CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

June 7, 1996 / Vol. 45 / No. RR-8

MMWR™

Recommendations and Reports

MORBIDITY AND MORTALITY WEEKLY REPORT

Prevention and Control of Tuberculosis in Correctional Facilities

Recommendations of the Advisory Council for the Elimination of Tuberculosis

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
and Prevention (CDC)

The *MMWR* series of publications is published by the Epidemiology Program Office, Centers for Disease Control and Prevention (CDC), Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA 30333.

SUGGESTED CITATION

Centers for Disease Control and Prevention. Prevention and control of tuberculosis in correctional facilities: recommendations of the Advisory Council for the Elimination of Tuberculosis. MMWR 1996;45(No. RR-8):[inclusive page numbers].

Copies can be purchased from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325. Telephone: (202) 783-3238.

Contents

Advisory Council for the Elimination of Tuberculosis
September 1995

*These ACET members rotated off the council during 1995; however, they made substantive contributions to this report.

The following CDC staff members prepared this report:

Susan M. Graham, M.P.H.
Phyllis E. Cruise

Division of Tuberculosis Elimination
National Center for Prevention Services

in collaboration with the

Advisory Council for the Elimination of Tuberculosis

Prevention and Control of Tuberculosis in Correctional Facilities

Recommendations of the Advisory Council for the Elimination of Tuberculosis

Summary

*The recommendations contained in this report update and expand previously published recommendations for preventing and controlling tuberculosis (TB) in correctional facilities (*MMWR *1989;38:313–20, 325). The Advisory Council for the Elimination of Tuberculosis (ACET) has prepared this report to assist officials of federal, state, and local correctional facilities in controlling TB among inmates and employees of both short- and long-term correctional facilities (e.g., prisons, jails, and juvenile detention centers). Additional information about TB is available in the American Thoracic Society/CDC statements referred to in this report.*

The transmission of Mycobacterium tuberculosis *in correctional facilities presents a public health problem for correctional-facility employees and for inmates and the communities into which they are released. ACET recognizes the urgent need to improve TB prevention and control practices in many correctional facilities. All correctional facilities, even those in which few TB cases are expected to occur, should designate a person or group of persons who will be responsible for the facility's TB infection-control program and the following three essential TB control activities: a)* screening—*identifying persons who are infected with* M. tuberculosis *or who have active TB disease; b)* containment—*preventing transmission of* M. tuberculosis *and adequately treating persons who have latent TB infection or active TB disease; and c)* assessment—*monitoring and evaluating the screening and containment activities. Correctional-facility officials should form close working relationships with their state and local health departments, which can assist correctional facilities in formulating, implementing, and evaluating these activities.*

INTRODUCTION

Tuberculosis (TB) is a problem in correctional facilities in the United States, and effective TB prevention and control in such facilities is necessary to reduce TB rates and, eventually, to eliminate TB in the United States (*1*). This report provides an overview of this problem and general guidelines for preventing and controlling TB in both short- and long-term correctional facilities.* In addition, this report describes the three essential activities necessary for a successful TB prevention and control program (i.e., TB screening, containment, and assessment) and the roles of the correctional facility and the public health department in achieving the goals of such programs.

During the past decade, the number of reported TB cases has increased substantially in correctional facilities in some geographic areas of the United States. For

*A glossary is provided that defines these and other terms contained in this document.

example, among inmates of the New York state correctional system, the incidence of TB disease increased from 15.4 cases per 100,000 inmates during 1976–1978 to 105.5 cases per 100,000 inmates during 1986 (*2*). By 1993, this incidence was 139.3 cases per 100,000 inmates (New York State Department of Health, unpublished data). In many areas, rates of TB cases for prison populations were substantially higher than rates for the total population. During 1993, the rate of TB cases for the New York state correctional system (139.3 cases per 100,000 inmates) was more than six times the rate for the total population of New York (21.7 cases per 100,000 persons) (New York State Department of Health, unpublished data). Similarly, the incidence of TB disease among inmates in New Jersey correctional facilities during 1994 was 91.2 cases per 100,000 inmates, compared with 11.0 cases per 100,000 persons in the state (*3*). In one California state prison, the incidence of active TB disease during 1991 was 184 cases per 100,000 inmates—10 times greater than the statewide incidence rate. Transmission of *Mycobacterium tuberculosis* also was documented in this California prison (*4*).

In 1993, as part of expanded national TB case reporting, state health departments began to report to CDC whether newly diagnosed TB cases occurred among persons who were incarcerated at the time of diagnosis. Forty-eight reporting areas (i.e., 47 states and New York City) provided this information for ≥75% of the cases that occurred in their areas. In these areas, 3.8% of TB patients for whom correctional-facility status was reported resided in a correctional facility at the time of diagnosis (*5*). During 1994, 4.6% of TB patients in 51 reporting areas (i.e., 48 states, New York City, the District of Columbia, and Puerto Rico) were reported as residents of a correctional facility at the time of diagnosis (*6*); in contrast, 0.6% of the total U.S. population were confined in prisons and jails during 1994 (U.S. Department of Justice, unpublished data). Thus, a disproportionately high percentage of diagnosed TB cases in the United States occur among persons residing in correctional facilities. Furthermore, previous studies have documented a high prevalence of TB infection among inmates, ranging from 14% to 25% (*7–10*). Other studies have indicated a correlation between rates of positive tuberculin skin-test results and length of incarceration, suggesting that transmission may have occurred within correctional facilities (*11,12*).

Populations Affected by TB in Correctional Facilities

An increasing number of persons either work in or are confined in U.S. correctional facilities. In 1980, one of every 453 U.S. residents was incarcerated; by the end of 1993, that ratio had grown to one in every 189 residents (*13*). From 1980 through 1994, the number of prisoners in federal and state correctional facilities more than tripled, from 329,821 in 1980 to 1,053,738 in 1994 (*13*); by mid-year 1995, this number had increased to 1,104,074 (U.S. Department of Justice, unpublished data). At mid-year 1994, the most recent period for which jail data were available, 490,442 adults were being held in local jails (*14*). Furthermore, recidivism is a problem for the inmate population; in the 1991 Survey of State Prison Inmates, 61% reported a history of previous incarceration (*15*).

The transmission of *M. tuberculosis* in correctional facilities presents a health problem for both inmates and the communities into which they are released. In 1991, U.S. jails released 9,929,347 persons, and state or federal jurisdictions released 436,991

sentenced prisoners (*16*). Inmates infected with *M. tuberculosis* who develop active TB disease after their release might infect other persons (*17*), including young children, who are especially vulnerable to development of active TB disease if infected (*18*). In a 1991 survey of >20,000 state and federal inmates, 56% of men and 67% of women reported having had at least one child; 6% of almost 39,000 female inmates were pregnant when they entered prison (*15*). In addition, correctional-facility employees are at risk for occupational exposure to TB, and, if they develop infectious disease, they might infect their families and other contacts.

In several recent TB outbreaks in correctional facilities, failure to detect active TB disease in inmates resulted in transmission of *M. tuberculosis* to other inmates, correctional-facility employees, and persons in the community (CDC, unpublished data). Moreover, outbreaks in New York and California involving the transmission of multidrug-resistant strains of *M. tuberculosis* (MDR-TB) to both inmates and employees of correctional facilities have been reported; during the outbreak in New York, *M. tuberculosis* also was transmitted to health-care workers and patients in a nearby hospital (*19,20*).

Factors Contributing to the Prevalence of TB in Correctional Facilities

A primary reason for the high risk for *M. tuberculosis* infection and active TB disease in correctional facilities is the disproportionate number of inmates who have risk factors for exposure to the organism or, if infected, for development of active disease. These risk factors include infection with human immunodeficiency virus (HIV), substance abuse, and being a member of a lower socioeconomic population that has poor access to health care. The strongest known risk factor for the development of active TB disease among adults who have latent TB infection is coinfection with HIV (*21,22*). Persons who are coinfected with HIV and *M. tuberculosis* have an estimated 8%–10% risk each year for developing active TB disease, whereas persons who are infected with only *M. tuberculosis* have a 10% risk for developing active TB disease during their lifetimes. Moreover, in HIV-infected persons who become infected with *M. tuberculosis*, the progression of latent TB infection to active TB disease is often rapid (*23*).

The prevalence of HIV infection and acquired immunodeficiency syndrome (AIDS) among inmates has increased substantially during the past decade, and the annual incidence of AIDS among prisoners is markedly higher than the incidence among the total U.S. population. In the New York state prison system, AIDS cases increased steadily from three cases in 1981, a rate of 43 cases per 100,000 inmates, to 228 cases in 1987, a rate of 574 cases per 100,000 inmates (*24*). Based on data from the U.S. Department of Justice for 1993, 0.4% of the total prison population and almost 0.5% of local jail inmates were confirmed as having AIDS; from 1991 through 1993, confirmed AIDS cases in state and federal prisons more than doubled, from 1,682 to 3,765 cases (*25*). During 1991–1992, CDC conducted a nationwide HIV seroprevalence survey that included >70,000 blood samples from persons entering adult correctional facilities. Among the inmates in these facilities, the median HIV seroprevalence was 2.9% (range: zero to 14.9%); in comparison, during this time period, the overall HIV seroprevalence among civilian applicants for military service, a low-risk population, was 0.06% (*26*).

HIV infection in inmates has been associated with previous injection of illegal drugs, a risk factor more prevalent among inmates than among the total population (*25*); in a 1991 survey of >20,000 state and federal prisoners in 45 states, 25% of the inmates reported a history of injecting-drug use (*15*). Persons who inject illegal drugs may be at increased risk for TB even if these persons are not infected with HIV, although the reasons for this increased risk are unclear (*27*). The use of crack cocaine also has been associated with transmission of both HIV and *M. tuberculosis* (*28,29*); 19.8% of state and federal prisoners during 1991 reported a history of crack cocaine use (*15*). However, even in the absence of HIV infection and the use of such drugs, inmates are at increased risk for TB because a disproportionately high number are from lower socioeconomic groups that have poor access to health care and a high prevalence of TB infection (*30*).

Residents of correctional facilities also are at increased risk for TB because many of these facilities have overcrowded environments conducive to the transmission of *M. tuberculosis* (*12,31*). In the 1994 Annual Survey of Jails, the jails surveyed were operating at 97% of their rated capacities (*14*). During 1994, according to U.S. Department of Justice reports, state prison facilities were operating at 17%–29% above design capacity, and federal facilities at 25% above capacity (*32*). During 1992, 118 (23%) of 503 jurisdictions* in which the jail populations were large (i.e., having an average daily inmate population of ≥100 persons) had been ordered by a court to limit the number of incarcerated persons or improve the conditions of confinement because of crowded living units (*32*). Poor ventilation, which is a problem in many correctional facilities, also can promote transmission of *M. tuberculosis* to inmates, correctional-facility employees, and visitors (*12,31*).

TB Prevention and Control in Correctional Facilities

Although the high risk for transmission of *M. tuberculosis* demonstrates the need for effective TB control in correctional facilities, a 1992–93 survey of 82 correctional systems in the United States indicated that policies for TB prevention and control in some correctional facilities did not meet CDC's recommended standards (*33*). Many correctional facilities had comprehensive written protocols for TB control, but the extent to which these protocols were being practiced was not measured (*33*). The need for improved health care in correctional facilities has been advocated by a position statement from the American College of Physicians, the National Commission on Correctional Health Care, and the American Correctional Health Services Association (*34*) and by others (*35*). Furthermore, several of the nation's courts have determined that inadequate TB control efforts constitute deliberate indifference to the medical needs of inmates and that inmates have a constitutional right to adequate TB control in correctional facilities (*33*).

The Advisory Council for the Elimination of Tuberculosis (ACET) recognizes the urgent need to improve TB prevention and control practices in all correctional facilities and has prepared this report to assist federal, state, and local correctional officials in achieving this objective. This effort also will require that health departments—which have ultimate responsibility for TB prevention and control—and legislators devise and implement innovative strategies in their jurisdictions. The implementation of these

* A jurisdiction is the territorial range over which a federal, state, or local governmental authority extends.

recommendations may require that stronger legislation and regulations be enacted and adequate financial resources be allocated. These improvements in TB prevention and control practices are essential for the following reasons:

- TB is spread through the air. One highly infectious person can infect others who share the same air space.
- Immediate isolation of infectious patients can interrupt transmission of *M. tuberculosis*.
- Prompt initiation of an adequate regimen of directly observed therapy (DOT) helps ensure adherence to treatment because either a medical worker, a specially trained correctional officer, or a health-department employee observes the patient swallowing each dose of medication. This method of treatment can diminish infectiousness, reduce the risk for relapse, and help prevent the development of drug-resistant strains of *M. tuberculosis*.
- Inmates who are coinfected with HIV and *M. tuberculosis* are at high risk for developing active TB disease in comparison with inmates who are only infected with *M. tuberculosis*.
- A completed regimen of preventive therapy can prevent the development of active TB disease in persons who are infected with *M. tuberculosis*.
- Correctional-facility officials have an opportunity to treat inmates who have active TB disease or latent TB infection before such inmates are released into the community.

GENERAL GUIDELINES

TB control is an essential element in health care in correctional facilities. All correctional facilities, including those in which few TB cases are expected to occur, should designate a person or group of persons who have experience in infection control, occupational health, and engineering to be responsible for the TB infection-control program in the facility. These persons should have the authority to develop, implement, enforce, and evaluate TB infection-control policies. If supervisory responsibility is assigned to a committee, one person should be designated as the contact person to whom questions and problems can be addressed. In multifacility systems, one person should be designated to oversee TB infection-control activities throughout the system. TB infection-control officials and all clinicians who treat inmates or employees of correctional facilities should be familiar with this report, other American Thoracic Society (ATS)/CDC guidelines concerning TB (*1,27,36*), and the National Commission on Correctional Health Care standards for correctional facilities (*37,38*). Medical facilities within correctional facilities should conduct a thorough risk assessment and follow the recommendations in the "Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Facilities, 1994" (*39*).

Correctional-facility officials should form close working relationships with state and local health departments. Health departments can assist correctional facilities in

formulating, implementing, and evaluating the following essential TB infection-control activities:

a. *Screening* (i.e., the measures used to identify persons who have active TB disease or latent TB infection):
   - All correctional-facility employees and inmates who have suspected or confirmed TB disease should be identified promptly, and the case(s) or suspected case(s) should be reported to the health department.
   - Employees and long-term inmates infected with *M. tuberculosis* (i.e., those who have positive skin-test results) should be identified and evaluated for preventive therapy.

b. *Containment* (i.e., the measures used to prevent transmission of *M. tuberculosis*):
   - Persons suspected of having infectious TB disease should be placed immediately in an appropriate TB isolation room. A thorough contact investigation should be implemented promptly.
   - Persons who have suspected or confirmed TB disease should promptly begin an adequate treatment regimen. Appropriate diagnostic, treatment, and laboratory services should be available. All therapy for TB disease should be directly observed.
   - Persons infected with *M. tuberculosis*, especially those in high-risk groups, should have a thorough medical evaluation and preventive therapy when appropriate. Preventive therapy should be directly observed.

c. *Assessment* (i.e., the monitoring and evaluation of screening and containment activities). Assessment procedures include the collection and analysis of data to monitor whether the following activities are being implemented successfully:
   - cases of active TB disease are detected;
   - persons who have latent TB infection are identified and evaluated;
   - cases of TB disease are promptly reported, counted, and recorded;
   - persons who begin therapy for active TB disease or latent TB infection complete a recommended course of therapy; and
   - referrals to other correctional facilities or to health departments are made and confirmed in a timely manner.

SCREENING

Screening Methods

The following methods are usually used to identify *M. tuberculosis* infection or active TB disease. Additional information concerning these methods is provided in the ATS/CDC document "Diagnostic Standards and Classification of Tuberculosis" (*36*).

Symptom Screening

Screening for symptoms of TB disease is the first step of intervention in locations where the prevalence of TB disease is high. Persons who have symptoms of pulmonary TB (e.g., a productive, prolonged cough [a cough lasting for ≥3 weeks]; chest pain; and hemoptysis [coughing up blood]) may be infectious. The index of suspicion should be high when pulmonary symptoms are accompanied by general, systemic symptoms of TB (e.g., fever, chills, night sweats, easy fatigability, loss of appetite, and weight loss). Inmates should be interviewed systematically to determine whether they have experienced symptoms in recent weeks. Inmates who have symptoms suggestive of TB disease should immediately receive a thorough medical evaluation, including a tuberculin skin test, a chest radiograph, and, if indicated, sputum examinations. Chest-radiograph interpretations and sputum-smear results should be available within 24 hours; skin-test results should be read 48–72 hours after administration of purified protein derivative (PPD) by the Mantoux method.

During their initial medical evaluations, inmates should be asked if they have had active TB disease or if they have been treated for latent TB infection or active TB disease; this information should be recorded in each inmate's respective medical records. Any inmate who has a history of inadequate treatment for TB disease should undergo a thorough medical evaluation. If an inmate has a positive skin-test result and a diagnosis of active TB disease has been excluded, the inmate should be considered for preventive therapy.

Chest-Radiograph Screening

A posterior-anterior view of the chest is the standard radiograph initially needed to detect and describe chest abnormalities. Other views (e.g., lateral or apical lordotic views) or additional studies (e.g., computed tomographic [CT] scans) may be necessary for further evaluation. When chest-radiograph films are taken of women who may be pregnant, lead shielding should be used to protect the pelvic and abdominal area. Chest-radiograph interpretations for asymptomatic persons should be available within 72 hours; whenever possible, radiography should be performed on-site to avoid delays in diagnosis. Sputum-smear and culture examinations should be conducted for inmates whose chest radiographs are suggestive of active TB disease, regardless of their skin-test results.

Mantoux Tuberculin Skin-Test Screening

The preferred method of screening for TB infection is the Mantoux tuberculin skin test using 0.1 mL of 5 tuberculin units (TU) of PPD. Multiple-puncture tests should not be used to determine if a person is infected. Persons who have a documented history of a positive skin-test result, a documented history of TB disease, or a reported history of a severe necrotic reaction to tuberculin should be exempt from routine tuberculin skin-test screening. Neither pregnancy, lactation, nor previous vaccination with Bacillus of Calmette and Guérin (BCG) vaccine are contraindications for tuberculin skin testing. The Mantoux skin test is not a recommended method of screening for active TB disease; an average of 10%–25% of patients with active TB disease have a negative reaction to the tuberculin skin test (*40–42*).

The reaction to the Mantoux skin test should be interpreted by an experienced worker 48–72 hours after the injection by measuring the area of induration (i.e., the palpable swelling) at the injection site. The diameter of the indurated area should be measured across the width of the forearm. Erythema (i.e., the redness of the skin) should not be measured. All reactions, even those classified as negative, should be recorded in millimeters of induration.

Generally, a tuberculin skin-test reaction of ≥10 mm induration is considered a positive result in inmates and correctional-facility employees. However, an induration of ≥5 mm is considered a positive result in persons in the following groups:

- close contacts of a person who has infectious TB (see Contact Investigation);
- persons whose chest radiographs are suggestive of previous TB disease;
- persons known to have HIV infection; and
- persons who are at risk for HIV infection, including injecting-drug users whose HIV status is unknown.

Persons who have a positive skin-test result and no symptoms suggestive of TB should be screened with a chest radiograph within 72 hours after the skin test is interpreted. Persons who have symptoms suggestive of TB disease should be evaluated immediately (see Symptom Screening).

Vaccination with BCG, a TB vaccine used in many countries, can cause a reaction to the tuberculin skin test. No reliable method can distinguish tuberculin reactions caused by BCG from those caused by infection with *M. tuberculosis*. However, a diagnosis of *M. tuberculosis* infection and the use of preventive therapy should be considered for any BCG-vaccinated person who has a tuberculin skin-test reaction of ≥10 mm of induration, especially if any of the following circumstances are present: a) the vaccinated person is a contact of another person who has infectious TB, particularly if the infectious person has transmitted *M. tuberculosis* to other persons; b) the vaccinated person was born or has resided in a country in which the prevalence of TB is high; or c) the vaccinated person is exposed continually to populations in which the prevalence of TB is high (e.g., some health-care workers, employees and volunteers at homeless shelters, and workers at drug-treatment centers) (*43*). A diagnosis of active TB disease should be considered for BCG-vaccinated persons—regardless of their tuberculin skin-test results or HIV serostatus—if they have symptoms suggestive of TB, especially if they have been exposed recently to infectious TB.

HIV-infected inmates who are at high risk for infection with *M. tuberculosis* and who do not react to tuberculin may be evaluated for skin-test anergy. Anergy testing is accomplished by using the Mantoux technique to administer at least two antigens other than tuberculin (e.g., tetanus toxoid, mumps, or *Candida*) (*44*). However, the scientific basis for anergy testing is not well established, and the skin-test antigens currently used for anergy testing have not been standardized. Therefore, all HIV-infected persons, regardless of whether they are anergic, should be screened with a chest radiograph and further diagnostic evaluation if indicated. Medical and nonmedical personnel should safeguard the confidentiality of sensitive information while screening persons for infection with *M. tuberculosis* or active TB disease.

Two-Step Tuberculin Skin-Test Screening

Some persons who are skin tested many years after infection with *M. tuberculosis* have a negative reaction to an initial tuberculin skin test, followed by a positive reaction to a subsequent skin test; this phenomenon is referred to as a boosted reaction. Boosted reactions to tuberculin skin tests are common in older adults and in persons who have been vaccinated with BCG. To reduce the likelihood of misinterpreting a boosted reaction as a new infection, two-step testing is used for baseline testing of persons who periodically will receive tuberculin skin tests. If the result of the first test is positive, the person is considered infected with *M. tuberculosis*; if negative, a second test should be administered 1–3 weeks later. To eliminate one appointment, some correctional facilities wait until 1 week after the first test both to interpret the reaction to the first test and to administer the second test to tuberculin-negative persons. The reaction to the second test should be interpreted 48–72 hours after the injection.

A positive reaction to the second test probably represents a boosted reaction and is not considered a skin-test conversion. Persons who have a negative reaction to the second test should be classified as uninfected. In persons who have a negative skin-test result, a positive reaction to any subsequent test is considered a skin-test conversion and is likely to represent new infection with *M. tuberculosis*.

Initial Screening

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

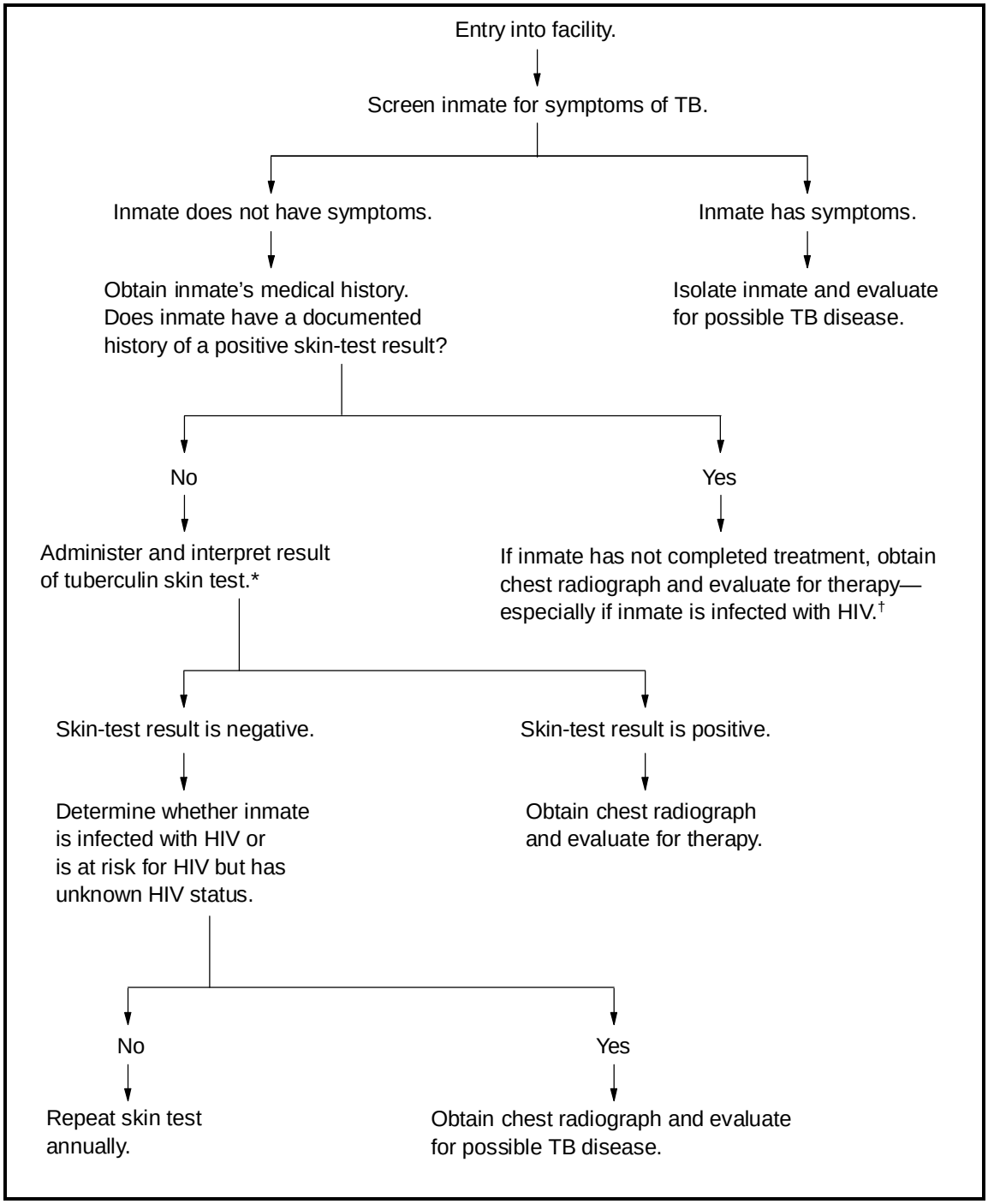
Inmates in Long-Term Correctional Facilities

Symptom screening should be done as soon as possible for all new inmates. Any inmate who has symptoms suggestive of TB should be placed immediately in a TB isolation room and evaluated promptly for TB disease. In addition, tuberculin skin-test screening of all inmates who do not have a documented history of a positive skin-test result should be mandatory in long-term correctional facilities. Decisions concerning the use of two-step skin testing for inmates entering the facility should be based on the frequency of boosting in the facility; in some facilities, two-step testing may provide a more reliable baseline. Persons who have a positive skin-test result should be screened with a chest radiograph and should be given a thorough medical evaluation; if active TB disease is excluded as a diagnosis, preventive therapy should be considered for these persons. Regardless of their tuberculin skin-test status, inmates known to have HIV infection, as well as inmates who are at risk for HIV infection but whose HIV status is unknown, should have a chest radiograph taken as part of the initial screening (Figure 1) (*1*).

Inmates in Short-Term Correctional Facilities that Provide Service to Populations at High Risk for TB

As in long-term facilities, symptom screening should be done as soon as possible for all new inmates in short-term facilities. Any inmate who has symptoms suggestive of TB should be placed immediately in a TB isolation room and promptly evaluated for TB disease. Tuberculin skin-test screening usually is not feasible for short-term

FIGURE 1. Protocol for screening inmates for tuberculosis (TB) in long-term correctional facilities



*In some correctional facilities, particularly those in which the frequency of boosting is high, the use of two-step testing for initial testing should be considered.
†HIV = human immunodeficiency virus.

inmates. However, long-term inmates who reside in short-term facilities and who do not have a documented history of a positive skin-test result should be tuberculin tested within 14 days of entry. Persons who have a positive skin-test result should have a chest radiograph taken and should be given a thorough medical evaluation; if TB disease is excluded as a diagnosis, the inmate should be considered for preventive therapy. Regardless of their skin-test results, inmates known to have HIV infection, as well as inmates who are at risk for HIV infection but whose HIV status is unknown, should have a chest radiograph taken as part of the initial screening.

In some large jails, TB control officials should consider using on-site chest radiography to screen all inmates, both short-term and long-term, for TB disease. Such screening is particularly important for jails in which a) the prevalence of TB disease is high, b) the inmate population changes rapidly, and c) the prevalence of HIV infection and illicit-drug injection is high. Jail officials should consult the local TB control officer for assistance in assessing the need for, and cost-effectiveness of, such screening. In jails in which chest-radiograph screening is routinely conducted, long-term inmates also should be tuberculin skin tested (Figure 2).

Inmates in Short-Term Facilities that Provide Service to Populations at Low Risk for TB

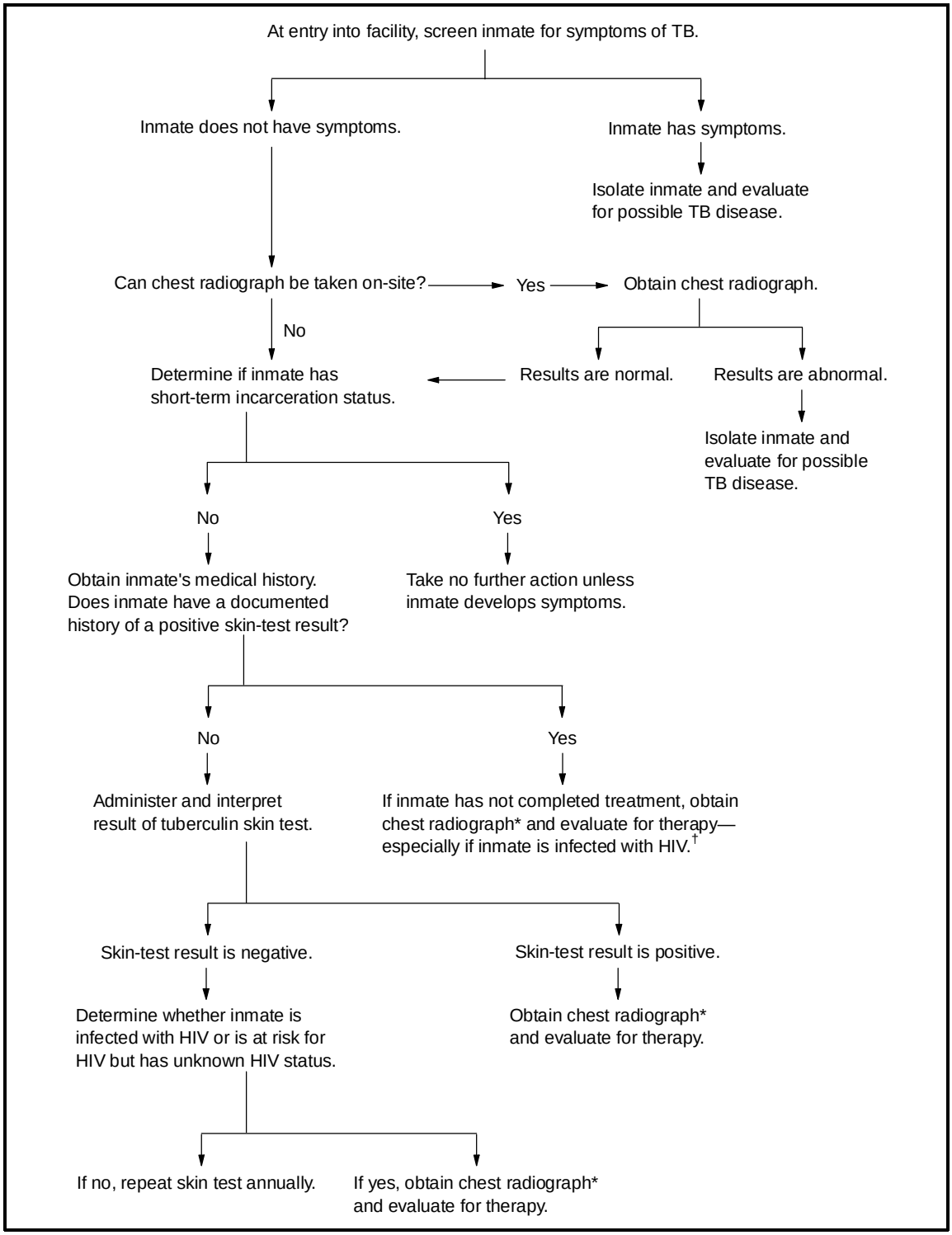
Symptom screening is recommended for all inmates at time of entry into the facility. Any inmate who has symptoms suggestive of TB should be placed immediately in a TB isolation room and evaluated promptly for TB disease. Correctional facilities without an on-site medical facility should have a written plan to refer patients who have suspected or confirmed TB to a collaborating facility that is equipped to evaluate and manage TB patients (Figure 3).

When short-term facilities do not institute an extensive TB screening protocol, the decision should be supported by a thorough assessment of the risk for *M. tuberculosis* transmission in the facility. For example, screening for infection may not be indicated in facilities in which the risk for exposure to and transmission of *M. tuberculosis* is minimal; such facilities a) do not contain inmates who have infectious TB, b) are located in communities in which no TB cases were reported during the preceding year, and c) do not contain inmates who resided in areas in which TB cases were reported during the preceding year. In contrast, more extensive TB screening may be necessary if cases of drug-resistant TB have been reported in the facility or its community or if the prevalence of HIV infection among inmates or employees at the facility is high.

Employees in All Correctional Facilities

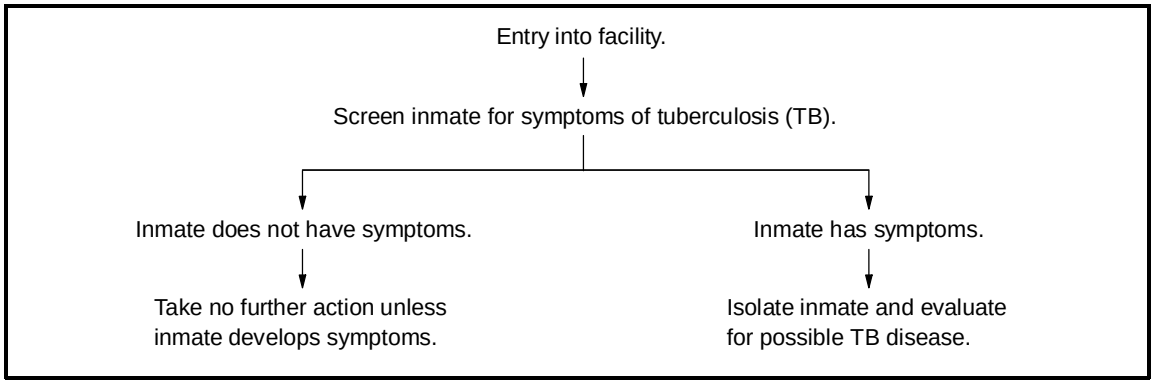
A medical history should be obtained from and recorded for all new employees at the time of hiring, and they should receive a physical examination. In addition, tuberculin skin-test screening should be mandatory for all employees who do not have a documented history of a positive skin-test result. To improve the accuracy of the baseline result, two-step Mantoux skin testing should be used for the initial screening of employees who have not been tested in the preceding 12 months. Persons who have a positive skin-test result should have a chest radiograph taken and evaluated and should be given a thorough medical evaluation; if TB disease is excluded as a diagnosis, such persons should be considered for preventive therapy. All employees should be informed that they should seek appropriate follow-up and screening for TB if they

FIGURE 2. Protocol for screening inmates for tuberculosis (TB) in short-term correctional facilities that provide service to high-risk populations



*If not obtained previously.
†HIV = human immunodeficiency virus.

FIGURE 3. Protocol for screening inmates for tuberculosis (TB) in short-term correctional facilities that provide service to low-risk populations



are immunosuppressed for any reason (e.g., HIV-infected persons, regardless of their skin-test results, should have a chest radiograph taken and evaluated). Any employee who has symptoms suggestive of TB should not return to the workplace until a physician has excluded a diagnosis of infectious TB disease.

Facilities in which the risk for infection with *M. tuberculosis* is minimal may not need to maintain an ongoing tuberculin skin-testing program. However, administering baseline skin tests to employees would enable medical staff to distinguish between a skin-test conversion and a positive skin-test result caused by a previous exposure to *M. tuberculosis* (Figure 4).

Follow-Up Screening

Long-term inmates and all employees who have a negative skin-test result should have an annual PPD skin test. Persons who have a history of a positive skin-test result and who have not completed a course of preventive therapy should be screened for symptoms of TB disease. However, annual chest radiographs are unnecessary for the follow-up evaluation of infected persons. Tuberculin skin-test results should be recorded in the person's medical record and in a retrievable aggregate database of all tuberculin skin-test results. Personal identifying information should be confidential.

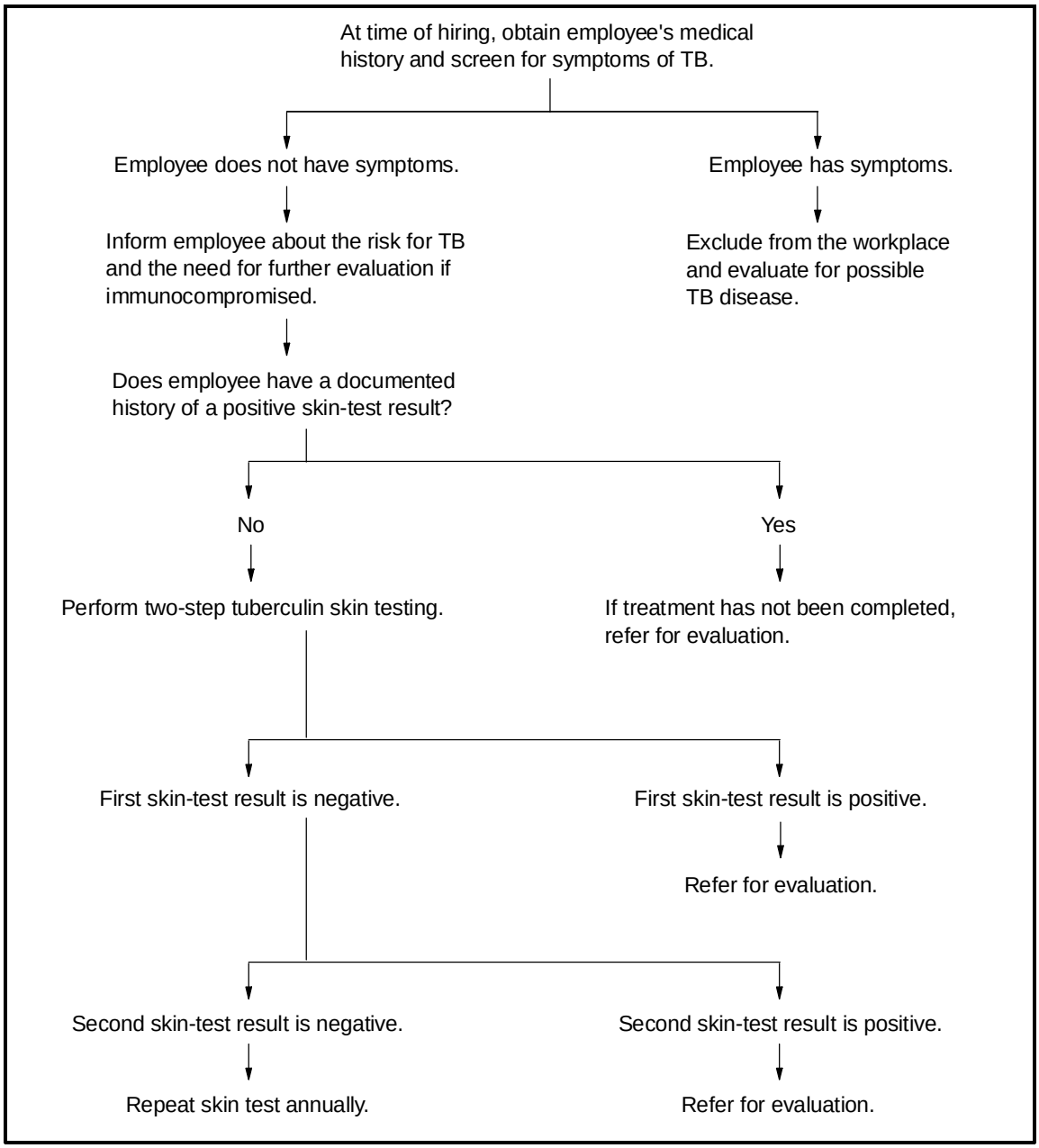
The database should be analyzed periodically to estimate the risk for acquiring new infection in the correctional facility; however, this analysis should be completed by using only the skin-test results of a) employees and b) inmates who have remained in the facility continually during the interval between skin tests. The tuberculin skin-test conversion rate equals the number of employees whose skin-test results have converted from negative to positive during a specific time interval (i.e., the numerator) divided by the total number of previously PPD-negative employees who were tested during the same specific time interval (i.e., the denominator). Conversion rates also can be calculated for previously PPD-negative inmates who were tested during the same specific time interval if these inmates remained in the facility continually since their last skin test. In some facilities, data analysis of skin-test results for specific areas or groups within the facility may be appropriate.

Additional investigation, and possibly more frequent testing, are needed when a tuberculin skin-test conversion rate is substantially higher than previous rates. A

cluster (i.e., when two or more tuberculin skin-test conversions occur in the correctional facility and the epidemiologic evidence indicates transmission has occurred within the facility) or other evidence of person-to-person transmission also warrants additional epidemiologic investigation* or a revision of the facility's TB prevention and control protocol.

*For a detailed explanation of how to conduct such an investigation, see CDC's "Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Facilities, 1994" (*39*).

FIGURE 4. Protocol for screening correctional-facility employees for tuberculosis (TB)



Diagnosis

All persons who have a positive skin-test result or symptoms suggestive of TB should receive a thorough medical evaluation, and a chest radiograph should be taken and evaluated. A negative skin-test result does not exclude the diagnosis of active TB disease, especially for patients who have severe TB disease or HIV infection. Abnormalities on a chest radiograph might suggest, but do not confirm, a diagnosis of active TB disease. However, chest radiographs may be used to exclude the possibility of pulmonary TB in a person who has a positive skin-test result but no symptoms of disease.

At least three sputum specimens obtained from a person suspected of having pulmonary or laryngeal TB should be examined using an acid-fast bacilli (AFB) smear and culture. A series of three specimens should be collected during the early morning on different days. Sputum should be submitted for AFB smear and culture examinations from persons who are diagnosed initially with other respiratory diseases (e.g., pneumonia) but whose symptoms do not improve within 14 days after initiation of treatment. Aerosol induction can be used to obtain specimens if sputum cannot be produced spontaneously. Precautionary infection-control measures should be used during sputum collection, sputum induction, bronchoscopy, and other diagnostic procedures.

Detection of AFB in stained sputum smears examined microscopically may provide the first bacteriologic indication of TB disease; however, smear examination enables only the presumptive diagnosis of TB because the AFB on a smear may be mycobacteria other than *M. tuberculosis*. Furthermore, the sputum smears obtained from TB patients might be negative for AFB. Smear examination is a rapid and relatively easy procedure to perform; results should be available within 24 hours after the laboratory receives the specimen. The results of the smear examination can be used to help determine the infectiousness of the patient; patients whose sputum-smear results are positive are considered infectious because they can expel many tubercle bacilli into the air when they cough or sneeze.

A positive culture for *M. tuberculosis* confirms a diagnosis of TB disease. In the absence of a positive culture, TB also may be diagnosed on the basis of clinical signs and symptoms. When liquid culture media and rapid identification methods are used, culture results are usually available within 2–3 weeks after specimen collection. For all patients, the initial *M. tuberculosis* isolate should be tested for drug susceptibility.

TB can be difficult to diagnose in HIV-infected persons or other severely immunosuppressed persons (*36*). A high frequency of extrapulmonary involvement, usually with concomitant pulmonary TB, is a striking clinical feature of TB in these patients, especially in patients who have severe HIV-induced immunosuppression (*45*). The chest radiographs of severely immunosuppressed persons who have pulmonary TB might not have a classical appearance; for example, infiltrates without cavities in any lung zone or mediastinal or hilar lymphadenopathy might be present. In rare situations, the chest radiograph of a severely immunosuppressed person who has pulmonary TB disease may appear normal (*46*).

Case Reporting

All states require designated health-care professionals to report cases of TB to the local or state health department; this reporting is mandatory for all correctional facilities, whether private, federal, state, or local. Correctional-facility medical staff should report any suspected or confirmed TB cases among inmates or employees to the appropriate health agency in accordance with state and local laws and regulations. Cases must be reported to access health department resources for case management and for contact investigation in both the facility and the community. For each suspected case of TB, the diagnosis or the exclusion of a diagnosis of TB should be entered immediately into a) the person's medical record, b) the retrievable aggregate TB control database at the facility, and c) the database at a centralized office if the system has multiple facilities. In addition, drug-susceptibility results should be sent to the state or local health department for use in monitoring the rates of drug resistance in the health department's jurisdiction.

Contact Investigation

A prompt and thorough contact investigation is essential for the control of TB. Persons who have confirmed pulmonary or laryngeal TB should be considered infectious if they meet two criteria. First, the person either a) is coughing, b) is undergoing cough-inducing or aerosol-generating procedures, or c) has had a sputum smear that was positive for AFB. Second, the person either a) is not receiving therapy, b) has just started therapy, or c) is having a poor clinical or bacteriologic response to therapy.

When a person who has suspected or confirmed TB might be infectious, close contacts of that person should be skin tested unless they have a documented history of a positive tuberculin skin-test result (*1*). Close contacts include persons who live with, work with, or otherwise are frequently in close physical proximity to a person who has infectious TB. These contacts are at highest risk for acquiring infection. Depending on the ventilation in a correctional facility and the infectiousness of the index patient, close contacts in correctional facilities could include all cell mates of the infectious person, all inmates and employees on a tier or unit, and all inmates and employees in a building.

All persons should be considered potential contacts if they could have been exposed to the patient when the patient was likely to have been infectious. Contacts also might include frequent visitors, inmates or employees who are no longer at the facility, and family or community members who were in close contact with the patient before the incarceration. Contacts who are children or who have HIV infection should be evaluated as soon as possible after the exposure.

Because the public health department is responsible for identifying and testing contacts outside the correctional facility, the health department should be consulted to help determine who should be screened for possible TB infection. To help identify contacts within the facility, correctional facilities should maintain a tracking system that documents inmate transfers, releases, and moves within a facility or system; this information should be available, when necessary, to other correctional facilities and to the health department.

If the skin testing of close contacts indicates that the rate of positive skin-test results in this group exceeds the expected rate, the investigation should be extended to

include persons who have had less frequent contact with the patient. Health departments should help determine when a contact investigation should be extended to include such persons.

Contacts should be screened with a chest radiograph if they have a skin-test result of ≥5 mm induration or symptoms suggestive of active TB disease; those persons who do not have evidence of active TB disease should be evaluated for preventive therapy. Contacts whose initial skin-test result is <5 mm of induration should be screened with a chest radiograph and should be considered for preventive therapy in the following situations:

- the contact is a child or adolescent;
- the contact is immunosuppressed, especially because of HIV infection;
- the contact was exposed to a person who was highly infectious (i.e., who had not been treated for TB at the time of this exposure and who either a] had pulmonary or laryngeal TB and a cough or was undergoing cough-inducing procedures, b] had a positive AFB sputum smear, or c] had cavitation on chest radiograph);
- the environment in which the contact was exposed to *M. tuberculosis* was conducive to transmission of the organism;
- *M. tuberculosis* was transmitted to other persons who had a similar degree of exposure to the infectious person.

Contacts who have a negative reaction to an initial skin test should be retested 10–12 weeks after their last known exposure to *M. tuberculosis*. Preventive therapy can be discontinued if the result of the second skin test is negative and the contact has had no further exposure to infectious TB. Contacts who are infected with HIV should be considered for preventive therapy regardless of their skin-test results (*1*). All involved personnel should ensure the confidentiality of sensitive information during the contact investigation.

If the sputum-smear result of a patient who has clinically active TB disease is negative, that patient probably is not infectious. However, if this patient could have been infected recently with *M. tuberculosis*, close contacts of that person should be evaluated to determine the probable source case and to identify other newly infected inmates or employees.

CONTAINMENT

Isolation

Persons who have suspected or confirmed pulmonary or laryngeal TB disease should be placed immediately in a TB isolation room that meets recommended standards (*39*). Moving a patient to another facility or hospital that has an available TB isolation room may be necessary. TB isolation procedures can be discontinued if a diagnosis of TB is excluded. If a diagnosis of TB cannot be excluded, the patient should remain in isolation until the patient is determined to be noninfectious. Current guidelines recommend daily monitoring of TB isolation rooms in use so that negative

pressure is maintained and air is exhausted properly (*39*). No special precautions are needed for handling the patient's dishes, books, laundry, bedding, or other personal items.

The length of time required for a TB patient to become noninfectious after initiating TB therapy varies considerably. Isolation should be discontinued only when the patient is receiving effective therapy, is improving clinically, and has had three consecutive negative AFB smears from specimens collected on different days. In patients who have drug-resistant TB, the response to treatment should be closely monitored, and TB isolation should be maintained until noninfectiousness has been determined. Prolonged isolation should be considered for patients who have MDR-TB because these patients are more likely to experience treatment failure or relapse, both of which can prolong infectiousness.

Because crowded living conditions and poor ventilation are conducive to the transmission of *M. tuberculosis*, improvements in housing conditions can help prevent outbreaks. Standard engineering controls are based primarily on the use of ventilation systems, which might not prevent transmission of *M. tuberculosis*. These ventilation systems may be supplemented with high-efficiency particulate air (HEPA) filtration and ultraviolet germicidal irradiation (UVGI) in high-risk areas (e.g., temporary holding areas and communal areas). HEPA filters can be used in ventilation systems to remove droplet nuclei from the air. UVGI lamps can be used in ceiling or wall fixtures or within air ducts of ventilation systems to kill or inactivate *M. tuberculosis* contained in droplet nuclei. When HEPA filtration or UVGI is used, proper installation and maintenance are essential to ensure effective operation and reduction of potential health hazards (e.g., conjunctivitis caused by UVGI overexposure) (*39,47*).

If inmates who are suspected of having infectious TB must be transported outside their TB isolation rooms for medically essential procedures that cannot be performed in the isolation rooms, they should be required to wear a surgical mask that covers their mouth and nose during transport. Medical or security staff who transport infectious TB patients in a closed vehicle or who must enter TB isolation rooms should wear a personal respirator. A respiratory protection program, including education and fit testing (i.e., testing for proper fit of respiratory equipment), should be included in the correctional facility's TB infection-control program (*39*).

Treatment

Current ATS/CDC recommendations should be followed for the treatment and management of persons who have suspected or confirmed TB disease (*27*). For most patients, the preferred initial treatment regimen includes four drugs: isoniazid, rifampin, pyrazinamide, and either ethambutol or streptomycin. Three drugs (isoniazid, rifampin, and pyrazinamide) may be adequate for the initial regimen if the possibility of drug resistance is unlikely. Drug resistance does not usually occur when the primary isoniazid-resistance rate in the community is <4% and the patient a) has not been treated previously for TB, b) was not born in or has not resided in a country in which the prevalence of drug-resistant TB is high, and c) has had no known exposure to a patient with drug-resistant TB. Because pyrazinamide and streptomycin should not be used to treat pregnant women, pregnancy must be excluded in women of childbearing ages before treatment for TB disease is initiated.

For persons who have positive sputum smears or cultures at the initiation of therapy, response to treatment should be monitored by smear and culture examination at least monthly until the results are negative. Failure to respond to treatment usually is caused by patient nonadherence to therapy, but it also can be caused by a drug-resistant strain of *M. tuberculosis*. Drug-susceptibility testing should be performed on all initial *M. tuberculosis* isolates, regardless of sputum-smear results. If cultures continue to be positive after 2 months of recommended therapy, or if the patient's condition does not improve or worsens, drug-susceptibility tests should be performed again, and adherence to the prescribed regimen should be reassessed.

All patients should be monitored by trained personnel for signs and symptoms of adverse reactions during therapy. A thorough medical evaluation is necessary if the patient develops drug intolerance or has signs or symptoms of an adverse reaction. In some situations, adjusting the regimen to enable completion of therapy may be necessary. Expert medical consultation should be sought for monitoring and treating patients who have complex psychosocial problems or associated medical conditions (e.g., AIDS, diabetes, pregnancy, or extrapulmonary or drug-resistant TB). HIV counseling and testing should be offered to all inmates who have active TB disease. HIV-infected patients who have active TB disease should be monitored closely for treatment failure, relapse, and adverse reactions to medications (*27*).

All inmates being treated for active TB disease should be on DOT to ensure adherence to therapy. When DOT is used, TB medication may be administered either a) twice weekly (with an appropriate change in dosage) after an initial period of daily medication or b) three times weekly from the beginning of therapy (*27*).

Inadequate or interrupted treatment for TB can result in relapse, continued transmission, and the development of drug-resistant disease. Therefore, after effective therapy has begun, continued treatment without interruption is critical until patients complete an entire course of therapy. If treatment lapses for any reason, prompt action should be taken to ensure that therapy is reinstituted. If an inmate is to be released or transferred out of the facility before completing therapy, the public health department or receiving correctional facility should be notified as far in advance as possible and should be provided with appropriate medical records to ensure continued adherence to and timely completion of therapy. Innovative efforts should be made to encourage released inmates to complete treatment for active TB disease; such efforts can decrease the number of TB patients who are lost to follow-up. For example, among persons released from Rikers Island Correctional Facility in New York City, an expanded outreach program and the use of incentives increased the percentage of released inmates who went to follow-up medical appointments from <20% to 92% (*48*).

Preventive Therapy

The recommended regimen for preventive therapy in adults is a single daily dose of 300 mg of isoniazid for 6–12 months. Regardless of their ages, persons in the following high-risk groups should be evaluated for preventive therapy if they have a positive skin-test result:

- persons known to be infected with HIV who have a skin-test result of ≥5 mm induration;

- persons who are at risk for HIV infection (including injecting-drug users whose HIV status is unknown) and who have an induration of ≥5 mm;
- persons who have had close contact with a person who has infectious TB and who have an induration of ≥5 mm;
- persons who have chest-radiograph findings suggestive of previous TB but who have received inadequate or no treatment and who have an induration of ≥5 mm;
- injecting-drug users who are known to be HIV negative and who have an induration of ≥10 mm;
- persons who have medical conditions known to increase the risk for TB disease and who have an induration of ≥10 mm (see Glossary: Medical conditions known to increase the risk for TB); and
- persons whose tuberculin skin-test result converted from negative to positive within the preceding 2 years and who have a ≥10 mm increase in the size of induration if <35 years of age or a ≥15 mm increase if ≥35 years of age.

Persons in these high-priority groups should start a course of preventive therapy unless treatment is medically contraindicated. In addition, in the absence of any risk factors, correctional-facility employees or inmates <35 years of age should be evaluated for preventive therapy if their reaction to the tuberculin skin test is ≥10 mm (*27,39*). These persons should start preventive therapy only if they are likely to complete a regimen of at least 6 months of preventive therapy (i.e., the correctional facility has formal agreements with collaborating facilities and the local health department for referral and follow-up upon transfer or release of the inmate).

Regardless of their ages, persons coinfected with HIV and *M. tuberculosis* are at high risk for developing active TB disease. Therefore, HIV counseling and testing should be offered to all inmates who have had a positive skin-test result. In addition, HIV-infected persons, or persons who are at risk for HIV infection but whose HIV status is unknown, should receive 12 months of preventive therapy if they have a positive skin-test result.

Preventive therapy given to inmates always should be directly observed by a medical worker or other specially trained person. Because daily supervised therapy often is not feasible, twice-weekly supervised therapy is suggested as a satisfactory alternative when directly observed preventive therapy is used. Twice-weekly intermittent preventive therapy (using 15 mg/kg of isoniazid per dose, with a maximum dose of 900 mg) is considered to be safe and effective, although this therapy has not been studied in controlled clinical trials (*27*). Medication should **not** be given to an inmate without direct observation of drug ingestion. Before release or transfer of an inmate, provisions should be made for the public health department or receiving facility to oversee completion of an appropriate course of preventive therapy.

During the entire treatment period, persons receiving preventive therapy should be monitored monthly by medical personnel for signs and symptoms of adverse reactions. Because isoniazid-associated hepatitis occurs more frequently among persons ages ≥35 years, transaminase measurements should be obtained for persons in this age group at the initiation of preventive therapy and monthly during the course of

treatment (*27*). Other factors associated with an increased risk for hepatitis include chronic liver disease, daily use of alcohol, injecting-drug use, a history of discontinuing isoniazid because of adverse reactions, or current use of another medication that might cause interactions. Persons in some demographic groups might have an increased risk for severe or fatal cases of isoniazid-associated hepatitis; case clusters have been reported among both black and Hispanic women, particularly among Hispanic women during postpartum periods (*49*). Persons in these high-risk groups may require more careful monitoring during preventive therapy; such monitoring might include more frequent liver function tests. If any of these test results exceeds three to five times the upper limit of the normal range, isoniazid should be discontinued and a thorough clinical evaluation should be conducted promptly. Liver function tests are not a substitute for monthly clinical evaluations or for the prompt assessment of possible adverse reactions that might occur between regularly scheduled evaluations (*27*).

Persons for whom TB preventive therapy is recommended but who refuse or are unable to complete a recommended course of therapy should be counseled to seek prompt medical attention if they develop signs or symptoms suggestive of TB. Routine, periodic chest radiographs of persons who have a documented history of a positive skin-test result usually are not useful for detecting disease in the absence of symptoms. Chest radiographs should be taken only if symptoms, especially a persistent cough, develop.

ASSESSMENT

Inmates in large jails and prison systems are transferred frequently from one facility to another and from one unit to another within a facility. Thus, a retrievable aggregate record system is essential for tracking all inmates and for assessing the status of persons who have active TB disease and latent TB infection in prisons and jails. This record system should maintain current information about the location, screening results, treatment status, and degree of infectiousness of these persons. The record system also should provide the information necessary to assess the overall effectiveness of TB control efforts. The following information should be reviewed at least annually:

- the numbers of correctional-facility employees and inmates currently infected with *M. tuberculosis*;
- the number of newly infected persons (i.e., those who have skin-test conversions);
- the number of persons for whom preventive therapy was initiated;
- the percentage of persons who completed the prescribed preventive therapy regimen, excluding those released from or transferred out of the facility;
- the number of diagnosed TB cases and the case rate;
- the percentage of persons in whom active TB disease was diagnosed who completed the prescribed treatment regimen, excluding those released from or transferred out of the facility;

- the number of infectious (i.e., smear-positive) patients; and
- the percentage of released or transferred inmates who kept their scheduled referral appointment.

In a multifacility correctional system, these data should be compiled for each facility, and for all the facilities in the system, and then provided to correctional-facility and health-department officials. In large correctional facilities, analysis of the data by unit may be necessary. ACET has established the following goals: a) at least 95% of persons who begin preventive therapy should complete the prescribed regimen (excluding inmates released from or transferred out of the facility); b) at least 95% of persons in whom active TB disease is diagnosed should complete the prescribed treatment regimen (excluding inmates released from or transferred out of the facility); and c) at least 90% of released or transferred inmates should keep their scheduled referral appointments.

ROLE OF THE CORRECTIONAL FACILITY

The correctional facility should be responsible for in-facility TB screening, containment, and assessment unless otherwise mandated by legal statute. In all correctional facilities, officials should work closely with the state and local health departments in their jurisdictions. Correctional facilities, including local jails, should establish formal written working agreements with health departments in their areas. These written agreements should delineate responsibilities and specify procedures for the following activities:

- screening and treatment of inmates,
- follow-up of symptomatic inmates,
- follow-up of inmates who have abnormal chest radiographs,
- contact investigations for reported TB cases,
- follow-up of inmates released before completing treatment for TB disease, and
- follow-up of inmates released before completing preventive therapy.

Correctional facilities also should collaborate with health department staff to provide TB education and counseling to inmates and employees.

ROLE OF THE PUBLIC HEALTH DEPARTMENT

Public health departments should assist correctional facilities in developing and updating policies, procedures, and record-keeping systems for TB control. The health department also should provide access to expert TB medical consultation and ensure that correctional facilities have access to adequate laboratory services. A specific health department contact person should be designated to provide epidemiologic and management assistance to correctional facilities. These duties initially may require on-site consultation at the correctional facility. Small jails may need more direct

support from the health department (e.g., to perform screening activities or administer DOT).

Health-department personnel should assist in developing programs to train correctional-facility personnel for activities such as a) performing, interpreting, and recording tuberculin skin tests; b) identifying signs and symptoms of TB; c) initiating and observing therapy; d) monitoring medication side effects; e) collecting diagnostic specimens; f) educating inmates; and g) maintaining record systems. Some health departments and correctional facilities have encouraged participation in such programs by certifying correctional-facility employees who complete the training courses. Health department officials also should provide educational information concerning TB to senior-level prison and jail authorities and to county boards of supervisors and other elected officials.

In addition, health departments should provide consultation for contact investigations for each case within correctional facilities and ensure appropriate examinations for community contacts of persons diagnosed with or suspected of having active TB disease in these facilities. Health department staff also should cooperate with correctional-facility staff in identifying TB among persons who enter the correctional facility and in arranging continued treatment of inmates who are released while receiving TB treatment or preventive therapy.

Health departments should maintain TB registries containing updated medical information on all current TB patients in their jurisdictions, including those in correctional facilities. Cross-matching information from the TB registry with the names of inmates admitted into correctional facilities can help identify persons who have active TB disease but who did not provide this information to correctional-facility personnel; cross-matching also can help locate patients lost to follow-up (New York City Department of Health, unpublished data). TB case records should be assessed quarterly, and necessary revisions in policies or procedures should be recommended. The reported information on TB cases among inmates and correctional-facility staff should be assessed periodically by health departments to determine the communitywide impact of *M. tuberculosis* infection and TB disease in correctional facilities.

Because inmates could be coinfected with HIV and *M. tuberculosis*, health department officials should assist correctional facilities in developing and implementing HIV-prevention programs that include strategies for a) identifying persons who practice high-risk behaviors, b) reducing high-risk behaviors among all inmates, and c) counseling HIV-infected persons.

CONCLUSION

These recommendations will be revised periodically as necessary. They are not intended to discourage new and innovative approaches in addressing TB prevention and control in correctional settings, but should be used to enhance the quality of medical care for all persons in correctional facilities.

References

1. American Thoracic Society/CDC. Control of tuberculosis in the United States. Am Rev Respir Dis 1992;146:1623–33.
2. Braun MM, Truman BI, Maguire B, et al. Increasing incidence of tuberculosis in a prison inmate population: association with HIV infection. JAMA 1989;261:393–7.

3. Tuberculosis Control Program. Annual report, 1994. Trenton, NJ: New Jersey Department of Health, 1995.
4. CDC. Probable transmission of multidrug-resistant tuberculosis in a correctional facility—California. MMWR 1993;42:48–51.
5. CDC. Reported tuberculosis in the United States, 1993. Atlanta: US Department of Health and Human Services, Public Health Service, CDC, 1994.
6. CDC. Reported tuberculosis in the United States, 1994. Atlanta: US Department of Health and Human Services, Public Health Service, CDC, 1995.
7. Salive ME, Vlahov D, Brewer TF. Coinfection with tuberculosis and HIV-1 in male prison inmates. Public Health Rep 1990;105:307–10.
8. Spencer SS, Morton AR. Tuberculosis surveillance in a state prison system. Am J Public Health 1989;79:507–9.
9. CDC. Tuberculosis prevention in drug-treatment centers and correctional facilities—selected U.S. sites, 1990–1991. MMWR 1993;42:210–3.
10. Alcabes P, Vossenas P, Cohen R, Braslow C, Michaels D, Zoloth S. Compliance with isoniazid prophylaxis in jail. Am Rev Respir Dis 1989;140:1194–7.
11. Bellin EY, Fletcher DD, Safyer SM. Association of tuberculosis infection with increased time in or admission to the New York City jail system. JAMA 1993;269:2228–31.
12. Stead WW. Undetected tuberculosis in prison: source of infection for community at large. JAMA 1978;240:2544–7.
13. Bureau of Justice Statistics. Prisoners in 1994. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1995; document no. NCJ-151654.
14. Bureau of Justice Statistics. Jails and jail inmates 1993–94: census of jails and survey of jails. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1995; document no. NCJ-151651.
15. Bureau of Justice Statistics. Survey of State Prison Inmates, 1991. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1993; document no. NCJ-136949.
16. Bureau of Justice Statistics. Correctional populations in the United States, 1991. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1993; document no. NCJ-142729.
17. Hutton MD, Cauthen GM, Bloch AB. Results of a 29-state survey of tuberculosis in nursing homes and correctional facilities. Public Health Rep 1993;108:305–14.
18. Miller FJW, Seal RME, Taylor MD. Tuberculosis in children. Boston: Little Brown, 1963.
19. Valway SE, Richards SB, Kovacovich J, Greifinger RB, Crawford JT, Dooley SW. Outbreak of multi-drug-resistant tuberculosis in a New York State prison, 1991. Am J Epidemiol 1994;140:113–22.
20. CDC. Tuberculosis transmission in a state correctional institution—California, 1990–1991. MMWR 1992;41:927–9.
21. Selwyn PA, Hartel D, Lewis VA, et al. A prospective study of the risk of tuberculosis among intravenous drug users with human immunodeficiency virus infection. N Engl J Med 1989;320:545–50.
22. Daley CL, Small PM, Schecter GF, et al. An outbreak of tuberculosis with accelerated progression among persons infected with the human immunodeficiency virus: an analysis using restriction-fragment–length polymorphisms. N Engl J Med 1992;326:231–5.
23. CDC. Nosocomial transmission of multidrug-resistant tuberculosis among HIV-infected persons—Florida and New York, 1988–1991. MMWR 1991;40:585–91.
24. Morse DL, Truman BI, Hanrahan JP, et al. AIDS behind bars: epidemiology of New York State prison inmate cases, 1980–1988. NY State J Med 1990;90:133–8.
25. Bureau of Justice Statistics. HIV in prisons and jails, 1993. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1995; document no. NCJ-152765.
26. CDC. National HIV serosurveillance summary: results through 1992. Vol 3. Atlanta: US Department of Health and Human Services, Public Health Service, CDC, 1994.
27. American Thoracic Society/CDC. Treatment of tuberculosis and tuberculosis infection in adults and children. Am J Respir Crit Care Med 1994;149:1359–74.

28. Leonhardt KK, Gentile F, Gilbert BP, Aiken M. A cluster of tuberculosis among crack house contacts in San Mateo County, California. Am J Public Health 1994;84:1834–6.
29. CDC. Crack cocaine use among persons with tuberculosis—Contra Costa County, California, 1987–1990. MMWR 1991;40:485–9.
30. Dowdle WR. Public health opportunities and correctional health services. Presented at the American Correctional Health Services Association Meeting, Atlanta, March 12, 1993.
31. Snider DE Jr, Hutton MD. Tuberculosis in correctional institutions [Editorial]. JAMA 1989;261:436–7.
32. Bureau of Justice Statistics. Correctional populations in the United States, 1992. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 1995; document no. NCJ-146413.
33. Hammett TM, Harrold L, Epstein J. Tuberculosis in correctional facilities. Washington, DC: US Department of Justice, National Institute of Justice, 1994.
34. Weiner J, Anno BJ, American College of Physicians, National Commission on Correctional Health Care, American Correctional Health Services Association. The crisis in correctional health care: the impact of the National Drug Control Strategy on correctional health services. Ann Intern Med 1992;117:71–7.
35. Glaser JB, Greifinger RB. Correctional health care: a public health opportunity. Ann Intern Med 1993;118:139–45.
36. American Thoracic Society/CDC. Diagnostic standards and classification of tuberculosis. Am Rev Respir Dis 1990;142:725–35.
37. National Commission on Correctional Health Care. Standards for health services in jails. Chicago: National Commission on Correctional Health Care, 1992.
38. National Commission on Correctional Health Care. Standards for health services in prisons. Chicago: National Commission on Correctional Health Care, 1992.
39. CDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care facilities, 1994. MMWR 1994;43(No. RR-13).
40. Holden M, Dubin MR, Diamond PH. Frequency of negative intermediate-strength tuberculin sensitivity in patients with active tuberculosis. N Engl J Med 1971;285:1506–9.
41. Nash DR, Douglass JE. Anergy in active pulmonary tuberculosis: a comparison between positive and negative reactors and an evaluation of 5 TU and 250 TU skin test doses. Chest 1980;77:32–7.
42. Huebner RE, Schein MF, Bass JB Jr. The tuberculin skin test. Clin Infect Dis 1993;17:968–75.
43. CDC. The role of BCG vaccine in the prevention and control of tuberculosis in the United States: a joint statement by the Advisory Council for the Elimination of Tuberculosis and the Advisory Committee on Immunization Practices. MMWR 1996;45(No. RR-4).
44. CDC. Purified protein derivative (PPD)-tuberculin anergy and HIV infection: guidelines for anergy testing and management of anergic persons at risk of tuberculosis. MMWR 1991;40(No. RR-5):27–33.
45. CDC. Tuberculosis and human immunodeficiency virus infection: recommendations of the Advisory Committee for the Elimination of Tuberculosis (ACET). MMWR 1989;38:236–8, 243–50.
46. Barnes PF, Bloch AB, Davidson PT, Snider DE Jr. Tuberculosis in patients with human immunodeficiency virus infection. N Engl J Med 1991;324:1644–50.
47. Kizer KW. Using ultraviolet radiation and ventilation to control tuberculosis. Sacramento, CA: California Department of Health Services, 1990.
48. Frieden TR, Fujiwara PI, Washko RM, Hamburg MA. Tuberculosis in New York City—turning the tide. N Engl J Med 1995;333:229–33.
49. Snider DE Jr, Caras GJ. Isoniazid-associated hepatitis deaths: a review of available information. Am Rev Respir Dis 1992;145:494–7.

GLOSSARY

Active TB disease: Clinically active disease caused by organisms of the *Mycobacterium tuberculosis* complex, which are sometimes referred to as the tubercle bacillus. Persons who have active tuberculosis (TB) disease usually manifest symptoms that differ depending on the site of disease. The symptoms of pulmonary TB (i.e., the usual form of TB) include cough, chest pain, and hemoptysis; general symptoms of TB include fever, chills, night sweats, easy fatigability, loss of appetite, and weight loss.

Close contact: A person who lives with, works with, or otherwise is frequently in close physical proximity to a person who has infectious TB.

Directly observed therapy (DOT): Therapy in which either a health-care worker, a specially trained correctional officer, or a health-department employee observes the inmate swallow each dose of medication.

High-risk populations: a) Populations in which the prevalence of infection with *M. tuberculosis* is high (e.g., close contacts of a person who has infectious TB; persons who were born in or have resided in countries in which the prevalence of TB is high; medically underserved, low-income populations; residents of long-term care facilities; and persons who inject illegal drugs) or b) populations that are at high risk for developing active TB disease if they become infected with *M. tuberculosis* (e.g., persons infected with HIV, persons recently infected with *M. tuberculosis*, persons who have medical conditions known to increase the risk for developing active TB disease, injecting-drug users, or persons who have a history of inadequately treated TB).

Infectious: Capable of transmitting *M. tuberculosis*. Persons who have clinically active pulmonary or laryngeal TB disease can expel droplets containing *M. tuberculosis* into the air. Persons are usually considered infectious if their sputum smears are positive for acid-fast bacilli and they a) are not on therapy, b) have just begun therapy, or c) are on inadequate therapy.

Inmate: Any prisoner, detainee, or other resident of a correctional facility, whether adult or juvenile, sentenced or unsentenced.

Latent TB infection: A condition in which a relatively small number of living tubercle bacilli (i.e., *M. tuberculosis*) are present in the body but are not multiplying or causing clinically active disease. Although infected persons usually have positive tuberculin skin-test reactions, they have no symptoms associated with the infection and are not infectious. However, infected persons remain at lifelong risk for developing active TB disease; preventive therapy can substantially reduce this risk.

Long-term correctional facilities: State and federal prisons, juvenile facilities, and some jail facilities that house predominately long-term inmates, most of whom have been tried and sentenced.

Long-term inmate: An inmate who will remain in custody ≥14 days.

Low-risk populations: Populations that do not have risk factors for TB (see High-risk populations).

Medical conditions known to increase the risk for TB: HIV infection, substance abuse (especially injecting-drug use), infection with *M. tuberculosis* within the preceding 2 years, chest-radiograph findings suggestive of previous TB in a person who received inadequate or no treatment, diabetes mellitus, silicosis, prolonged corticosteroid therapy, other immunosuppressive therapy, cancer of the head and neck, hematologic and reticuloendothelial diseases (e.g., leukemia and Hodgkin's disease), end-stage renal disease, intestinal bypass or gastrectomy, chronic malabsorption syndromes, and body weight ≥10% below ideal weight.

Negative pressure: A difference in air pressure between a corridor and an isolation room so that a one-way flow of air into the isolation room prevents contaminated air from leaving the isolation room and entering other parts of the facility.

Short-term correctional facilities: Jails, detention centers, and temporary holding areas that house predominately short-term inmates, most of whom are awaiting trial or serving brief sentences.

Short-term inmate: An inmate who will remain in custody <14 days, especially pretrial detainees who probably will be released without supervision or placed in the community under court supervision.

TB case: A particular episode of clinically active TB. By law, TB cases must be reported to the state or local health department.

TB isolation room: A single-patient room that has specially designed ventilation characteristics appropriate for isolation, as described in the "Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Facilities, 1994" (*39*). These rooms should maintain negative air pressure; thus, doors to isolation rooms should be kept closed except when patients or personnel must enter or exit the room. TB isolation rooms should have a sufficient number of air changes per hour to enable a reduction in the concentration of droplet nuclei.

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format and on a paid subscription basis for paper copy. To receive an electronic copy on Friday of each week, send an e-mail message to *lists@list.cdc.gov*. The body content should read *subscribe mmwr-toc*. Electronic copy also is available from CDC's World-Wide Web server at *http://www.cdc.gov/* or from CDC's file transfer protocol server at *ftp.cdc.gov*. To subscribe for paper copy, contact Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 512-1800.

Data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the following Friday. Address inquiries about the *MMWR* Series, including material to be considered for publication, to: Editor, *MMWR* Series, Mailstop C-08, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30333; telephone (404) 332-4555.

☆**U.S. Government Printing Office: 1996-733-175/47004 Region IV**