addition, these staff members routinely should evaluate and update the facility's TB training and collaboration with the public health sector. External changes in the prevalence of TB in the community, changes in state or local public health policies, or changes in national TB control guidelines might necessitate the conduct of regular educational updates for staff.

Each facility should maintain training records to monitor correctional worker training and education. Adverse events (e.g., documented in-facility transmission) also should be monitored as a means of evaluating training and education outcomes. The circumstances of adverse events should be investigated, and the possibility of enhanced or altered training should be considered as an appropriate intervention.

**Initial Training and Education for all Correctional Workers**

Although the level and detail of any employee's initial TB training and education session will vary according to staff members' job responsibilities, the following components should be included for all correctional workers:

- communication regarding the basic concepts of *M. tuberculosis* transmission, signs, symptoms, diagnosis (including the difference between LTBI and TB disease), and prevention;
- provision of basic information regarding the importance of following up on inmates or correctional workers demonstrating signs or symptoms of TB disease;
- need for initiation of airborne precautions of inmates with suspected or confirmed TB disease;
- review of the policies and indications for discontinuing AII precautions;
- discussion of basic principles of treatment for TB disease and LTBI; and
- discussion regarding TB disease in immunocompromised persons.

**Required Training for Correctional Workers in Facilities with AII Rooms**

Correctional workers in facilities equipped with AII rooms also should be provided clear guidelines regarding the identification and containment of persons with TB disease. Education efforts for these staff members should include discussion of the use of administrative and engineering controls and personal protective equipment in the respiratory protection program (including annual training) as mandated by OSHA (Standard 29 CFR OSHA).

**Enhanced Training and Education for Correctional Workers in High-Risk Facilities**

Correctional workers in facilities with a high risk for TB transmission should receive enhanced training and education concerning:

- the signs and symptoms of TB disease,
- transmission of TB disease, and
TB infection-control policies (including instruction on and location of the facility's written and procedures, exposure control plan, and respiratory protection program).

If a contact investigation is being conducted because of suspected or confirmed infectious TB, the designated health provider should educate facility correctional workers in all aspects of the invest include information concerning

- contact investigation guidelines (165),
- TB transmission,
- the method used to determine a contact's risk for infection and prioritization for evaluation
- the noninfectiousness of inmates and correctional workers with LTBI,
- the noninfectiousness of persons with TB disease who have responded to therapy and have negative sputum-smear results, and
- patient confidentiality issues.

Facility staff members who are responsible for TB-control activities should stay informed regarding current TB trends and treatment options. Conference attendance, participation in professional programs, and other off-s supplemental training strategies for correctional worker trainers and facility medical and infectio  

Training and Education of Public Health Department Staff

State and local health department staff providing consultation or direct services to a correctional facility (who act as liaisons) should receive training and education regarding the unique aspects of health care and TB control in the correctional facility setting. Correctional facility administrators, contracted correctional facility health care professionals, and health department staff should collaborate to develop an appropriate training program. The use of self-study and other educational materials should be encouraged as a supplement to training. Certain TB training resources also can be accessed on the Internet (Appendix A). Education and training of health department staff should cover (but not be limited to) the following topics:

- TB-related roles of correctional facility and health department staff;
- methods of effectively collaborating with correctional facilities;
- differences between and among jails, prisons, and other forms of detention facilities;
- correctional culture and the importance of respecting the mission and purpose (i.e., custody) and correctional workers;
- the health department's role in the discharge of inmates (see Discharge Planning); and
- the effect of the custody and movement of foreign detainees on local facilities.

Training and Education of Inmates

Inmates should receive education from facility health-care professionals or other appropriately trained workers managing the screening or treatment process. Education and training should be appropriate in terms of the language of the trainees. The following components should be incorporated into inmate training:

- general TB information (provided either at the time of admission or when being screened for active TB disease);
- the meaning of a positive TST or QFT-G result and treatment options for LTBI;
- comprehensive TB education, including the infectiousness of and treatment for inmates with active or confirmed TB disease; and
- the importance of completing treatment for inmates with LTBI or TB disease.

Program Evaluation

Six steps should be followed to ensure successful monitoring and evaluation of a TB-prevention and control program:

- identifying collaborators,
- describing the TB-control program,
• focusing the evaluation to assess TB risk and performance,
• collecting and organizing data,
• analyzing data and forming conclusions, and
• using the information to improve the TB program (169).

The purpose of program evaluation is to improve accountability, enable ongoing learning and pro opportunities for improvement. The evaluation process should be designed to provide information stakeholders. Measures should be simple and the communication of results meaningful.

Identifying Collaborators

TB control requires the collaboration of correctional systems, health departments, and other com program evaluation also involves teamwork. Early engagement of program staff and internal and (including custody staff) helps ensure that the evaluation will yield the information that is most us engagement also promotes mutual cooperation for constructive change. Although multiple parties TB program should have a single person designated to be responsible for data quality and prog staff for these activities helps ensure that continuity and accountability are maintained.

Describing the Program

Underlying a useful evaluation is an understanding of how the TB program currently operates within facility. Evaluators should be knowledgeable about program goals and objectives, strategies, expe results, and the way in which the program fits into the larger organization and community. This in obtained by reviewing a facility's existing TB-control plan. In addition, all stakeholders should agree, before the evaluation is undertaken (169).

Focusing the Evaluation to Assess TB Risk and Performance

Risk Assessment

Each facility should assess its level of TB risk at least annually (71). The TB risk assessment (see S types and levels of administrative and environmental controls needed. Assessment of a facility's ri disease burden and facility transmission, which can be conducted by examining the following indi
- Burden of disease
  --- community rates of TB disease (including other communities from which substantial nu these data are available from local health departments),
  --- the number of cases of TB disease in the facility during the preceding year, and
  --- the number and percentage of inmates and staff with LTBI; and
- Facility transmission
  --- the number and percentage of staff and inmates whose tests for TB infection converted a conversion,
  --- the number of TB exposure incidents (see Contact Investigation), and
  --- evidence of person-to-person transmission.

Conversion rates (as determined by annual testing) for staff and inmates should be determined an monitor for unsuspected transmission in the facility. In larger facilities, conversion rates for staff: might place them at higher risk for TB (e.g., booking and holding areas, day rooms, libraries, enclosed medical and dental areas, and transport vehicles) should be calculated and tracked. Staff should a to TB exposure and transmission and plan for corrective intervention, as appropriate. The followi should be considered when determining risk within all correctional facilities, including those that facility within a larger correctional system:
- the timeliness with which patients with suspected TB disease are detected, isolated, and ev Measurement for Improving Quality); and
other factors (e.g., the total number of patients with TB housed in the facility and the number of persons housed in the facility who are risk for TB) that will help determine the controls needed (71).

Performance Measurement for Improving Quality
The risk-assessment process enables the monitoring of risk for TB transmission (the key program focus and intensity of ongoing performance measurement and monitoring. Facilities at higher risk of TB disease) benefit more from broader investigation of performance than facilities at lower risk. These performance measures can then be used to monitor program implementation and impact. Treatment completion and continuity of care are key performance indicators. Each facility should to measure performance in these areas (e.g., 100% of patients with TB disease will have documented treatment completion or, in the case of release or transfer, continuity of treatment on release). For LTBI, goals might be released during treatment will have a documented referral for continuity of care in the community. The following are examples of possible performance measures for a TB program evaluation, depending on the level of risk:

- Timeliness of screening and isolation
  - time from inmate admission to testing for TB infection,
  - time from TB testing to obtaining test results,
  - time from positive TB infection test results to obtaining a chest radiograph,
  - time from identification of a suspect TB patient (either through symptoms or abnormal placement in an AII room,
  - time from sputum collection to receipt of results, and
  - time from suspicious result (either via radiograph, smear-positive result, or smear-negative result) to initiation of contact investigation;

- Treatment
  - the number and percentage of patients with LTBI who initiated treatment and the percentage of patients who completed the prescribed treatment for LTBI (excluding those released from or transferred out of the facility), and
  - the reasons for treatment interruption among persons who stop therapy; and

- Continuity of care
  - the number and percentage of patients released before completing treatment for TB disease who had documented community appointments (or referrals) for continuity of care, and
  - the number and percentage of patients with confirmed and suspected TB disease who kept their first medical appointment in the community.

Other pertinent performance measures for correctional facilities might include the adherence rate of inmates who should undergo TB testing, the percentage of staff receiving TB education and training annually, and the percentage of inmates receiving TB education.

Assessment of Collaboration
On an annual basis, each program also should evaluate its success in working collaboratively with health departments in each area of TB control (e.g., screening, containment, and assessment). Correctional systems also should assess collaboration with other agencies released.
Collecting and Organizing Data

Data Sources

As part of quality assessment, all facilities that house persons with confirmed or suspected TB disease should conduct periodic reviews of medical records for these patients and for a sample of patients with LTBI. In collaboration with the public health department, the review should be conducted at least annually in facilities with any cases of TB (including low-risk facilities) and quarterly in higher-risk facilities with numerous cases should compare actual performance against time standards, protocols, and goals for TB activities. Performance Measures for Improving Quality). Multiple tools are available for data collection (Appendix B). Medical records should contain information regarding TB history and risk factors, treatment, and dates to enable performance to be monitored. Other sources of data include log books, interview observations. Quality controls for TST placement and reading should be checked at least annually used for calculating performance also should be verified.

Information Infrastructure

Effective program monitoring and evaluation is made possible through the reliable collection of valid data and through analysis of these data. Health care professionals responsible for the prevention and control of TB within a correctional facility should have access to complete medical records and a database of essential TB-related activity and measurements. A retrievable aggregate record system is essential for tracking all inmates and for assessing the state of disease and LTBI, particularly in large jail and prison systems in which inmates are transferred from one facility or unit to another. This record system should maintain at minimum current information about the results, treatment status, and degree of infectiousness of these persons. In addition to facilitating the record system provides facilities with the information necessary for conducting annual TB risk as trends, measuring performance, and assessing the effectiveness of overall TB control efforts. Information should always be kept confidential; all staff members involved in program evaluation should maintain the confidentiality of patient information.

Although medical databases can be maintained manually, electronic databases provide additional benefits by enabling a facility to better track inmates for testing and case management, access information regarding tests for TB infection, share medical information regarding transferred inmates with other facilities, link with the local health department, and measure the effectiveness of TB-control efforts.

Analyzing Data and Drawing Conclusions

In a multifacility correctional system, evaluation data should be compiled for each facility separately and in aggregate. Data should be analyzed against standards, which can be defined externally (e.g., by national organizations or CDC) or internally as established by the program collaborators. Once analyzed, conclusions should be drawn from the data and recommendations for program improvement developed. The evaluation and recommendations should be shared with program staff, administrators, and partners, including the local public health department.

Using Information to Improve the TB Program

The final step in the evaluation process is to implement the recommendations to improve the TB program. Program staff should use data to identify and remove barriers to improving performance, and administrators should make necessary revisions to policies or procedures.

Because the evaluation process is cyclical, assessing whether recommendations have been implemented and outcomes are improved is crucial. Existing data can be used to clearly demonstrate the effects of interventions.

Collaboration and Responsibilities

The management of TB from the time an inmate is suspected of having the disease until treatment is complete presents multiple opportunities for collaboration between correctional facilities and the public health department. Public health agencies can partner with correctional facilities in TB screening and treatment activities. A study of 20 urban jail systems and their respective public health departments, only 35% reported having collaborations conducting TB-prevention and -control activities. Formal organizational mechanisms (e.g., designation of liaisons, regular meetings) facilitate the development of such collaborations.
meetings, health department TB program staff providing on-site services, and written agreements effective collaboration between correctional facilities and health departments (37). Correctional facilities and health departments should each designate liaisons for TB-associated efforts as a familiar and accessible communication link between collaborating entities. The duty of liaison should be assigned to the person responsible for TB control or to another staff member familiar with management at the facility. Regular meetings between correctional facilities and health departments establish communication and collaboration on TB-related issues (37,171). Jurisdictions with regular meetings between jails and public health staff are 13 times more likely to report having highly effective collaboration than jurisdictions that have not established such meetings (37). For example, in Florida, the state TB-control health officials hold quarterly coordination meetings on TB issues and regularly schedule review conferences (171), activities that have encouraged communication between facilities and local health departments.

The presence of health department staff in correctional facilities can help promote more effective collaboration (37,171). Functions provided by such personnel within the correctional facility setting include screening, surveillance, education and training, contact investigation, and follow-up after release (171). For example, New York City Department of Mental Hygiene personnel assigned to the Rikers Island jail interview inmates, monitor their care changes, and work with the jail to determine discharge planning needs for continuity of care in the facility. These on-site access links are available on site that enable health department personnel to promptly inform correctional facilities of completed therapy, incomplete work-up or therapy, sputum-smear results, culture and drug-susceptibility data, and ongoing treatment for TB cases and suspects. These on-site access links diminish the time spent in AII rooms and decrease the time required for patient work-up by providing confirmatory historical documentation.

Correctional facilities and health departments should work together to agree on and delineate their respective roles and responsibilities. Establishing clear roles and responsibilities helps avoid duplication, confusion, the potential for breaching patient confidentiality, excess expenditures, and missed opportunities. Roles and responsibilities should be clearly defined for all TB-control activities that might require collaboration between correctional facilities and health departments, including:

- screening and treatment of inmates for LTBI and TB disease,
- reporting of TB disease,
- follow-up of inmates with symptoms or abnormal chest radiographs,
- medical consultation regarding persons with confirmed and suspected TB disease,
- contact investigations for reported TB cases,
- continuity of treatment and discharge planning for persons with TB disease and LTBI,
- training and education of correctional facility staff,
- evaluation of screening and case management, and
- facility risk assessment.

Agreements about roles and responsibilities may be formal or informal, but they should be recorded in writing. Formal agreements include memoranda of understanding and written policies or plans. Informal agreements may be as simple as an e-mail summary of a verbal discussion or meeting. The format for recording and communicating agreements (e.g., checklists, flow charts, algorithms, and lists of steps) may vary depending on the need. Once agreements are made, they should be reassessed periodically (see Program Evaluation).

Correctional facilities and health departments should work together to formulate agreements that specify the information to be shared in a particular timeframe, who will have access to specific information or databases, and that patient confidentiality will be protected. Information systems provide the framework for recording and accessing data (see Program Evaluation). Health departments should provide correctional facilities with pertinent TB-surveillance information (e.g., local rates of drug resistance, the number of TB cases occurring in the community, and the number of TB cases identified in the community among recent inmates).
which can bolster support for TB-screening activities within these facilities.

Legislation or policy statements can effectively encourage or mandate collaboration on issues (e.g., investigation, and discharge planning) when institutional barriers (e.g., time and resources) inhibit example, California has improved discharge planning by prohibiting the release or transfer of inn suspected TB unless a written treatment plan has been received and accepted by the local health o administrative code places responsibility for contact investigations of TB exposures in correctiona correctional facility but requires consultation with (and reporting to) the local health department. policy memorandum requesting that ICE field office directors grant a short-term hold on the dep disease to allow time for the ICE health services program to facilitate continuity of care.

Summary of Recommendations

Screening

Early identification and successful treatment of persons with TB disease remains the most effective disease transmission. Inmates who are likely to have infectious TB should be identified and begin released into the general population. Screening programs in the correctional setting also allow for numbers of persons with LTBI who are at high risk for TB disease and would likely benefit from: The type of screening recommended for a particular correctional facility is determined by an asse transmission within that facility. The risk assessment should be performed annually and should be collaboration with the local or state health department. A facility’s TB risk level can be defined as facility should be classified as having minimal TB risk on the basis of four criteria:

- No cases of infectious TB have occurred in the facility in the last year.
- The facility does not house substantial numbers of inmates with risk factors for TB (e.g., HIV drug use).
- The facility does not house substantial numbers of new immigrants (i.e., persons arriving in the previous 5 years) from areas of the world with high rates of TB.
- Employees of the facility are not otherwise at risk for TB.

Any facility that does not meet all of these criteria should be categorized as being a nonminimal T. Inmates in all minimal TB risk correctional and detention facilities require an evaluation at entry Persons with symptoms of TB require an immediate evaluation to rule out the presence of infectio kept in an AII room until they are evaluated. All newly arrived inmates should be evaluated for cl factors that increase the risk for TB disease. Persons who have any of these conditions require fur a QFT-G, or a chest radiograph within 7 days of arrival. Regardless of TST or QFT-G result, imm infection or other severe immunosuppression, as well as inmates who are at risk for HIV infection unknown, should have a chest radiograph taken as part of the initial screening. Persons who have radiograph should be evaluated further to rule out TB disease; if TB disease is excluded as a diag be considered if the TST or QFT-G is positive.

In nonminimal TB risk prisons, symptom screening assessment should be performed immediately inmate who has symptoms suggestive of TB should be placed in an AII room and evaluated promi who have no symptoms require further screening with a TST, a QFT-G, or a chest radiograph wit Regardless of their TST or QFT-G status, inmates known to have HIV infection or other severe in inmates who are at risk for HIV infection but whose HIV status is unknown, should have a chest r the initial screening. Persons who have an abnormal chest radiograph should be evaluated further TB disease is excluded as a diagnosis, LTBI therapy should be considered if the TST or QFT-G re Symptom screening should be performed immediately on entry for all new detainees in nonminim detainee who has symptoms suggestive of TB should be placed in an AII room and promptly eval Detainees who are without symptoms require further screening with a TST, a QFT-G, or a chest r
arrival. Regardless of TST or QFT-G result, detainees known to have HIV infection, and detainee infection but whose HIV status is unknown, should have a chest radiograph taken as part of the initial medical evaluation. If the result is positive for TB, the patient should be referred to a health care provider for further evaluation.

In addition, TST or QFT-G screening should be performed on employees who do not have a documented positive result. Persons who have a positive TST or QFT-G result should be screened for LTBI. All employees should be instructed to seek appropriate follow-up and screening for TB if they are immunosuppressed for any reason (e.g., HIV infection, organ transplant recipient receiving immunosuppressive therapy, and treatment with TNF antagonist). Any patient with a positive result should have follow-up evaluation of infected persons. Test results should be reported to the state or local health department for use in monitoring the rates of drug resistance.

Case Reporting
Correctional facility medical staff must report any suspected or confirmed TB cases among inmates to appropriate health agency in accordance with state and local laws and regulations, even if the inmate has been released or transferred from the facility. Reporting cases to health departments benefits the correctional facility by allowing it to obtain health department resources for case management and contact investigation in the community. In addition, drug-susceptibility results should be used to inform optimal therapy and health department for use in monitoring the rates of drug resistance. The drug-susceptibility report should be sent to all health departments managing contacts of the TB case because the choice of medication for LTBI treatment is based on susceptibility test results of the source case. Reports to local or state health departments show who has custodial responsibility for the inmate.

Airborne Infection Isolation
TB airborne precautions should be initiated for any patient who 1) has signs or symptoms of TB disease and has not completed treatment or not previously been determined to be noninfectious, or 2) has a documented positive result. Patients placed in an AII room because of suspected infectious TB disease of the lungs, airways, or larynx; who is on standard multidrug anti-TB treatment; and who has drug-susceptible TB of the lung, airways, or larynx; who is on standard multidrug anti-TB treatment and are clinical suspects for LTBI therapy. All employees should be informed and instructed to seek appropriate follow-up and screening for TB if they are immunosuppressed for any reason (e.g., HIV infection, organ transplant recipient receiving immunosuppressive therapy, and treatment with TNF antagonist). Any patient with a positive result should have follow-up evaluation of infected persons. Test results should be reported to the state or local health department for use in monitoring the rates of drug resistance.

Environmental Controls
Environmental controls should be implemented when the risk for TB transmission persists despite the presence of infected inmates. Environmental controls are used to remove, inactivate, or kill M. tuberculosis in the environment. Primary environmental controls consist of controlling the source (e.g., exhaust ventilation (e.g., hoods, tents, or booths)) and diluting and removing contaminated air using
Secondary environmental controls consist of controlling the airflow to prevent contamination of a source (AII rooms) and cleaning the air using HEPA filtration and/or UVGI. The efficiency of different primary or secondary environmental controls varies. A detailed discussion concerning the application of environmental controls has been published previously(71).

**Personal Respiratory Protection**

Respiratory protection is used when administrative (i.e., identification and isolation of infectious TB patients) and environmental controls alone have not reduced the risk for infection with *M. tuberculosis* to an acceptable level. The use of respiratory protection might be most appropriate in specific settings and situations within correctional facilities; for example, protection is warranted for inmates and facility staff when they enter AII rooms, transport infectious inmates in an enclosed vehicle, and perform or participate in cough-inducing procedures. In correctional facilities, approved N95 air-purifying respirator will provide adequate respiratory protection in the majority of situations that require the use of respirators.

All correctional facility staff members who use respirators for protection against infection with *M. tuberculosis* must participate in the facility’s respiratory protection program (e.g., understand their responsibilities, medical clearance, and engage in fit testing). All facilities should develop, implement, and maintain programs for health-care workers or other staff who use respiratory protection. (Respiratory protection required for facilities covered by OSHA.) In addition to staff members, visitors to inmates with TB disease should be given respirators to wear while in AII rooms and instructed how to ensure their own respiratory protection by checking their respirator for a proper seal. Each facility, regardless of TB risk classification (i.e., minimal or nonpolicy on the use of respirators by visitors of patients.

**Diagnosis and Treatment of LTBI and TB Disease**

A diagnosis of TB disease should be considered for any patient who has a persistent cough (>3 weeks) or other signs or symptoms compatible with TB disease (e.g., bloody sputum [hemoptysis], night sweats, weight loss). Diagnostic tests for TB include the TST, QFT-G, chest radiography, and laboratory examination of body tissues and fluids. Persons exposed to inmates with TB disease might become infected with LTBI, depending on host immunity and the degree and duration of exposure. Therefore, the treatment of persons with TB disease by stopping transmission and preventing potentially infectious cases from developing, condition that can be diagnosed by the TST or QFT-G.

Regardless of age, correctional facility staff and inmates in the following high-risk groups should be considered for treatment of LTBI if their reaction to the TST is >5 mm:

- HIV-infected persons,
- recent contacts of a TB patient,
- persons with fibrotic changes on chest radiograph consistent with previous TB disease, and
- patients with organ transplants and other immunocompromising conditions who receive therapy with prednisone for >1 month.

All other correctional facility staff and inmates should be considered for treatment of LTBI if their TST reaction is >10 mm. Treatment for LTBI is 9 months of daily isoniazid or biweekly dosing administered by DOT. Although LTBI treatment regimens are broadly applicable, modifications should be considered for patients with HIV infection and when drug resistance is suspected.

Individualized case management should be provided for all patients with TB disease. In addition, should be coordinated with officials of the local or state health department. Regimens for treating multiple drugs to which the organisms are susceptible. For the majority of patients, the preferred disease consists of an initial 2-month phase of isoniazid, rifampin, pyrazinamide, and ethambutol, phase of isoniazid and rifampin lasting >4 months, for a minimum total treatment period of 6 months. Therapy should be based on the number of doses taken within a maximum period (not simply a 6-month period).
with cavitary pulmonary TB disease and positive cultures of sputum specimens at the completion of 2 months of therapy (total duration: 9 months) because rate of relapse among persons with this type of TB disease.

Drug-susceptibility testing should be performed on all initial *M. tuberculosis* isolates from patients. If results from drug-susceptibility tests become available, the treatment regimen should be adjusted providers treating patients with drug-resistant TB disease should seek expert consultation and collaborate with the local health department for treatment decisions.

TB treatment regimens might need to be altered for HIV-infected persons who are receiving antiretroviral therapy. Whenever possible, they should be provided by or in the management of both TB and HIV-related disease.

The primary determinant of treatment outcome is patient adherence to the drug regimen. Thus, measures designed to enable and foster adherence. DOT is the preferred treatment strategy and high-risk (e.g., HIV infected) persons with LTBI. DOT should be used throughout the duration of therapy. Practitioners providing treatment to inmates should coordinate DOT with the local health department also may be involved in monitoring therapy for TB.

**Discharge Planning**

Postrelease follow-up is a necessary component of TB control efforts. Effective discharge planning between corrections and medical staff (both intra- and interfacility), as well as with public health service organizations.

To ensure uninterrupted treatment, discharge planning for inmates in whom TB disease is diagnosed possible after diagnosis. Corrections or health service administrators (or their designees) should a public health department of inmates receiving treatment for TB disease or LTBI. DOT should be used throughout the duration of therapy. Practitioners providing treatment to inmates should coordinate DOT with the local health department also may be involved in monitoring therapy for TB.

**Contact Investigation**

The overall goal of a TB contact investigation is to interrupt transmission of *M. tuberculosis*. Ongoing transmission is prevented by 1) identifying, isolating, and treating other persons with TB disease (e.g., secondary infected contacts of the source and secondary patients and providing them with a complete course of chemotherapy. Because decisions involved in planning and prioritizing contact investigations in correctional facilities, the input of a larger, multi-disciplinary team when possible. The best prepared investigations in correctional facilities is ongoing, formal collaboration between correctional and public health officials.

The decision to initiate a contact investigation for an inmate or detainee with possible TB is made on a case-by-case basis. In general, contact investigations should be conducted in the following circumstances: 1) suspected or confirmed pulmonary, laryngeal, or pleural TB and cavitary disease on chest radiograph or positive AFB smear results (sputum or other respiratory specimens) or 2) suspected or confirmed pulmonary (noncavitary) or pleural TB and negative AFB smear results (sputum or other respiratory specimens) and a decision has been made to initiate TB treatment. A more limited initial investigation may be conducted for smear-negative cases.

Contact investigation should be conducted in a stepwise fashion that includes 1) notifying correctional officials; 2) conducting a chart review of the source patient; 3) interviewing the source patient; 4) defining the infectious period; 5) convening the contact investigation team; 6) updating correctional management officials about the action steps involved in conducting the contact investigation; 7) obtaining source case inmate traffic history (i.e., the dates and locations of the TB source patient's housing during the infectious period); 8) touring exposure sites; 9) prioritizing contacts according to duration and intensity of exposure and risk factors for becoming infected with TB.
TB disease; 10) developing contact lists; 11) conducting a medical record review on each high-priority HIV-infected contacts promptly; 13) placing and reading initial TSTs or QFT-Gs on eligible contacts for contact evaluation (e.g., referrals to the local health department for contacts of inmates who have transferred to another facility, family members, frequent visitors of the source patient); 15) calculating the need to expand the investigation; 16) placing and reading follow-up TSTs or QFT Gs on eligible contacts; 17) determining the infection/transmission rate from the second round of testing; and 18) writing a summary report.

Training and Education

Although the level and detail of any employee's initial TB training and education session will vary according to staff members' job responsibilities, the following components should be included for all correctional workers, regardless of job function: 1) communication regarding the basic concepts of \textit{M. tuberculosis} transmission, signs, symptoms, diagnosis (including the difference between LTBI and TB disease), and prevention; 2) provision of basic information regarding the importance of following up on inmates or correctional workers demonstrating signs or symptoms of TB disease; 3) discussion of the need for initiation of AII for inmates with suspected or confirmed TB disease; 4) discussion of basic principles of treatment for TB disease; and 5) discussion regarding TB disease in immunocompromised persons.

Correctional workers in facilities with a high risk of TB transmission should receive enhanced and more frequent training and education regarding 1) the signs and symptoms of TB disease, 2) transmission of TB disease, 3) infection control policies (including instruction on and location of written infection-control policies and procedures control plan, and the respiratory protection program).

State and local health department staff providing consultation or direct services to a correctional facility (including those who act as liaisons) should receive training and education regarding the unique aspects of health care and TB control in the correctional facility setting. Correctional facility administrators, contracted correctional facility health department staff should collaborate to develop an appropriate training program. Inmates should receive education from facility health-care professionals or other appropriately trained workers managing the screening or treatment process. Education and training should be appropriate in terms of the education level and language of the trainees.

Program Evaluation

Program evaluation should be performed based on the CDC framework. Successful monitoring and evaluation of a TB prevention and control program includes identifying collaborators, describing the TB control program, focusing the evaluation to assess TB risk and performance, collecting and organizing data, analyzing data and forming conclusions, and using the information to improve the TB program.

Collaboration and Responsibilities

The management of TB from the time an inmate is suspected of having the disease until treatment is complete presents multiple opportunities for collaboration between correctional facilities and the public health department. Organizational mechanisms (e.g., designated liaisons, regular meetings, health department TB-pro site services, and written agreements) have been demonstrated to be associated with more effective collaboration between correctional facilities and health departments.

Correctional facilities and health departments should each designate liaisons for TB-associated efforts as a familiar and accessible communication link between collaborating entities. The duty of the liaison should be assigned to the person responsible for TB control or to another staff member familiar with patient confidentiality, excess expenditures, and missed opportunities. Agreements about roles and responsibilities may be formal or informal, but they should be recorded in writing to avoid misunderstandings and to give beyond personal relationships.

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the door gap into the room, an air flow rate of 6 air changes per hour (ACH) from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids. AII rooms should provide negative peripheral pressure and should be used to isolate MDR TB patients. Detention facilities and local jails frequently contract with U.S. Immigration and Customs Enforcement (ICE) to house detainees, a practice that should be accounted for in assessing a facility’s risk status.

**Notes:**
1. Therapy that involves providing the anti-TB drugs directly to the patient and watching as the patient swallows the medications. DOT for LTBI is referred to sometimes as directly observed preventive therapy.
2. Formerly called a negative pressure isolation room, an AII room is a single-occupancy patient-care room used to isolate confirmed infectious TB disease.
3. Environmental factors are controlled in AII rooms to minimize the transmission of infectious agents that are usually spread from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids.
4. A pressure differential of 0.125 inches of water is sufficient to minimize the transmission of TB from the patient’s environment to the building or recirculation of air through a high efficiency particulate air (HEPA) filter.
5. ACH is the ratio of the volume of air entering the room or booth per hour to the volume of that room or booth. It equals the exhaust airflow (Q) in cubic feet per minute (cfm) divided by the volume of the room or booth (V) in cubic feet (ft^3) multiplied by 60 minutes.

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** Surgical masks should never be worn in place of a respirator. Surgical masks often fit so poorly that they provide little protection from any airborne hazard, including *M. tuberculosis*. Surgical masks are designed to protect others from the wearer; they do not provide respiratory protection to the wearer.

†† Asymptomatic contacts with normal chest radiographs typically do not require isolation.

§§ Because being immunocompromised (having pathologic or iatrogenic immune suppression, e.g., HIV infection or chronic disease) is a risk factor for TB disease, correctional workers should be educated on the relation between TB and medical conditions associated with immunocompromising conditions. Correctional workers should be encouraged to discuss known or possible immunocompromising conditions with their private physicians or health-care professionals.

¶¶ Public health departments typically track treatment completion rates for patients referred to their care.

Table 1
Table 3

Table 4
Table 5
Table 6
Table 7