# Prevention and Control of Tuberculosis in Corr Detention Facilities: Recommendations fro

## Endorsed by the Advisory Council for the Elimination of Tuberculosis, the Natio Correctional Health Care, and the American Correctional Associa

The material in this report originated in the National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (propos Director, and the Division of Tuberculosis Elimination, Kenneth G. Castro, MD, Director.

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## *Summary*

*Tuberculosis (TB) control can be particularly problematic in correctional and detention facilities, in which persons from div 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 publish scientific literature. Effective TB-prevention and -control measures in correctional facilities include early identification of pe entry and periodic follow-up screening; successful treatment of TB disease and latent TB infection; appropriate use of airbo infection isolation, environmental controls, and respiratory protection); comprehensive discharge planning; and thorough a These measures should be instituted in close collaboration with local or state health department TB-control programs and o education of inmates, detainees, and correctional facility staff is necessary to maximize cooperation and participation. To en 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 ( remains a substantial public health challenge in multiple settings. TB can be particularly problematic in correctional and dete persons from diverse backgrounds and communities are housed in close proximity for varying periods. Effective TB prevent 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 Advisory Council for the Elimination of TB (ACET) in 1996 (*3*). This report provides a framework and general guidelines fo of TB in jails, prisons, and other correctional and detention facilities. In addition, on the basis of existing scientific knowledg correctional and public health officials, this report defines the essential activities necessary for preventing transmission of *M* facilities. These fundamental activities can be categorized as 1) screening (finding persons with TB disease and latent TB inf (preventing transmission of TB and treating patients with TB disease and LTBI); 3) assessment (monitoring and evaluating s and 4) collaboration between correctional facilities and public health departments in TB control. These overarching activities 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 transmi among inmates and facility employees. The target audience for this report includes public health department personnel, corre administrators, private correctional health vendors, staff in federal and state agencies, staff in professional organizations, and report is intended to assist policymakers in reaching informed decisions regarding the prevention and control of TB in correc

## Methods

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, a Physicians. The Working Group reviewed published guidelines and recommendations, published and unpublished policies ar studies discussing overall TB prevention and control and aspects of TB prevention and control specific to correctional and de 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 r 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 cente 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 assessm 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) immedia
- Testing recommendations have been updated to reflect the development of the QuantiFERON®-TB Gold test (QFT- QuantiFERON®-TB (QFT) diagnostic test for *M. tuberculosis* infection.
- The section on environmental controls has been expanded to cover local exhaust ventilation, general ventilation, air an environmental control program. Ventilation recommendations for selected areas in new or renovated correctiona
- A section on respiratory protection has been added, including information on implementing respiratory protection p
- Treatment recommendations for TB and LTBI have been updated on the basis of the most recent treatment statemer 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 wit and contact investigation.
- The need for corrections staff to work closely with public health staff to tailor an appropriately comprehensive train 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

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## 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. correction 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 s case rates have been reported in correctional populations (*2*). For example, the incidence of TB among inmates in New Jerse 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 (*7*). In addition, in 1993, the TB rate f correctional system was 139.3 cases per 100,000 persons, an increase from the rate of 15.4 during 1976--1978 (*3,8*). In Calif 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 ca demonstrated the prevalence of LTBI among inmates to be as high as 25% (*10--14*). Other studies have demonstrated a corre incarceration and positive tuberculin skin test (TST) response, indicating that transmission might have occurred in these facil At least three factors contribute to the high rate of TB in correctional and detention facilities. First, disparate numbers of inca for TB (e.g., users of illicit substances [e.g., injection drugs], persons of low socioeconomic status, and persons with human i 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 inad overcrowded (*9,17--19*). Third, movement of inmates into and out of overcrowded and inadequately ventilated facilities, cou factors of the inmates, combine to make correctional and detention facilities a high-risk environment for the transmission of 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 tre
population.

**Addressing the Challenges of TB Control in Correctional Facilities**

Published recommendations for elimination of TB in the United States include testing and treating inmates in correctional fa
development and transmission of TB (*23*). The basis for this recommendation is that LTBI and coinfection with HIV are mo
populations than in the general population (*24--26*). However, treating correctional inmates for LTBI can be challenging.

Before being incarcerated, inmates might have faced barriers to accessing community health services necessary for the detec
and LTBI (*27*). In addition, inmates released from correctional facilities often do not attend clinic visits or adhere to treatmer
released before completion of TB therapy indicated that only 43% made at least one visit to the clinic after release (*28*). In ar
educational intervention increased the rate of clinic visits after release from 3% to only 23% (*29*).

In the United States, TB is concentrated increasingly among the most disadvantaged populations, particularly immigrants (*3(*
arriving largely from countries with a high prevalence of TB (e.g., Mexico, the Philippines, and Vietnam) and therefore pres
elimination of TB in the United States* (*31*). Social and legal barriers often make standard testing and treatment intervention
undocumented immigrants (*31*). In certain instances, these patients have become resistant to first-line anti-TB drugs because
received in their countries of origin (*32*). 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 undiagnos
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 T
procedures in correctional facilities have been performed (*36--38*). Nevertheless, correctional facilities are increasingly basin
procedures on studies and data that support judicious interventions, including screening, case finding, case management, outl
and treatment for LTBI (*7,9,14,21,28,33,34,39--46*). Improving TB prevention and control practices within these settings is r
and eventually eliminate TB. TB prevention and control practices within correctional facilities should be strengthened for mu

- *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 b
  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-resistar
- 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.

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## Screening

Early identification and successful treatment of persons with TB disease remains the most effective means of preventing dise
inmates who are likely to have infectious TB should be identified and begin treatment before they are integrated into the gen
(i.e., at the time of admission into the correctional system). When possible, newly arrived inmates should not be housed with
appropriately screened for TB disease. Screening programs in the correctional setting also allow for the detection of substant
who are at high risk for progressing to TB disease and would likely benefit from a course of treatment. This secondary benef
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 prevale
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 collaborat
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
  of the world with high rates of TB, and

- employees of the facility are not otherwise at risk for TB.

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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 screeni
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 r
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., immigratio
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 disea
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 T
However, such screening will not identify inmates with LTBI. One study demonstrated that screening inmates with a chest ra
finding rate and reduced the time from intake into the correctional facility to isolation substantially compared with TST testi
respectively), thereby reducing the risk for TB exposure for other inmates and staff (*50*). Digital radiographs (miniature or fu
and improved storage and readability. A miniature radiograph can be performed in <1 minute and exposes the patient to appr
dose of a conventional radiograph. One cost-effectiveness analysis of miniature chest radiography for TB screening on admi
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 radi
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 prevalenc
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 Calmett
contraindications for tuberculin skin testing. The TST is not completely sensitive for TB disease; its sensitivity ranges from 7
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 measuri
palpable swelling) at the injection site. The diameter of the indurated area should be measured across the width of the forearı
the skin) should not be measured. All reactions, even those classified as negative, should be recorded in millimeters of indura
In the majority of cases, a TST reaction of ≥10 mm induration is considered a positive result in inmates and correctional faci
induration of ≥5 mm is considered a positive result in the following persons:

- persons infected with HIV,
- 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 m
  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 radiogra
test is interpreted. Persons who have symptoms suggestive of TB disease should be evaluated immediately and placed in an A
Symptom 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 hypersensitivit
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, t
misinterpreted as a new infection (recent conversion) rather than a boosted reaction. For two-step testing, persons whose base
are retested 1--3 weeks after the initial test. If the second test result is negative, they are considered not infected. If the secon
classified as having had previous TB infection. Two-step testing should be considered for the baseline testing of persons who
and who will receive repeated TSTs as part of an institutional periodic skin-testing program. In the majority of cases, a two-s
because of the short average length of stay of inmates.
In the past, a panel of other common antigens was often applied with the TST to obtain information regarding the competenc
system and to identify anergy. More recently, however, anergy testing has been demonstrated to be of limited usefulness bec
standardization and reproducibility, the low risk for TB associated with a diagnosis of anergy, and the lack of apparent benef
of anergic HIV-infected persons. Therefore, the use of anergy testing in conjunction with a TST is no longer recommended r
for *M. tuberculosis* infection in the United States (*52*).
Intracutaneous inoculation with BCG is currently used worldwide as a vaccine against TB. BCG is a live attenuated *Mycoba*
the immune system to protect against TB. No reliable method has been developed to distinguish TST reactions caused by vac
caused by natural mycobacterial infections, although reactions of ≥20 mm of induration are not likely caused by BCG (*55*). T
persons who have been vaccinated with BCG, and the TST results of such persons are used to support or exclude the diagnos
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 amo
by cells in whole blood that have been stimulated by mycobacterial peptides. The peptides used in the test mimic proteins kn
which are present in *M. tuberculosis* but absent from all BCG strains and from the majority of commonly encountered non-T
intended for use as a diagnostic tool for *M. tuberculosis* infection, including both TB disease and LTBI. As with a TST, QFT
LTBI 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 r
"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 QFT-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 e
in these situations. 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-a) ant

## Use of Local Health Department TB Registry

Correctional facilities and local health departments should collaborate to ensure effective TB screening in the correctional se

inaccurate information on admission for multiple reasons, ranging from forgetfulness and confusion to deliberate misrepresen perform cross-matches with the local TB registry and search for matches on known aliases, birth dates, maiden names, and o inmates suspected of having TB infection. A readily accessible record of previous TB history, drug-susceptibility patterns, tr 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. Person evaluated immediately to rule out the presence of infectious disease and kept in an AII room until they are evaluated. If the f the inmate should be transported to a facility that has one. In addition, all newly arrived inmates should be evaluated for clini 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.

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

**Inmates in Nonminimal TB Risk Prisons**

Immediately on arrival, all new inmates should be screened for symptoms, and any inmate with symptoms suggestive of TB and evaluated promptly for TB disease. If the facility does not have an AII room, the inmate should be transported to a facili no symptoms require further screening with a TST, a QFT-G, or a chest radiograph within 7 days of arrival. Regardless of th known to have HIV infection or other severe immunosuppression, and those who are at risk for HIV infection but whose HIV chest radiograph taken as part of the initial screening. Persons who have an abnormal chest radiograph should be further eval 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 hi become essential components of the TB elimination strategy promoted by ACET (*59*). Targeted testing using the TST or QF for TB disease who would benefit from treatment for LTBI. Prisons offer an excellent public health opportunity for identifyi can be screened for TB infection and placed on LTBI therapy, if indicated. If the TST is used, a two-step testing procedure sh obtaining a baseline reading. A single step QFT-G is an adequate baseline. Inmates with a positive test should be evaluated f is excluded.

**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 wh should be placed immediately in an AII room and evaluated promptly for TB disease. If the facility does not have an AII roo transported promptly to a facility that does have one. Detainees without symptoms require further screening with a TST, a Q 7 days of arrival. Regardless of the TST or QFT-G result, detainees known to have HIV infection, and those who are at risk f status is unknown, should have a chest radiograph taken as part of the initial screening. Persons who have a positive result sh out TB disease.

The primary purpose of screening in correctional settings is to detect TB disease. TST or QFT-G screening in jails to initiate because of the high rate of turnover and short lengths of stay. Although not all jail detainees have short lengths of stay, deter the jail for a long term is difficult. Nationwide, approximately half of persons detained in local jails are released within 48 ho detainees can be tested at intake, a large proportion will be unavailable to have their TSTs read or to be evaluated when QFT those still 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 comple A substantial proportion of detainees who are incarcerated long enough to begin LTBI therapy will be released before compl

Francisco study indicated that approximately 62% of detainees who were started on LTBI treatment were released before co
the challenges of implementing a testing and treatment program for LTBI in jails with highly dynamic detainee populations.
targeted approach of performing TSTs only on new detainees who are at high risk for TB disease (e.g., detainees with known
and treating LTBI are most effective within the jail setting if resources dedicated to discharge planning and reliable access to
available. 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 (*60,61*).

**Persons in Holding or Booking Facilities**

City, county, and other law enforcement authorities frequently have facilities that hold arrestees and detainees for short perio
multiple days. TB symptom screening is recommended for all persons at the time of entry into these facilities. Any detainee
TB should be immediately isolated and transferred to a facility or hospital in which the detainee can be placed in an AII roon
disease.

**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 phy
should be required. The results of the screening and examination should be kept confidential; access should be granted to pul
medical professionals only when necessary. In addition, a TST or QFT-G should be mandatory for all employees who do not
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
who have not been tested during the preceding 12 months. Persons who have a positive TST or QFT-G result should have a
interpreted and should be required to have a thorough medical evaluation; if TB disease is excluded as a diagnosis, such pers
therapy. All employees should be informed that they should seek appropriate follow-up and testing for TB if they are immun
have HIV infection). Any employee who has symptoms suggestive of TB should not return to the workplace until a clinician
infectious TB disease.

**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 co
persons might include contractors (e.g., food handlers and service workers), volunteers, and those providing religious ministr
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 annu
a positive test result should be screened for symptoms of TB disease. Annual chest radiographs are unnecessary for the follo
persons. Test results should be recorded in medical records and in a retrievable aggregate database of all TST or QFT-G resu
information should be kept confidential.

Correctional facilities can use multiple strategies to ensure annual screening of long-term inmates for newly acquired TB inf
schedule annual screening on the inmate's date of birth or on the anniversary of the inmate's most recent test. Other institutio
movement and screen the entire population on the same day every year. Methods of screening a subset of the inmate populat
beneficial because they provide an ongoing assessment of *M. tuberculosis* transmission within the facility.

Results from TST or QFT-G testing should be analyzed periodically to estimate the risk for acquiring new infection in a corr
analysis should be completed by using only the test results of facility employees and inmates who have remained in the facil
between testing. The conversion rate equals the number of employees or inmates whose test results have converted from neg
numerator) during a specific interval divided by the total number of previously negative employees or inmates who were test
the denominator). In certain facilities, conducting an analysis of test results for specific areas or groups within the facility mi
More frequent screening is needed when a conversion rate is substantially higher than previous rates or when other evidence
detected. A cluster (i.e., either two or more patients with TB disease that are linked by epidemiologic or genotyping data or t
conversions occurring in the correctional facility among inmates who are epidemiologically linked) or other evidence of pers
warrants additional epidemiologic investigation and possibly a revision of the facility's TB prevention and control protocol.

Facilities in which the risk for infection with *M. tuberculosis* is minimal might not need to maintain a periodic screening pro
TST or QFT-G testing of employees would enable medical staff to distinguish between a TST or QFT-G conversion and a p
caused by a previous exposure to *M. tuberculosis*. A decision to discontinue periodic employee screening should be made in
health department.

## HIV Counseling, Testing, and Referral

HIV counseling, testing, and referral (CTR) should be routinely recommended for all persons in settings in which the popula
clinical risk for acquiring or transmitting HIV infection, regardless of setting prevalence (62). Because correctional facilities
the population is at increased risk for acquiring or transmitting HIV, routine HIV CTR is recommended for inmates. Furthern
risk factor for progression from LTBI to TB disease (*63,64*). Therefore, HIV CTR should be routinely offered to all inmates
LTBI or TB disease if their HIV infection status is unknown at the time of their LTBI or TB disease diagnosis (*64*,65). Corre
particularly aware of the need for preventing transmission of *M. tuberculosis* in settings in which persons infected with HIV
(*66*).

### 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 scre
Working in conjunction with their state or local TB-control program, correctional and detention facilities should refine their
as indicated by such data. In the absence of local data that justify revision, correctional and detention facilities should adhere
detailed above.

## Case Reporting

All states require designated health-care professionals to report suspected and confirmed cases of TB to their local or state he
mandatory for all correctional facilities, whether private, federal, state, or local. Correctional facility medical staff should rep
cases among inmates or employees to the appropriate health agency in accordance with state and local laws and regulations,
already been released or transferred from the facility. Reporting cases to health departments benefits the correctional facility
department resources for case management and contact investigation in both the facility and the community. For each suspec
the exclusion of a diagnosis of TB should be entered immediately into 1) the person's medical record, 2) the retrievable aggr
facility, and 3) the database at a centralized office if the system has multiple facilities. In addition, drug-susceptibility results
health department for use in monitoring the rates of drug resistance in the health department's jurisdiction. Drug-susceptibilit
health departments managing the infectious person's contacts because the choice of medication for LTBI treatment is based
results (*64*). Reports to local or state health departments should identify the agency that has custodial responsibility for the in
agency, state corrections agency, ICE, Federal Bureau of Prisons [FBOP], and U.S. Marshals Service [USMS]) and the corre
that agency (e.g., U.S. alien number, FBOP number, or USMS number). Federal law enforcement agencies frequently contra
private detention facilities. Therefore, custodial authority and corresponding custody identification numbers should be verifie
detention facility medical staff might not have this information available.

## Isolation in an Airborne Infection Isolation Room

### Initiation

TB airborne precautions should be initiated for any patient who has signs or symptoms of TB disease or who has documente
completed treatment or not been determined previously to be noninfectious.

### Discontinuation

For patients placed in an AII room because of suspected infectious TB disease of the lungs, airways, or larynx, airborne prec
infectious TB disease is considered unlikely and either 1) another diagnosis is made that explains the clinical syndrome or 2)
acid-fast bacilli (AFB) sputum-smear results (*67*,*68*). The three sputum specimens should be collected 8--24 hours apart (*69*)
early morning specimen (because respiratory secretions pool overnight). Typically, this will allow patients with negative spu
from an AII room in 2 days. Incarcerated patients for whom the suspicion of TB disease remains after the collection of three
results should not be released from airborne precautions until they are on standard multidrug anti-TB treatment and are clinic
with TB disease who have negative AFB sputum-smear results can still be infectious (*70*), patients with suspected disease wh
release from airborne precautions should not be released to an area in which other patients with immunocompromising condi
A patient who has drug-susceptible TB of the lung, airways, or larynx, is on standard multidrug anti-TB treatment, and has h
bacteriologic response to therapy (i.e., reduction in cough, resolution of fever, and progressively decreasing quantity of AFB
longer infectious. However, because culture and drug-susceptibility results are not typically known when the decision to disc
made, all patients with confirmed TB disease should remain in an AII room while incarcerated until they

- have had three consecutive negative AFB sputum-smear results collected 8--24 hours apart, with at least one being
- have received standard multidrug anti-TB treatment, and
- have demonstrated clinical improvement.

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Because the consequences of transmission of MDR TB (i.e., TB that is resistant to isoniazid and rifampin) are severe, infecti
choose to keep persons with suspected or confirmed MDR TB disease in an AII room until negative sputum-culture results h
to negative AFB sputum-smear results.

## Environmental Controls

### Overview

Guidelines for preventing transmission of *M. tuberculosis* in health-care settings and for environmental infection control in h
published previously (*71*,*72*). These guidelines and this report can be used to educate correctional facility staff regarding use
infection-control programs.

Environmental controls should be implemented when the risk for TB transmission persists despite efforts to screen and treat
controls are used to remove or inactivate *M. tuberculosis* in areas in which the organism could be transmitted. Primary enviro
controlling the source of infection by using local exhaust ventilation (e.g., hoods, tents, or booths) and diluting and removing
ventilation. These controls help prevent the spread and reduce the concentration of airborne infectious droplet nuclei (see Glo

work in conjunction with administrative controls such as isolation of inmates with suspected TB disease detected through scr
environmental controls consist of controlling the airflow to prevent contamination of air in areas adjacent to the source (AII r
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 maintenan
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 nuclei
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 correctio
attempting to control this type of transmission, source control is not a feasible option. Instead, general ventilation and air clea
environmental control. General ventilation can be used to dilute the air and remove air contaminants and to control airflow pa
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 corr
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 compone
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 oper
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 direc
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 infectiou
hood. Fully enclosed hoods, booths, or tents are always preferable to exterior devices because of their superior ability to prev
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 A
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 operate
exhaust locations allow for good air mixing, approximately 46 minutes would be required to remove 99% of the contaminate
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 v
construction and operational requirements of the ventilation system and might differ for retrofitted and newly constructed fac
achieving a high ventilation rate might be reasonable for new construction but not be as feasible when retrofitting an existing
Ventilation design guidance for correctional facilities and related areas has been published (*78*). This design guidance includ
recommendations regarding total ventilation, filtration efficiency, and environmental design parameters. For minimum outdo
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 infe
minimum outdoor air supply rates should meet or exceed those recommended in ANSI/ASHRAE Standard 62.1-2004 (*74*). V
enhanced potential for undiagnosed cases of infectious TB, facility designers and owners may consider using higher supply r
recommended for areas within health-care facilities anticipated to contain infectious patients). Minimum outdoor air supply r
facilities have been published (*71*,*79*). Because correctional areas frequently will not have an exact equivalent area within th
designer or owner should identify an analogous health-care area from which to choose the outdoor air supply recommendatio
on the basis of occupant risk factors for TB, occupant activities, and occupant density within the area. For example, the intak
a higher risk correctional facility might be considered analogous to the emergency waiting room area in a health-care facility
outdoor air supply would be at least two ACH.
The direction of air movement relative to adjacent areas is necessary for the containment of contaminated air. Air within a co
minimize exposure of others within the building (Table 2). For example, air inside an AII room or cell should flow from the
across the worker, then across that patient, and finally out of the room. To ensure that air is flowing from the corridor into an
should be performed daily, even if the AII room or cell is equipped with a pressure-sensing device. Air flow (supply air and
least annually and compared with the designed air flow rates to ensure that optimal directional air flow and air exchange rate

## Air Cleaning Methods

Detailed information has been published regarding the selection, design, maintenance, and safety considerations associated v
filtration and UVGI) (*71*). Designers and end users should consult this information. Air removed from areas likely to contain
sputum collection and other procedure rooms, and intake areas) should be exhausted directly to the outdoors to ensure that it
building or pose a hazard to persons outside, in accordance with applicable federal, state, and local regulations. If dischargin
HEPA filters should be used to clean the air before returning to the general ventilation system. Such recirculation is acceptab
back into the same general area from which it originated.
For general population areas in which infectious aerosols are not anticipated but might be present (from persons with undiag
ventilation should be considered where and when the outdoor environmental conditions (temperature and humidity) are comp
without undue energy or equipment costs. When recirculating air from these areas, the minimum ASHRAE-recommended le
(*78*). However, CDC encourages selection and use of filters with higher MERV ratings to provide an incremental improveme
this mechanism. The filtration system should be designed to prevent filter by-pass and to allow filter leakage testing and safe
air cleaning methods (e.g., MERV-rated filters and supplemental UVGI) may be used to increase effective air cleaning.
When used, UVGI should be applied in-duct (i.e., inside the ductwork of existing HVAC systems) or in the upper room of th
organisms are inactivated. Upper-air systems should be designed, installed, and monitored to ensure both sufficient irradiatio
*M. tuberculosis* and safe levels of UVGI in the occupied space.

## Environmental Control Maintenance

To be most effective, environmental controls should be installed, operated, and maintained correctly. Ongoing maintenance s
infection-control plan. The plan should outline the responsibility and authority for maintenance and address staff training nee
Failure to maintain environmental control systems properly has adversely impacted TB control and prevention efforts at facil
At one hospital, improperly functioning ventilation controls were believed to be a factor in the transmission of MDR TB dise
and a correctional officer), three of whom died (*80*). In three other multihospital studies evaluating the performance of AII ro
air-pressure differentials (whether manually or through use of continuous monitoring devices) resulted in a substantial percen
positive pressure (*81--84*).
Correctional facilities should schedule routine preventive maintenance that covers all components of the ventilation systems
diffusers, and exhaust grilles) and any air-cleaning devices in use. Performance monitoring should be conducted to verify tha
operating as designed. Performance monitoring should include 1) directional airflow assessments using smoke tubes and use
sensitive to pressures at 0.001 inch of water gauge and 2) measurement of supply and exhaust airflows to compare with reco
respective areas of the facility. Records should be kept to document all preventive maintenance and repairs.
Standard procedures should be established to ensure that 1) maintenance staff notify infection-control personnel before perfo
systems servicing inmate-care areas and 2) infection-control staff request assistance from maintenance personnel in checking
and local exhaust devices (e.g., booths, hoods, and tents) before use. A protocol that is well written and followed will help to
correctional facility staff and inmates to infectious aerosols. Proper labeling of ventilation system components (e.g., ducts, fa
air-flow paths. Clearly labeling which fan services a given area will help prevent accidental shutdowns (*85*). In addition, pro
emergency power to avoid interruptions in the performance of essential environmental controls during a power failure.

## Respiratory Protection

### Considerations for Selection of Respirators

Respiratory protection is used when administrative (i.e., identification and isolation of infectious TB patients) and environme reduced the risk for infection with *M. tuberculosis* to an acceptable level. The use of respiratory protection is most appropria within correctional facilities. For example, protection is warranted for inmates and facility staff when they enter AII rooms, t 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 basis of a risk assessment of the likelihood for TB transmission.** For correctional facilities, a CDC/NIOSH-approved N95 provide adequate respiratory protection in the majority of situations that require the use of respirators. If a higher level of res additional information on other classes of air-purifying respirators and powered air-purifying respirators (PAPRs) is availabl 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, i training.

### Implementing a Respiratory Protection Program

All facilities should develop, implement, and maintain a respiratory-protection program for health-care workers or other staf Respiratory-protection programs are required for facilities covered by the U.S. Occupational Safety and Health Administrati elements of a respiratory protection program include 1) assignment of responsibility, 2) training, and 3) fit testing (*71,87,90,* who use respirators for protection against infection with *M. tuberculosis* must participate in the facility's respiratory protecti responsibilities, receive training, receive medical clearance, and engage in fit testing) (*71*). In addition to staff members, visi should be offered respirators to wear while in AII rooms and instructed on proper use. Certain regular visitors (e.g., law enfo ministers and other religious representatives, and attorneys and other legal staff) might be there in an occupational capacity. classification (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 susp disease should be transported in an ambulance whenever possible. The ambulance ventilation system should be operated in t maximum amount of outdoor air be provided to facilitate dilution. If the vehicle has a rear exhaust fan, it should be used duri equipped with a supplemental recirculating ventilation unit that passes air through HEPA filters before returning it to the veh increase the number of 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 be set to nonrec should be physically isolated from the rest of the vehicle, and the patient should be placed in the rear seat. Drivers or other pe patients with suspected or confirmed infectious TB disease in an enclosed vehicle should wear at least an N95 disposable res symptoms of infectious TB disease (i.e., positive AFB sputum-smear result), consideration might be given to having the pati mask, if possible, during transport, in waiting areas, or when others are present.

## Diagnosis and Treatment of Latent Tuberculosis Infection and Tuberculo

The principles of diagnosis and treatment of LTBI and TB disease discussed in this section are guidelines and not meant to s and judgment. Medical providers not familiar with the management of LTBI and TB disease should consult a person with ex operations procedures should include plans for consultation with and referral to persons with expertise in TB and should incl consultation and referral are indicated.

Although the index of suspicion for TB disease varies by individual risk factors and prevalence of TB in the population serve correctional facilities typically are considered higher-risk settings (see Screening). A diagnosis of TB disease should be cons persistent cough (i.e., one lasting ≥3 weeks) or other signs or symptoms compatible with TB disease (e.g., hemoptysis, night fever). Diagnostic tests for TB include the TST, QFT-G, chest radiography, and laboratory examination of sputum samples o Persons exposed to inmates with TB disease might become latently infected with *M. tuberculosis* depending on host immuni exposure. Therefore, the treatment of persons with TB disease plays a key role in TB control by stopping transmission and p cases from occurring (*92*). LTBI is an asymptomatic condition that can be diagnosed by the TST or QFT-G.

### Interpreting TST Results

A baseline screening TST result of ≥10 mm induration is considered positive for the majority of correctional facility staff an should be referred for medical and diagnostic evaluation. However, for correctional facility staff and inmates who have had a facility (i.e., close contact with an inmate or staff member with infectious TB disease) after having a previous (baseline) TST mm should be considered positive and interpreted as a new infection. Correctional facility staff and inmates with a screening <10 mm, who are subsequently exposed to TB disease, should be considered newly infected if they have TST values increas For example, a baseline TST result with 8 mm induration and a repeat TST result 1 year later with 18 mm induration would i a repeat TST result with 12 mm induration would not 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. Detail
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 staff 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 offere
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 substanc
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) (*58*). A complete description of the test's interpretation is included in the product insert.
Persons who have a positive QFT-G result should be referred for a medical and diagnostic evaluation. On serial testing, a per
from negative to positive should be referred for medical and diagnostic evaluation and considered to be a QFT-G converter.
prevalence of TB disease and personal risk factors) should be assessed when making decisions about the diagnosis and treatr

## Interpreting Chest Radiographs

### 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 lo
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 pul
The radiographic presentation of pulmonary TB in HIV-infected persons might be atypical. Apical cavitary disease is less co
HIV-negative patients. More common findings among HIV-infected persons are infiltrates in any lung zone, mediastinal or h
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 cl
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*]).

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## Specimen Collection

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

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

**Laboratory Examination**

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

Although smears allow for the detection of mycobacteria, definitive identification, strain typing, a
testing of *M. tuberculosis* can be performed only via culture (*93*). A culture of sputum or other clin
*M. tuberculosis* provides a definitive diagnosis of TB disease. In the majority of cases, identificatio
drug-susceptibility results are available within 28 days using recommended rapid methods (e.g., li
probes). A negative culture result is obtained in approximately 14% of patients with confirmed pu

Testing sputum with certain techniques (e.g., nucleic acid amplification [NAA]) facilitates the rapi
identification of *M. tuberculosis*, but should not replace culture and drug-susceptibility testing in p
disease (*88*,*101*,*102*). Recommendations for use and interpretation of NAA tests in the diagnosis of
published previously (*101*,*102*).

Laboratories should report positive smear results within 24 hours of collection and positive cultur
notation of the positive culture. Drug-susceptibility tests should be performed on initial isolates fr
the identification of an effective anti-TB regimen. Drug-susceptibility tests should be repeated if 1)
continue to be culture-positive 3 months after initiation of treatment or if 2) persons whose cultur
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 bec
reduces the risk that TB infection will progress to TB disease (*23*). Certain persons are at high risk
once infected, and every effort should be made to begin these persons on a standard LTBI treatme
that they complete the entire course of treatment for LTBI . Before treatment for LTBI is started,
out by history, medical examination, chest radiography, and when indicated, mycobacteriologic st

**Candidates for Treatment of LTBI**

Correctional facility staff and inmates in the following high-risk groups should be given treatment
to the TST is ≥5 mm, regardless of age (*64*,*65*):

- 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 th
  of prednisone for ≥1 month.

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All other correctional facility staff and inmates should be considered for treatment of LTBI if thei
induration. If QFT-G is used, any correctional facility staff member or inmate with a positive QF
considered for LTBI treatment. Decisions regarding initiation of LTBI treatment should include c
likelihood of the patient continuing and completing LTBI treatment under supervision if released
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

occurred. Other persons who might be poor candidates for treatment of LTBI include those with a injury or a history of excessive alcohol consumption; active hepatitis and end-stage liver disease ar contraindications to the use of isoniazid or pyrazinamide for treatment of LTBI (*64*,*103*). If the de patients, 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 treatı of daily isoniazid or biweekly dosing administered by DOT. Although regimens are broadly applic be considered for certain populations (e.g., patients with HIV infection) and when drug resistance Reports of severe liver injury and death associated with the combination of rifampin and pyrazina 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 su demonstrated risk for severe liver injury and death associated with this regimen and the patient h regimen may be considered; a physician with experience treating LTBI and TB disease should be regimen (*103*). Clinicians should continue the appropriate use of rifampin and pyrazinamide in st regimens for the treatment of TB disease (*65*).

For all LTBI treatment regimens, nonadherence to intermittent dosing results in a larger proport than daily dosing; therefore, all patients on intermittent treatment should receive DOT. In additio with daily dosing of LTBI treatment whenever feasible. Patients with the highest priority for DOT risk for progression from LTBI to TB disease, including persons with HIV infection and persons v infectious patients with pulmonary TB.

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

Contacts of patients with drug-susceptible TB disease who once tested negative but subsequently h (i.e., ≥5 mm) 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 confi Persons with TB infection should be advised that they can be re-infected with *M. tuberculosis* if re have not been treated previously, HIV-infected persons (regardless of TST result or previous LTB persons receiving immunosuppressive therapy (regardless of TST result or previous LTBI treatm with a known previous (to current exposure) positive TST also should be considered for LTBI trea Treatment of LTBI should not be started until a diagnosis of TB disease has been excluded. If the uncertain because of an equivocal chest radiograph, a standard multidrug anti-TB therapy might necessary, depending on the results of sputum cultures, drug-susceptibility tests, and clinical respo obtained without initiating therapy for TB disease, treatment for LTBI should not be initiated unt as negative, which might take 6--8 weeks.

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

Treatment for LTBI caused by drug-resistant *M. tuberculosis* organisms is complex and should be with the local health department's TB control program and persons with expertise in the medical resistant TB. Often this will require waiting for results of susceptibility testing of the isolate from patient. Treatment should be guided by in vitro susceptibility test results from the isolate to which (*65*,*112*,*113*).

**Pretreatment Evaluation and Monitoring of Treatment**

Routine laboratory monitoring during treatment of LTBI is indicated only for patients with abnor persons at risk for hepatic disease. Baseline laboratory testing is indicated only for persons infecte women, women in the immediate postpartum period (typically within 3 months of delivery), perso disease, persons who use alcohol regularly, and persons who have or who are at risk for chronic li All patients should undergo clinical monitoring at least monthly. This monitoring should include 1

**assessment regarding the signs of hepatitis (i.e., nausea, vomiting, abdominal pain, jaundice, and y 2) education about the adverse effects of the drug(s) and the need for prompt cessation of treatme 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 Inforn 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). 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 b information; clinical, pathological, and radiographic findings; and the results of microscopic exan sputum smears and cultures for mycobacteria. A positive AFB-smear result provides strong infere 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-negati made if sputum cultures are negative, the TST result is positive (in this circumstance, a reaction o considered positive), a clinical or radiographic response is observed 2 months after the initiation o 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 respo 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 wh 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*). In 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 be
treatment is more important in the initial phase of therapy, when the bacillary burden is highest a
developing drug resistance is greatest. Although no evidence on which to base detailed recommen
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
Whenever possible, the care of persons with concomitant TB and HIV should be provided by or in
with expertise in the management of both TB and HIV-related disease (*65*). To prevent the emerg
persons with TB, HIV, and CD4+ T-lymphocyte cell counts <100 cells/$mm^3$ should not be treated
(i.e., once- or twice-weekly) regimens. These patients should instead receive daily therapy during t
first 2 months) and receive daily dosing or 3 doses per week by DOT during the continuation phas
therapy should not be withheld because the patient is being treated for TB if it is otherwise indica
beginning both antiretroviral therapy and combination chemotherapy for TB at nearly the same t
Although data on which to base recommendations are limited, experience in the fields of HIV and
for TB should be initiated first. Delaying the initiation of antiretroviral therapy until 4--8 weeks a
therapy is advantageous because it 1) better enables providers to ascribe a specific cause to a drug
the severity of paradoxical reactions, and 3) decreases adherence challenges for the patient. Until
been conducted that evaluate the optimal time for starting antiretroviral therapy in patients with
decision should be individualized on the basis of 1) the patient's initial response to treatment for T
effects, and 3) the availability of multidrug antiretroviral therapy. Because drug-drug interaction
with use of rifabutin, substitution of rifabutin for rifampin might be indicated with certain antiret
Detailed information on TB treatment in HIV-infected persons has been published (*65*,*107*). Upda
Internet as new findings become available (at http://www.dhfs.state.wi.us/aids-hiv/resources/overv
http://www.hiv-druginteractions.org, and http://www.cdc.gov/nchstp/tb/tb_hiv_drugs/toc.htm).
Drug-susceptibility testing should be performed on all initial isolates from patients with TB diseas
susceptibility tests become available, the treatment regimen should be adjusted accordingly (*65*,*11*
and 7). Medical providers treating patients with drug-resistant TB disease should seek expert cons
with the local health department for treatment decisions (*65*).
The primary determinant of treatment outcome is patient adherence to the drug regimen. Thus, c
paid to measures designed to enable and foster adherence (*65*,*119*,*120*). DOT is the preferred treat
persons with TB disease and high-risk (e.g., HIV infected) persons with LTBI. DOT should be use
course of therapy whenever feasible. Practitioners providing treatment to inmates should coordin
health department on an inmate's release. The local health department also may be involved in m
correctional facility staff (*65*).

**Challenges to Treatment Completion**

Achieving completion of treatment for LTBI or TB disease often is difficult, particularly in correc
of inmates both within and outside of correctional systems interferes with continuity of care and n
default (*121*). Comprehensive case management that includes discharge planning and coordinatio
facilities and health departments is needed to ensure completion of therapy for patients with TB d
Multiple studies have demonstrated that inmates have relatively low LTBI treatment completion r
jails who are likely to be released before their therapy has been completed (*14*,*28*,*40*,*122*). For a su
inmates, referrals for follow-up after release are not made; of inmates whose appointments are sch
not attend their first clinic visit (*36*,*40*). Multiple interventions have been attempted to improve L
in this population, including patient education while in jail, use of incentives, and use of DOT (*61*,
strategies has had substantial success, although patient education and use of DOT have increased
in certain situations (*61*,*122*). Active case management, as recommended for TB disease, should be
in improving the completion rates for LTBI treatment (*14*,*42*).

## Discharge Planning

**Correctional facilities should plan for the discharge of inmates and other detainees who have conf 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 discha 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 discl collaboration between corrections and medical staff (both intra- and inter-facility), and with publi based service organizations (*37*). Correctional facilities and public health departments should ove associated with postdetention follow-up (*125*), 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.**

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**Collaboration is essential to ensure that TB-control efforts are undertaken in the most cost-effecti between the correctional facility and the public health department maximizes the effectiveness of correctional facility (*126*), and linking released detainees to the public health-care system might in adherence (*35*) and reduce recidivism (*127*,*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 r 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 dise 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 res transfer to another facility or after release to the community. At minimum, all inmates who have l 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 (*124*). 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 desig notify the public health department of inmates receiving treatment for TB disease or LTBI. Inmat be interviewed while still incarcerated (ideally by public health staff) to enable facility administra the appropriate support and referrals that will be needed after discharge (*131*). Such personnel al 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- 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 and 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 car meet basic survival needs on release. The role of case manager should be assigned to a facility staf 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 rec (*132*):**

- **Where will the ex-inmate reside after discharge (e.g., a permanent residence, a halfway hou**
- **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 servi medical services, and HIV/AIDS services)?**
- **Does the inmate understand the importance of follow-up and know how to access health-ca**

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**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 nu and landlords; 2) anticipated place of residence; and 3) areas typically frequented (e.g., restauran community centers) (*61,133*). Inmates also should complete a release form authorizing health depa contact worksites, family members, corrections staff (parole officers), and public and private treat 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 develop discharge plan. 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 ca community service providers have not been trained to interact with mentally ill patients. Persons have difficulties keeping medical appointments. Collaboration between corrections and health dep facilitate the placement of former inmates in substance abuse or mental-health treatment program 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 bene correctional facilities have agreements with local Social Security Administration field offices to fa 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 disea supply of medication at discharge adequate to last until their next medical appointment. Discharg 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 heal 87%--92% for inmates with TB disease (*37,126*) to only 17% for inmates with LTBI (*36,37*). Corr responsible for health department notification should relay information about all scheduled and u becomes available. All TB information concerning persons who are being transferred to other cor provided to the receiving facility. In addition, inmates should be given a written summary or discl treatment plan to ensure continuity of care in case of unplanned and unanticipated release (*131,14 disease who are eligible for release or transfer to another medical or correctional facility but conti remain in airborne precautions during and after transfer until noninfectious (*132*).**

**Provide Education and Counseling**

**Patient education and documentation of education in the correctional facility is critical; multiple r among inmates and facility staff regarding means of transmission, differences between infection a prevention and treatment for TB (*143*). Persons receiving treatment should be counseled about th the treatment plan (*131*) as a measure to improve postrelease follow-up (*61*). Education should be first preferred language and should be culturally sensitive with respect to ethnicity, sex, and age ( should be actively involved in all education sessions to encourage communication regarding previ (e.g., the inmate's treatment motivations and any positive or negative experiences with specific pr LTBI who have not been started on therapy should be counseled on their risk factors, encouraged 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 an for establishing a routine of medication administration. The effect, if any, of DOT on postrelease h evaluated formally, but this practice might enhance adherence (*122*).**

**Community-Based Case Management after Release**

**Case-management strategies begun in the correctional facility should be continued after release fo confirmed or suspected TB disease and those with LTBI who are at high risk for progression to T 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 matte needs (particularly among foreign-born persons) results in improved completion rates for LTBI th management by health department personnel after release is critical for continuity of care in the e The provision of follow-up information from local health departments and community-based orga corrections staff 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 strat United States (*32*,*152*).**

**In March 2003, the detention and removal functions of the former Immigration and Naturalizatio transferred from the U.S. Department of Justice (DOJ) to the U.S. Department of Homeland Secu 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 disea appropriate. ICE detainees with confirmed or suspected TB disease receive treatment while they a ICE does not deport detainees with known infectious TB, but such persons might be deported whe 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 susp disease until continuity of care is arranged, which affords the ICE health services program the tin continuity of TB therapy arrangements before the patient's release or removal. The ICE health se enroll all persons with confirmed or suspected TB disease in programs that facilitate the continuit countries. 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 Un countries.**

**ICE field office directors may consider a stay of removal for persons with MDR TB or other comp 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 pro confirmed or suspected TB disease. Collaboration with detention facilities and local and state heal facilitate enrollment in the appropriate continuity of care program before transfer, release, or rep facility staff should identify these patients as ICE detainees when reporting TB cases to local and s**

**Evaluation of Discharge Planning Effectiveness**

**Evaluation of a discharge planning program is critical and should begin with an assessment of exi activities. Program evaluation should be incorporated into the overall correctional quality improv (*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 transla 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 between correctional facilities and the public health department and other community age**

## Contact Investigation

**Overview**

**Multiple outbreaks of TB, including those involving MDR TB, have been reported in prisons and HIV-infected inmates (*17*,*22*,*45*,*154*). The identification of a potentially infectious case of TB in a c always provoke a rapid response because of the potential for widespread TB transmission. A pron 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 *M. tuberculosis*. Ongo 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 a and prevention of TB in correctional facilities; inform staff and inmates regarding the importance recommended TB-control practices and procedures within the correctional system; and emphasiz completion of therapy for persons with TB disease and LTBI.**

**Because decisions involved in planning and prioritizing contact investigations in correctional facil multidisciplinary team is preferable. Health departments often can help correctional facilities in p and evaluating 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 inves investigation personnel should adopt a uniform approach. Investigators should have a clear under is defined and what constitutes an exposure (*156--158*).**

**Two correctional information systems are critical to the efficient conduct of a contact investigation record system containing TST results and other relevant information and 2) an inmate tracking sy system can lead to the unnecessary use of costly personnel time and medical evaluation resources ( radiographs). Without these information systems, facilities also might be forced to implement cost screenings.**

**TB Transmission Factors**

**TB transmission is determined by the characteristics of the source patient and exposed contacts; t surrounding the exposure itself also determine whether ongoing transmission will occur. The follo 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 substantially more likely to transmit TB than persons who have neither characteristic (*159--163*) I 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 stat delayed diagnosis increase the likelihood of transmission, certain persons with these characteristic whereas others with none of these characteristics might infect multiple persons. The best measure 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 ha exposure than other contacts. Persons receiving prolonged therapy with corticosteroids, chemothe immunosuppressive agents (e.g., TNF-a antagonists) also should be considered high priority for in persons with end-stage renal disease and diabetes mellitus should be promptly evaluated, because associated with compromised immune function.**

**Age. Young children (i.e., those aged <4 years) are at high risk for rapid development of TB disea meningitis. If an inmate with TB identifies a young child as a community contact, a health departm made 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 in 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 oc patient into other rooms or central corridors, their occupants also will be exposed. Areas that hav with little or no ventilation or 2) recirculated air without HEPA filtration have been associated wi transmission.**

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

**Decision to Initiate a Contact Investigation**

**The decision to initiate a contact investigation for an inmate or detainee with possible TB is made Each potential source patient's clinical presentation and opportunities for exposure should be eva 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 however, should not influence decisions about the contact investigation (*102*).**
- **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 limi may be conducted for smear-negative cases.**

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**Contact investigations typically are not indicated for extrapulmonary TB cases (except for laryng pulmonary involvement is also diagnosed.**

**The decision as to whether the facility should conduct a contact investigation should be guided by inmate or employee has pulmonary TB. Sputum results for AFB serve as a major determinant (*16* patients with pulmonary TB, collecting sputum samples is not feasible. In this circumstance, othe specimens (e.g., those from bronchoscopy) may be collected for AFB smear and mycobacterial cul**

**Principles for Conducting the Contact Investigation**

**No simple formula has been devised for deciding which contacts to screen in a correctional facility However, the investigation should be guided by the following basic principles:**

- **Identified contacts should be stratified by their duration and intensity of exposure to the so**
- **HIV-infected contacts should be classified as the highest priority group for screening and i regardless of duration and intensity of exposure.**
- **Identified groups of contacts with the greatest degree of exposure should be screened imme 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 calculated infection rate. If no evidence of transmission is observed, the investigation shoul transmission is occurring, the investigation should be expanded incrementally to groups wi group screened shows minimal or no evidence of transmission, the contact investigation sh further.**
- **Corrections and medical staff should be included in the contact investigation depending on**

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**Ideally, decisions about structuring the contact investigation should be made collaboratively with team that includes input from the state or local health department. For certain investigations, scre sample before expanding the investigation is prudent. For example, in jail investigations, multiple have been released, rendering those who remain incarcerated the only available group for screeni**

**of high priority contacts cannot be evaluated fully, a wider contact investigation should be conside**
**The investigation should focus on identifying the contacts at highest risk for transmission, screeni**
**providing a full course of LTBI treatment for persons demonstrated to be infected. In general, bec**
**investigations divert attention away from the high priority activities necessary to interrupt transm**
**screening of all persons who had any contact with the source patient should be avoided (*166*). Rar**
**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 th**
**TST or QFT-G results. Adequate knowledge of these data is possible only through use of a medica**
**complete, up-to-date, and reliable with regard to TST or QFT-G status, testing date, and documer**
**millimeters (for TST). Without an adequate medical record system (and therefore definitive infor**
**TST or QFT-G results), the true infection and transmission rates cannot be determined. The lack**
**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 questio**
**contacts should receive a chest radiograph and a complete medical evaluation by a physician, rega**
**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 shou**
**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 radiogra**
**respiratory symptoms).**

**HIV-Infected Inmates**

**HIV-infected contacts should be interviewed for symptoms, have a TST or QFT-G and chest radio**
**initiate a complete course of treatment for LTBI (once TB disease has been ruled out), regardless**
**result. Treatment should be initiated even for persons with a history of previous treatment for LT**
**of the possibility of re-infection. Those with a history of a negative TST or QFT-G should have a T**
**baseline and again in 8--10 weeks. The results of the TST or QFT-G will not affect treatment decis**
**important information 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- or QFT-G--negative inmate co**
**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 indicate**
**should be monitored regularly for symptoms. Certain facilities have chosen to monitor HIV-infect**
**chest radiographs.**

**Contact Investigation Stepwise Procedures**

**The following steps are involved in conducting a contact investigation and might overlap in time. A**
**confirmed or suspected of having TB disease, the case should be reported to the appropriate local**
**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 notif**

**chain of command that a case of TB has been identified in the institution so that appropria efforts can be initiated.**

- **Conduct a source patient chart review. The following data (with specific dates) should be c previous exposure to TB, 2) history of TB symptoms (e.g., cough, fever, and night sweats), (particularly unexplained weight loss), 4) chest radiograph reports, 5) previous TST or QF mycobacteriology results (e.g., AFB smears, cultures, and susceptibilities), 7) NAA test resu other medical risk factors.**
- **Interview the source patient. A chart review and case interview should be accomplished wi persons with AFB smear-positive respiratory specimens or cavitation on chest radiograph other persons (*165*). Source patients should be asked concerning TB symptom history, with duration of cough. Source patients also should be asked about where they conduct their da confirmed or suspected TB who were detained during the course of the infectious period sh regarding potential community contacts, particularly HIV-infected persons and young chil regarding the location of community contacts also should be obtained. Source patients shou 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 invest back to go when investigating potential contacts. The infectious period is typically defined diagnosis or onset of cough (whichever is longer). If a patient has no TB symptoms, is AFB noncavitary chest radiograph, the presumed infectious period can be reduced to 4 weeks b positive finding consistent with TB. If the contact investigation reveals that TB transmissio 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 medical, nursing, custody, and local public health personnel) should be convened and char 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) sh addition, a communications plan and a plan for handling contact investigation data should**
- **Update correctional management officials. Administrative personnel should be kept appris and action steps involved in conducting the contact investigation.**
- **Obtain source case inmate traffic history. The dates and locations of the source patient's h period and information regarding employment and education should be obtained. Groups prioritized according to duration of exposure and immune status.**
- **Tour exposure sites. A tour should be conducted of each place the source patient lived, wor during the infectious period. In addition, information should be obtained regarding any co housed the source patient during the infectious period, including 1) the number of inmates one time, 2) the housing arrangement (e.g., cells versus dorms), 3) the general size of the ai ventilation system (e.g., whether air is recirculated), 5) the pattern of daily inmate moveme working, and recreating), and 6) the availability of data on other inmates housed at the san patient. The assistance of a facility engineer often is necessary to help characterize the vent direction within a correctional facility.**
- **Prioritize contacts. Contacts should be grouped according to duration and intensity of exp most exposure and HIV-infected or other immunosuppressed contacts (regardless of durat considered highest priority. Because progression from exposure to death can be rapid amo a facility in which HIV-infected persons are housed or congregated separately, the entire g priority (*45*).**
- **Develop contact lists. Rosters of inmate and employee contacts from each location should b current location investigated. Lists of exposed contacts should be generated and grouped a**

location (e.g., still incarcerated, released, and transferred).

- Conduct a medical record review on each high-priority contact. TST or QFT-G status, che history of treatment for LTBI, HIV status, and other high-risk medical conditions should b attention should be given to weight history and previous visits to facility health-care profes symptoms. Dates should be carefully recorded.
- Evaluate HIV-infected contacts for TB disease and LTBI promptly. LTBI therapy should b among these persons once TB disease has been excluded.
- Place and read initial TSTs or perform QFT-Gs on eligible contacts. Tuberculin skin or QI previously TST- or QFT-G--negative inmate contacts should be conducted at baseline (unl 1--3 months of exposure). Referrals should be made for persons who have been released or receiving their initial TST or QFT-G.
- Make referrals for contact evaluation. Referrals should be made to the local health departı the source case who have been released or transferred to another facility. Additionally, fan visitors of the source patient should be investigated by the health department; follow-up TS substantial percentage of contacts of released inmates have been obtained on re-arrest by n contacts with the jail intake TST or QFT-G registry (*21*).
- Calculate the infection rate and determine the need to expand the investigation. To calcula total number of inmates whose TST or QFT-G has converted from negative to positive sho number with a TST placed and read or QFT-G performed. Persons with a history of a prio should be excluded. The infection rate 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 investigatior 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 exposur ended. Referrals should be made for persons who have been released or transferred and ne QFT-G.
- Determine the infection/transmission rate. The infection rate from the second round of test addition, the need to expand the investigation should be determined.
- Write a summary report. The summary report should briefly describe the circumstances o was conducted, the results of the investigation (e.g., the number of secondary cases identifi transmission rates), and any special interventions required (including follow-up plans). Th distributed to corrections administrators and the local health department.

## Tuberculosis Training and Education of Correctional Workers and I

TB training and education of correctional workers and other persons associated with any correcti volunteers and inmates) can help lower the risk for TB transmission and disease. To ensure the ef and education, multiple factors should be considered. First, correctional facilities and local or stat 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, rou be provided for all persons who spend significant time in the facility, and additional training shou who will interact with persons at risk for TB. The ideal amount of training time and information v TB transmission and by the job descriptions and characteristics of those needing training. Finally efforts and other TB-related events should be documented to ensure that these programs can be e

### Training and Education in Correctional Facilities

Correctional workers, volunteers, inmates, and other persons spending significant time in correcti

**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 ed Regional and national professional associations frequently provide ongoing education regarding T and national correctional health-care conferences and courses for medical professionals working i regularly include TB in their curricula.**

**TB-associated training should be designed to meet the needs of correctional workers with diverse multiple facilities and for multiple categories of correctional workers, appropriate TB training mi through incorporation of the topic into other annual employee trainings (e.g., bloodborne pathoge or topic-specific training should be developed for persons who are specifically involved in TB cont inmates to provide peer-to-peer TB-education programs should provide similarly tailored training inmates. Facilities located in areas with a high TB prevalence or whose inmates have lived in such increase the time and resources dedicated to TB training.**

**The correctional facility health services director or designee (i.e., the staff member responsible for program) should collaborate with the local public health department to establish TB education an 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 comm local public health policies, or changes in national TB control guidelines might necessitate the con updates for staff.**

**Each facility should maintain training records to monitor correctional worker training and educa adverse events (e.g., documented in-facility transmission) also should be monitored as a means of education outcomes. The circumstances of adverse events should be investigated, and the possibili 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 members' job responsibilities, the following components should be included for all correctional wo function:**

- **communication regarding the basic concepts of *M. tuberculosis* transmission, signs, sympto the difference between LTBI and TB disease), and prevention;**
- **provision of basic information regarding the importance of following up on inmates or cor demonstrating signs or symptoms of TB disease;**
- **need for initiation of airborne precautions of inmates with suspected or confirmed TB dise**
- **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.[§§]**

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

**Correctional workers in facilities equipped with AII rooms also should be provided clear guidelin identification and containment of persons with TB disease. Education efforts for these staff memb discussion of the use of administrative and engineering controls and personal protective equipmen 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 an 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).**

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**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 evaluatio**
- **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.**

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**Facility staff members who are responsible for TB-control activities should stay informed regardi 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 who act as liaisons) should receive training and education regarding the unique aspects of health correctional facility setting. Correctional facility administrators, contracted correctional facility h and health department staff should collaborate to develop an appropriate training program. The educational materials should be encouraged as a supplement to training. Certain TB training reso on the Internet (Appendix A). Education and training of health department staff should cover (bu 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., custod 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.**

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**Training and Education of Inmates**

**Inmates should receive education from facility health-care professionals or other appropriately tr 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 a**

- **general TB information (provided either at the time of admission or when being screened f**
- **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 bei 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 ar**

- **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*).**

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**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 progra 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 wi 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 i obtained by reviewing a facility's existing TB-control plan. In addition, all stakeholders should ag 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 conversion,**
  **--- the number of TB exposure incidents (see Contact Investigation), and**
  **--- evidence of person-to-person transmission.**

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**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, encl 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 eva Measurement for Improving Quality); and**

- other factors (e.g., the total number of patients with TB housed in the facility and the numb facility who are risk for TB) that will help determine the controls needed (*71*).

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Performance Measurement for Improving Quality

The risk-assessment process enables the monitoring of risk for TB transmission (the key program the focus and intensity of ongoing performance measurement and monitoring. Facilities at higher of TB disease) benefit more from broader investigation of performance than facilities at lower risk should help guide the development of simple process performance measures for each pertinent are control. These performance measures can then be used to monitor program implementation and i 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 document 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 communit patients will follow-up on their referral. The following are examples of possible performance meas part of 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-negat to initiation of contact investigation;
- Treatment
  --- the number and percentage of patients with LTBI who initiated treatment and the perce completed the prescribed treatment for LTBI (excluding those released from or transferre
  --- the number and percentage of persons in whom TB disease was diagnosed who complete regimen (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 dis documented community appointments (or referrals) for continuity of care, and
  --- the number and percentage of patients with confirmed and suspected TB disease who ke appointment in the community.

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Other pertinent performance measures for correctional facilities might include the adherence rate who should undergo TB testing, the percentage of staff receiving TB education and training annua 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). Cor meet with their respective public health departments each year to assess risk, update TB policies a compliance regarding environmental control and respiratory protection recommendations (see En Respiratory Protection). 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 dis
periodic reviews of medical records for these patients and for a sample of patients with LTBI. In c
public health department, the review should be conducted at least annually in facilities with any c
cases of TB (including low-risk facilities) and quarterly in higher-risk facilities with numerous cas
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 (A
Medical records should contain information regarding TB history and risk factors, treatment, and
and dates to enable performance to be monitored. Other sources of data include log books, intervi
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 va
analysis of these data. Health-care professionals responsible for the prevention and control of TB
facility should have access to complete medical records and a database of essential TB-related acti
retrievable aggregate record system is essential for tracking all inmates and for assessing the statu
disease and LTBI, particularly in large jail and prison systems in which inmates are transferred fi
or unit to another. This record system should maintain at minimum current information about th
results, treatment status, and degree of infectiousness of these persons. In addition to facilitating c
record system provides facilities with the information necessary for conducting annual TB risk ass
trends, measuring performance, and assessing the effectiveness of overall TB control efforts. Infor
records should always be kept confidential; all staff members involved in program evaluation sho
maintain the confidentiality of patient information.

Although medical databases can be maintained manually, electronic databases provide additional
facility to 1) better track inmates for testing and case management, 2) access information regardin
share medical information regarding transferred inmates with other facilities, 4) link with the loca
5) 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 separat
should be analyzed against standards, which can be defined externally (e.g., by national organizat
standards) or internally as established by the program collaborators (*170*). Once analyzed, conclu
from the data and recommendations for program improvement developed. The evaluation and re
shared with program staff, administrators, and partners, including the local public health departm

#### Using Information to Improve the TB Program

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

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

## Collaboration and Responsibilities

The management of TB from the time an inmate is suspected of having the disease until treatment
multiple opportunities for collaboration between correctional facilities and the public health depa
public health agencies can partner with correctional facilities in TB screening and treatment activ
jail systems and their respective public health departments, only 35% reported having collaborate
conducting TB-prevention and -control activities (*38*). Formal organizational mechanisms (e.g., de

**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 eff 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 w management at the facility. Regular meetings between correctional facilities and health departme establish communication and collaboration on TB-related issues (*37*,*171*). Jurisdictions with regul between jails and public health staff are 13 times more likely to report having highly effective coll jurisdictions that have not established such meetings (*37*). For example, in Florida, the state TB-c corrections health officials hold quarterly coordination meetings on TB issues and regularly sched review conferences (*171*), activities that have encouraged communication between facilities and lo**

**The presence of health department staff in correctional facilities can help promote more effective Functions provided by such personnel within the correctional facility setting include screening, su training, contact investigation, and follow-up after release (*171*). For example, New York City Dep 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 th links are available on site that enable health department personnel to promptly inform correction completed therapy, incomplete work-up or therapy, sputum-smear results, culture and drug-susc treatment for TB cases and suspects. These on-site access links diminish the time spent in AII roo required for patient work-up by providing confirmatory historical documentation.**

**Correctional facilities and health departments should work together to agree on and delineate the responsibilities. Establishing clear roles and responsibilities helps avoid duplication, confusion, th patient confidentiality, excess expenditures, and missed opportunities.**

**Roles and responsibilities should be clearly defined for all TB-control activities that might require 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.**

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

**Correctional facilities and health departments should work together to formulate agreements that be shared in a particular time frame, who will have access to specific information or databases, an confidentiality will be protected. Information systems provide the framework for recording and a information (see Program Evaluation). Health departments should provide correctional facilities surveillance information (e.g., local rates of drug resistance, the number of TB cases occurring in relative to the community, and the number of TB cases identified in the community among recent**

**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) inhibi**
**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 effectiv**
**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 b**
**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., H**
  **drug use).**
- **The facility does not house substantial numbers of new immigrants (i.e., persons arriving i**
  **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.**

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**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, inm**
**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 diagn**
**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 promp**
**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 evalu**
**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 in who have a positive result should be further evaluated to rule out TB disease. Screening in jails wi purposes of initiating LTBI therapy often is not practical because of the high rate of turnover and A medical history relating to TB should be obtained from and recorded for all new employees at t physical examination for TB disease should be required. In addition, TST or QFT-G screening sh employees who do not have a documented positive result. Persons who have a positive TST or QF chest radiograph taken and interpreted and should be required to have a thorough medical evalua excluded as a diagnosis, such persons should be considered for LTBI therapy. All employees shoul instructed to seek appropriate follow-up and screening for TB if they are immunosuppressed for a infection, organ transplant recipient receiving immunosuppressive therapy, and treatment with T employee who has symptoms suggestive of TB should not return to the workplace until a clinician contagious TB disease.**

**In general, long-term inmates and all employees who have a negative baseline TST or QFT-G resu testing at least annually. Persons who have a history of a positive test result should be screened an disease. Annual chest radiographs are unnecessary for the follow-up evaluation of infected person recorded in medical records and in a retrievable aggregate database of all TST or QFT-G results.**

**Case Reporting**

**Correctional facility medical staff must report any suspected or confirmed TB cases among inmat appropriate health agency in accordance with state and local laws and regulations, even if the inm been released or transferred from the facility. Reporting cases to health departments benefits the allowing it to obtain health department resources for case management and contact investigation i 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 repo all health departments managing contacts of the TB case because the choice of medication for LTI drug-susceptibility test results of the source case. Reports to local or state health departments shou 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 d documented TB disease and has not completed treatment or not previously been determined to be patients placed in an AII room because of suspected infectious TB disease of the lungs, airways, or precautions can be discontinued when infectious TB disease is considered unlikely and either 1) an that explains the clinical syndrome or 2) the patient has three negative AFB sputum-smear results whom the suspicion of TB disease remains after the collection of three negative AFB sputum-smea released from an AII room until they are on standard multidrug anti-TB treatment and are clinic who has drug-susceptible TB of the lung, airways, or larynx; who is on standard multidrug anti-T had a clinical and bacteriologic response to therapy is probably no longer infectious. However, be susceptibility results typically are not known when the decision to discontinue airborne precaution whom the probability of TB disease is high should remain in an AII room while incarcerated until consecutive negative AFB sputum smear results, 2) received standard multidrug anti-TB treatmen clinical improvement.**

**Environmental Controls**

**Environmental controls should be implemented when the risk for TB transmission persists despite infected inmates. Environmental controls are used to remove, inactivate, or kill *M. tuberculosis* in organism could be transmitted. Primary environmental controls consist of controlling the source c exhaust ventilation (e.g., hoods, tents, or booths) and diluting and removing contaminated air usin**

**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 diff secondary environmental controls varies. A detailed discussion concerning the application of envi been published previously(*71*).**

**Personal Respiratory Protection**

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

**All correctional facility staff members who use respirators for protection against infection with *M* 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 maintai program for health-care workers or other staff who use respiratory protection. (Respiratory-prot required for facilities covered by OSHA.) In addition to staff members, visitors to inmates with T respirators to wear while in AII rooms and instructed how to ensure their own respiratory protec respirator for a proper seal. Each facility, regardless of TB risk classification (i.e., minimal or non policy 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 we 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 body tissues and fluids. Persons exposed to inmates with TB disease might become infected with L immunity and the degree and duration of exposure. Therefore, the treatment of persons with TB TB control 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 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 th of prednisone for ≥1 month.**

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**All other correctional facility staff and inmates should be considered for treatment of LTBI if thei induration. The preferred treatment for LTBI is 9 months of daily isoniazid or biweekly dosing ac Although LTBI treatment regimens are broadly applicable, modifications should be considered fo 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 mo therapy should be based on the number of doses taken within a maximum period (not simply a 6-**

**with cavitary pulmonary TB disease and positive cultures of sputum specimens at the completion should receive a longer, 7-month continuation phase of therapy (total duration: 9 months) becaus 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 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 col health department for treatment decisions.**

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

**The primary determinant of treatment outcome is patient adherence to the drug regimen. Thus, c paid to measures designed to enable and foster adherence. DOT is the preferred treatment strateg disease and high-risk (e.g., HIV infected) persons with LTBI. DOT should be used throughout the whenever feasible. Practitioners providing treatment to inmates should coordinate DOT with the an inmate's release. The local health department also may be involved in monitoring therapy for c**

**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 diagno 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. Inmates with TI interviewed while still incarcerated (ideally by public health staff) to enable facility administrator appropriate support and referrals that will be needed after discharge.**

**All correctional facilities should assign personnel (preferably health-care professionals) to serve as managers should be responsible for conducting discharge planning in the facility, which entails co communicating treatment histories with public health department and other health-care counterp**

**Contact Investigation**

**The overall goal of a TB contact investigation is to interrupt transmission of *M. tuberculosis*. Ongo 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 Because decisions involved in planning and prioritizing contact investigations in correctional facil process benefits from the input of a larger, multi-disciplinary team when possible. The best prepa investigations in correctional facilities is ongoing, formal collaboration between correctional and p The decision to initiate a contact investigation for an inmate or detainee with possible TB is made general, contact investigations should be conducted in the following circumstances: 1) suspected o laryngeal, or pleural TB and cavitary disease on chest radiograph or positive AFB smear results ( respiratory specimens) or 2) suspected or confirmed pulmonary (noncavitary) or pleural TB and (sputum or other respiratory specimens) and a decision has been made to initiate TB treatment. A investigation may be conducted for smear-negative cases.**

**Contact investigation should be conducted in a stepwise fashion that includes 1) notifying correcti 2) conducting a chart review of the source patient; 3) interviewing the source patient; 4) defining t 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 traff and locations of the TB source patient's housing during the infectious period); 8) touring exposure contacts according to duration and intensity of exposure and risk factors for becoming infected wi**

**TB disease; 10) developing contact lists; 11) conducting a medical record review on each high-pric HIV-infected contacts promptly; 13) placing and reading initial TSTs or QFT-Gs on eligible conta for contact evaluation (e.g., referrals to the local health department for contacts of inmates who ha transferred to another facility, family members, frequent visitors of the source patient); 15) calcul determining the need to expand the investigation; 16) placing and reading follow-up TSTs or QFT 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 members' job responsibilities, the following components should be included for all correctional wo function: 1) communication regarding the basic concepts of *M. tuberculosis* transmission, signs, sy (including the difference between LTBI and TB disease), and prevention; 2) provision of basic info importance of following up on inmates or correctional workers demonstrating signs or symptoms explanation of the need for initiation of AII of inmates with suspected or confirmed TB disease; 4) indications for discontinuing AII precautions; 5) discussion of basic principles of treatment for TB discussion regarding TB disease in immunocompromised persons.**

**Correctional workers in facilities with a high risk of TB transmission should receive enhanced and and education regarding 1) the signs and symptoms of TB disease, 2) transmission of TB disease, a 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 f who act as liaisons) should receive training and education regarding the unique aspects of health c correctional facility setting. Correctional facility administrators, contracted correctional facility h and health department staff should collaborate to develop an appropriate training program. Inma education from facility health-care professionals or other appropriately trained workers managin treatment process. Education and training should be appropriate in terms of the education level a**

**Program Evaluation**

**Program evaluation should be performed based on the CDC framework. Successful monitoring an prevention and -control program includes identifying collaborators, describing the TB-control pro evaluation to assess TB risk and performance, collecting and organizing data, analyzing data 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 multiple opportunities for collaboration between correctional facilities and the public health depa 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 effectiv correctional facilities and health departments.**

**Correctional facilities and health departments should each designate liaisons for TB-associated eff 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 w management at the facility.**

**Correctional facilities and health departments should work together to agree on and delineate the responsibilities. Establishing clear roles and responsibilities helps avoid duplication, confusion, th patient confidentiality, excess expenditures, and missed opportunities. Agreements about roles and formal or informal, but they should be recorded in writing to avoid misunderstandings and to give beyond personal relationships.**

**Acknowledgments**

**The following persons contributed to this report: G. Scott Earnest, PhD, Michael G. Gressel, PhD Division of Applied Research and Technology; Teresa A. Seitz, MPH, Douglas B. Trout, MD, Divi Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CI**

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* The epidemiology of TB in the United States has changed dramatically since the early 1990s. Immigration from cou TB contributes substantially to the continued high rates of disease and transmission among foreign-born persons. In 2 foreign-born persons in the Untied States was 8.7 times higher than the rate for persons born in the United States. Mo 2003 occurred in foreign-born persons, particularly those from Mexico, the Philippines, and Vietnam. Of 114 patients TB (MDR TB) were diagnosed, foreign-born persons accounted for 95 (83%) cases (*6*). Detention facilities and local j Immigration and Customs Enforcement (ICE) to house detainees, a practice that should be accounted for in assessing

† Therapy that involves providing the anti-TB drugs directly to the patient and watching as the patient swallows the m preferred core management strategy for all patients with TB. DOT for LTBI is referred to sometimes as directly obse

§ Formerly called a negative pressure isolation room, an AII room is a single-occupancy patient-care room used to isol confirmed infectious TB disease. Environmental factors are controlled in AII rooms to minimize the transmission of i spread from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids. AI pressure in the room so clean air flows under the door gap into the room, an air flow rate of 6--12 air changes per hou air from the room to the outside of the building or recirculation of air through a high efficiency particulate air (HEPA

¶ 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 eq cubic feet per minute (cfm) divided by the volume of the room or booth (V) in cubic feet ($ft^3$) multiplied by 60 minutes

**** Surgical masks should never be worn in place of a respirator. Surgical masks often fit so poorly that they provide**
**any airborne hazard, including *M. tuberculosis*. Surgical masks are designed to protect others from the wearer; they**
**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 cl**
**TB disease, correctional workers should be educated on the relation between TB and medical conditions associated w**
**Correctional workers should be encouraged to discuss known or possible immunocompromising conditions with their**
**care professionals.**
**¶¶ Public health departments typically track treatment completion rates for patients referred to their care.**

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