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Prevention and Control of Tuberculosis in U.S. Communities with At-Risk Minority Populations

and

Prevention and Control of Tuberculosis Among Homeless Persons

Recommendations of the Advisory Council for the Elimination of Tuberculosis

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Contents

Prevention and Control of Tuberculosis in U.S. Communities with At-Risk Minority Populations

Recommendations of the Advisory Council for the Elimination of Tuberculosis*

Summary

Tuberculosis (TB) is an increasing public health problem in the United States, particularly among racial/ethnic minorities. In 1990, the number of reported TB cases increased 9.4% compared with 1989 and 15.5% compared with 1984. In 1990, almost 70% of all TB cases and 86% of those among children ages <15 years occurred among racial/ethnic minorities. Compared with non-Hispanic whites, the 1990 TB case rate was notably higher for racial/ethnic minorities.

Adverse social and economic factors, the human immunodeficiency virus epidemic, and immigration of persons with tuberculous infection are contributing factors to the increase in TB cases. Other contributing factors include physician nonadherence in prescribing recommended treatment regimens and patient nonadherence in following prescribed recommended treatment regimens.

To eliminate TB in U.S. communities with at-risk racial/ethnic minorities, the Advisory Council for the Elimination of Tuberculosis recommends a) initiating public awareness campaigns to alert these communities about the increasing TB problems; b) training and educating public and private health-care providers in the skills needed to relate effectively to the at-risk communities being served, and empowering at-risk populations with knowledge and other resources needed to influence the TB programs directed toward their communities; c) building coalitions to help design and implement intensified community TB prevention and control efforts; d) intensifying the screening of at-risk populations for TB and tuberculous infection and providing appropriate treatment and preventive therapy; e) increasing the speed and completeness with which all health-care providers report confirmed and suspected TB cases to appropriate health departments; and f) improving the availability and quality of TB health-care services in socioeconomically disadvantaged areas.

INTRODUCTION

A national plan for the elimination of tuberculosis (TB) in the United States has specified three basic steps: a) more effective use of existing tools and technology; b) the development of new diagnostic, treatment, and prevention tools; and c) rapid

*The Advisory Council for the Elimination of Tuberculosis recognizes that a variety of terms are used and preferred by different groups to describe race and ethnicity. Racial and ethnic terms used throughout the document reflect the way data are collected and reported by official health agencies.

introduction of new technology and tools (*1*). Providing TB screening and preventive interventions to high-risk populations is the plan's top priority. Implementation of these intervention programs among U.S. racial/ethnic minority populations is of great urgency because TB has become epidemic among some racial/ethnic groups. For example, in 1990, almost 70% of all reported TB cases occurred among racial/ ethnic minorities (Figure 1). Among children ages <15 years, 85.9% of reported TB cases occurred among racial/ethnic minorities (Figure 2).

FIGURE 1. Total tuberculosis cases, United States, 1990

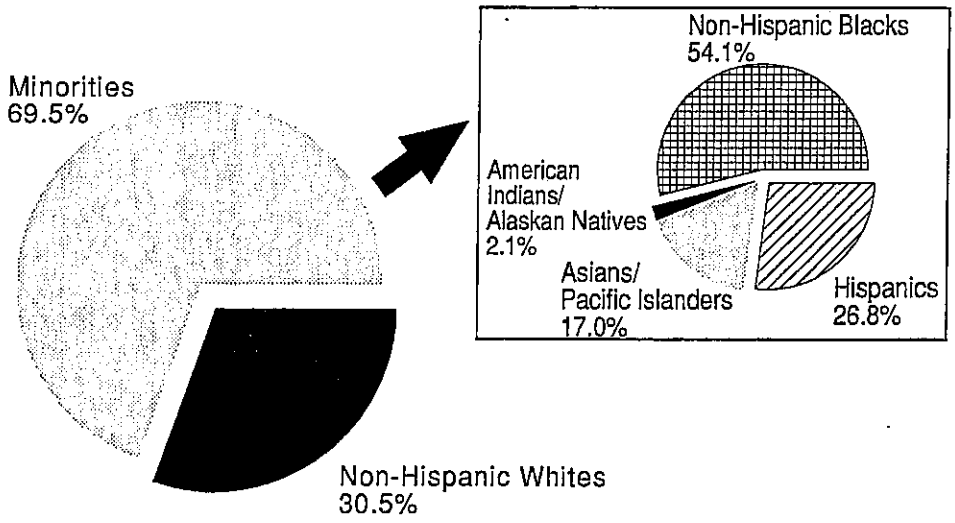
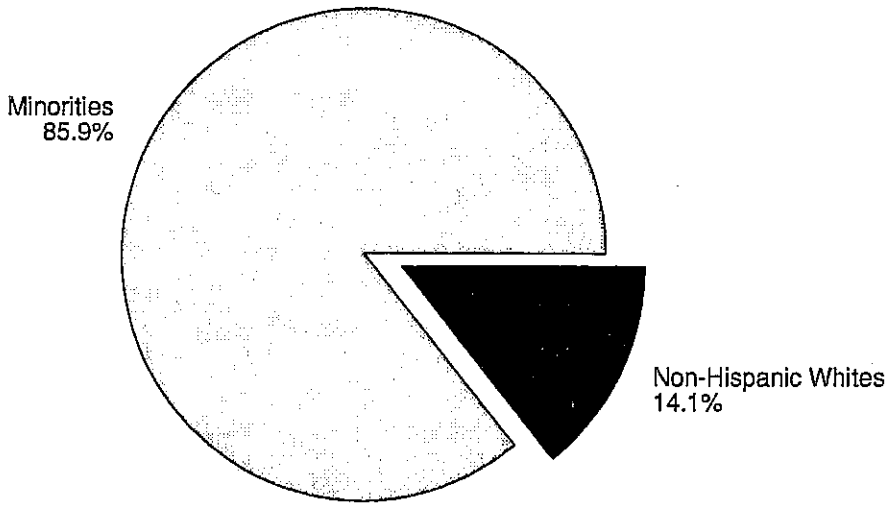


FIGURE 2. Reported tuberculosis cases among children, United States, 1990



This document is a blueprint for the many agencies and organizations that must work together to plan, develop, and implement effective strategies to eliminate TB in racial/ethnic minority population groups and high-risk geographic areas. The Advisory Council for the Elimination of Tuberculosis urges that resources be directed to areas where the disease has shifted into clearly identifiable geographic enclaves, and where the disease disproportionately affects socioeconomically disadvantaged racial/ethnic minorities.

BACKGROUND

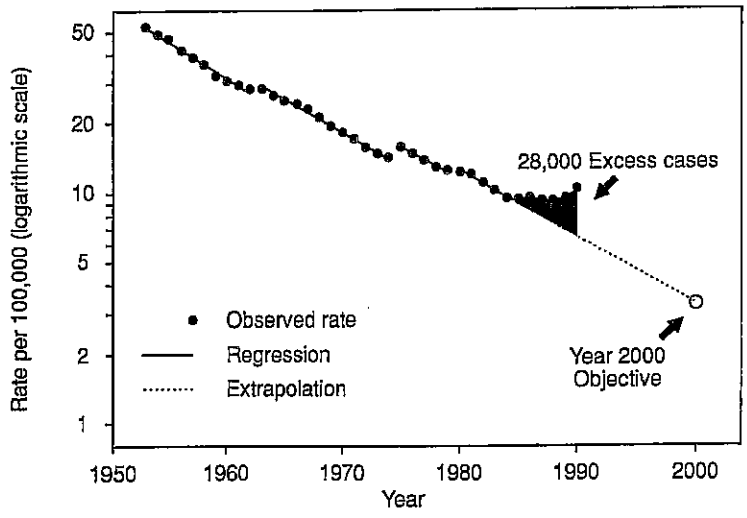
Magnitude and Extent of Problem

Ongoing analyses of TB morbidity data in the United States continue to identify the magnitude and extent of the TB problem among U.S. racial/ethnic minorities. The number of reported TB cases in the United States decreased from 84,304 in 1953 (when uniform national reporting of TB was initiated) to 22,255 in 1984—a reduction of 73.6%. In the same period, the annual risk of TB decreased from a case rate of 53.0/100,000 population to 9.4/100,000—a reduction of 82.3%. From 1953 through 1984, the number of reported TB cases declined by an average of almost 5% per year.

Since 1984, the TB morbidity trend has changed. In 1990, 25,701 cases were reported for a case rate of 10.3/100,000 population; this represents a 9.4% increase over the cases reported in 1989 and is 15.5% higher than the number of cases reported in 1984. When the trend for 1953 through 1984 was used to calculate expected cases, 28,000 more cases were reported than expected from 1985 through 1990 (Figure 3).

From 1985 through 1990, Miami, Atlanta, San Francisco, Newark, Tampa, and New York City consistently ranked among the 10 cities with populations greater than 250,000 with the highest TB rates. In 1990, the TB rates for these six cities ranged from

FIGURE 3. Actual and expected tuberculosis cases, United States



38/100,000 in Tampa to 68.3/100,000 in Newark. Certain sociodemographic and geographic pockets, such as Central Harlem in New York City, have rates approaching or exceeding 300/100,000 population.

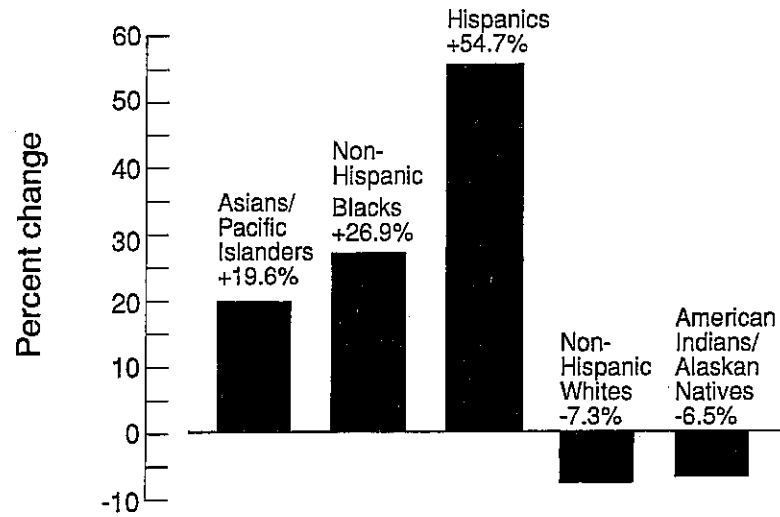
From 1985 through 1990, increases in TB cases occurred among non-Hispanic blacks, Hispanics, and Asians/Pacific Islanders, while decreases occurred among non-Hispanic whites and American Indians/Alaskan Natives (Figure 4). Increases in TB cases among non-Hispanic blacks were largest in the 5- to 14-year-old and 25- to 44-year-old groups (41.1% and 55.1%, respectively). Among Hispanics, the largest increases were also in the 5- to 14-year-old and 25- to 44-year-old groups (102.6% and 76.7%, respectively).

Of the 25,701 cases of TB reported in the United States in 1990, 17,814 (69.3%) occurred among racial/ethnic minorities, 7,836 cases (30.5%) occurred among non-Hispanic whites, and 51 cases (0.2%) were in persons whose race/ethnicity was not noted. The risk of TB (compared with the case rate of 4.2/100,000 population among non-Hispanic whites) was 9.9 times higher for Asians/Pacific Islanders, 7.9 times higher for non-Hispanic blacks, 5.1 times higher for Hispanics, and 4.5 times higher for American Indians/Alaskan Natives.

There is evidence that the human immunodeficiency virus (HIV) epidemic is a major factor associated with the recent increase in TB cases. Immunosuppression resulting from HIV infection allows persons with latent tuberculous infection and newly infected persons to progress rapidly to clinical disease. Because the prevalence of latent tuberculous infection is higher among racial/ethnic minorities than among non-Hispanic whites, clinical TB is likely to be more common among HIV-infected minority populations than among HIV-infected non-Hispanic whites.

In addition to the HIV epidemic, persons immigrating from countries with a high incidence of TB also appear to be contributing to increases in TB cases. From 1986 through 1990, the number of TB cases among the foreign-born increased from 4,925 to 6,262 and the percentage of total cases among foreign-born persons increased from 21.6% to 24.4%.

FIGURE 4. Changes in reported tuberculosis cases, United States, 1985–1990



Because of HIV infection and immigration, increasing rates of clinical TB among persons of childbearing/child-rearing age in racial/ethnic populations place the ≤14-year-old group in affected racial/ethnic minority populations at greater risk of being exposed to and becoming infected with TB. This may explain the recent increase in TB cases in this age group.

Other factors that may contribute to increases include social and economic factors such as substance abuse, limited access to available and acceptable health care, poverty, substandard housing, and homelessness. The role of each of these factors, if any, cannot be quantified, but they are major components in the complex circumstances that make more difficult the prevention and control of TB among disadvantaged groups in our society.

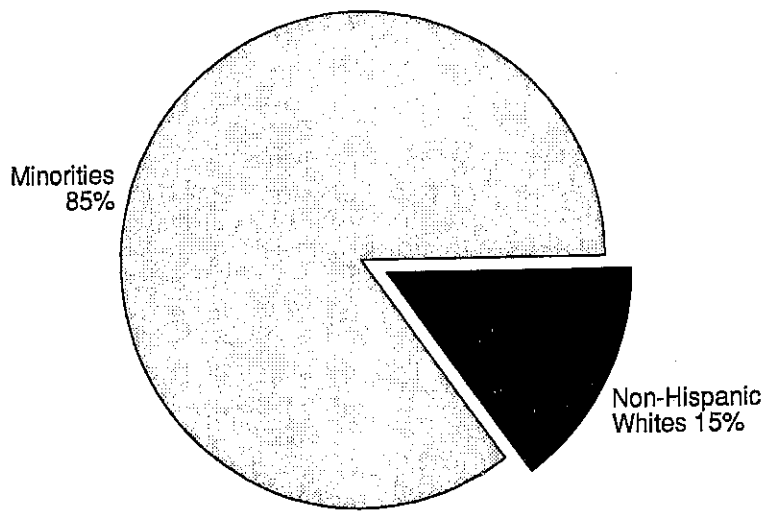
Multiple-drug-resistant (MDR) TB is an emerging problem. MDR TB is associated with a) immigration of persons from countries with a high incidence of resistant TB, b) inappropriate treatment regimens prescribed by private- and public-sector physicians, and c) patients who do not comply with appropriately prescribed treatment regimens.

Case Prevention Potential for High-Risk Areas and Groups

Of the 25,701 cases reported in 1990, 8,381 occurred among persons ages <35 years. Cases in this age group are considered potentially preventable by administration of preventive therapy to infected persons who have not yet developed disease. Eighty-five percent of potentially preventable cases occurred among racial/ethnic minorities (Figure 5).

A large proportion of potentially preventable cases are distributed among a few geographic locations. Of the 3,436 cases among non-Hispanic blacks ages <35 years, 70.3% (2,414) occurred in 53 counties that reported 10 or more such cases. Of the 2,412 cases among Hispanics ages <35 years, 79.8% (1,924) occurred in 40 counties that reported 10 or more such cases. Of the 1,139 cases among Asians/Pacific

FIGURE 5. Potentially preventable cases of tuberculosis, United States, 1990



Islanders ages <35 years, 55.3% (630) occurred in 19 counties that reported 10 or more such cases. Of the 121 cases among American Indians/Alaskan Natives ages <35 years, 12.4% (15) occurred in one county that reported 10 or more cases.

During 1990, 79.7% of the potentially preventable TB cases among racial/ethnic minorities were reported by 106 counties that reported 10 or more such cases. This represents 3.4% of the nation's 3,138 counties. These counties are located primarily in the Southeastern states, along the East and West coasts, and in Texas (Figure 6). Representatives and health-care providers from at-risk communities, appropriate government agencies, and interested organizations should work collectively with these counties to intensify TB elimination efforts.

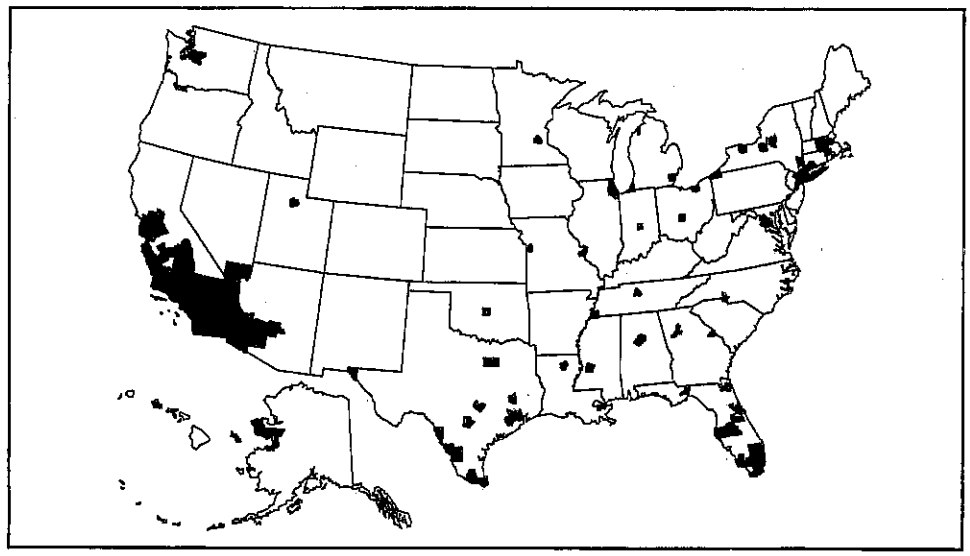
RECOMMENDATIONS

Public Awareness Campaigns

Individuals in at-risk population groups, including local leaders, are often unaware of the extent of the TB problem in their communities and the potential for preventing infection. Public awareness campaigns can provide essential information.

1. A public awareness campaign should be initiated by national, state, and local organizations to alert communities at high risk for TB about the increasing TB threat and to the potential for eliminating the disease.
2. At the national level, this campaign should be designed and supported by CDC, the American Lung Association/American Thoracic Society (ALA/ATS), the American Public Health Association, and other national organizations that support or provide services to high-risk population groups.
3. At the state and local levels, health departments should collect and analyze epidemiologic data to identify local communities and population groups with

FIGURE 6. U.S. counties reporting 10 or more cases of tuberculosis (N = 106/3,138 [3.4%]) among racial/ethnic minorities ages <35 years, 1990



high incidences so that TB prevention activities and public awareness campaigns can be appropriately directed. Local public awareness campaigns should be focused toward community members, health-care providers, and religious, social, economic, and other influential organizations. Awareness campaigns should be designed and supported by health departments and ALA/ATS affiliates working with recognized community leaders, organizations, and health-care providers.

4. The media (print, radio, and television) should be effectively utilized to disseminate information about TB prevention and related elimination efforts:
   a. Local community, minority, and ethnic media (newspapers, magazines, newsletters, radio, and television) should deliver the information to the general public, high-risk communities, and at-risk population groups.
   b. Messages should be disseminated through national and community-based organizations such as churches and forums focused on economic, medical, political, and social activities.
5. National and local TB awareness programs should be supported by the availability of convenient and high-quality TB screening, prevention, and treatment services.

Training and Education of Public and Private Health-Care Providers

Empowerment of at-risk groups in the community is a crucial element in TB control. This step begins with the public awareness campaigns described above because it is vitally important for members of at-risk populations to understand TB; its impact on the community; how it is diagnosed, treated, and prevented; and what services are available. These populations also should be able to influence the TB programs directed toward their communities.

1. Health departments should ensure that the sociodemographic composition of the communities being served is represented in the composition of the TB-control-program staff. The staff should be culturally and linguistically competent and sensitive to the populations being served.
2. All health department and other health-care staff who provide TB services should receive training to improve interpersonal skills needed to encourage open and effective communication with members of high-risk communities and groups. Continuous efforts must be made to establish and maintain the rapport needed to relate effectively to the communities being served and to the public and private health-care providers serving those communities.
3. Health-care providers serving at-risk areas should be given TB training on recommended procedures for examining, diagnosing, and treating TB cases, suspected cases, and contacts. The training should include information on procedures for rapidly reporting confirmed and suspected TB cases.

Coalition Building

Major progress toward elimination can be achieved by focusing TB screening and preventive therapy programs toward groups of persons at high risk of becoming infected or developing disease. Public and private health-care providers serving many at-risk clients in the community may not fully apply recommended prevention methods. Some at-risk population groups lack access to medical care, and special

efforts are often required to provide them with needed services. Coalitions composed of representatives from groups and communities at increased risk of TB can assist in developing and implementing plans to improve access to health care.

1. Health departments should expand their efforts to reach community groups at high risk of TB and health-care providers serving these groups.
2. Decision makers, other key people, and agencies within at-risk communities should be identified and involved in TB elimination planning and implementation activities.
3. Coalitions should be established to advise health departments and health-care providers on how to design and carry out intensified community TB prevention and control efforts. These groups should be composed of representatives from affected communities, community-based organizations, health departments, private and public health-care providers, and the media serving high-risk populations and communities. These coalitions should be responsible for defining the problems and identifying obstacles related to excessive rates of TB in the at-risk communities; establishing short- and long-term goals; setting realistic and time-phased objectives; establishing priorities; and developing, implementing, and evaluating strategies. They should also analyze their communities to determine how strategies should be implemented and how to motivate and mobilize community members.
4. Coalitions should help identify and obtain resources needed by community programs and people serving the at-risk areas.
5. Credit for accomplishments should be given to members of the coalitions and the at-risk communities involved in these efforts.

Screening and Prevention

Screening at-risk populations for TB and tuberculous infection and providing appropriate treatment are crucial for achieving TB elimination. Screening is done to identify persons in need of preventive therapy (*2*). Responsibility for conducting screening will vary. For some groups, the local health department and health-care providers should assume responsibility for conducting the screening. For others, community-based organizations may conduct the screening with training and evaluation assistance from the health department.

1. Health departments should assess the prevalence, incidence, and sociodemographic characteristics of cases of TB and infected persons in their jurisdictions to identify high-risk areas in their communities. On the basis of this assessment, health departments should work with community-based organizations and health-care providers serving those communities to plan and initiate tuberculin screening and preventive therapy programs specifically adjusted to each community's at-risk groups.
2. Planning, developing, and implementing screening programs should be a joint effort coordinated among the local health department, public and private community organizations, and health-care providers serving the affected community. Medicaid, Medicare, and private health-care funds should be sought to support screening and preventive treatment programs.

3. When possible, initiatives to systematically screen for TB should be established in specific high-risk settings such as correctional institutions, long-term-care facilities, nursing homes, drug treatment centers, in- and outpatient hospital facilities, and homeless shelters (*2*).

Case Reporting

Early reporting of TB is essential so that contacts can be examined for evidence of infection and disease and can be given appropriate therapy as quickly as possible.

1. Health departments should inform health-care providers serving at-risk groups and communities about the importance of early TB case reporting and about the services offered by the health departments. Health-care providers should become familiar with the TB case reporting system used in their particular areas.
2. Early TB case reporting can be encouraged by offering incentives, such as free laboratory services, to health-care providers and free antituberculosis drugs to their patients.
3. To facilitate TB case reporting for health-care providers, health departments should consider using facsimile machines or telephone-answering machines to receive reports. Large laboratories and health-care facilities should consider using computer-to-computer reporting systems.
4. All private physicians, public and private hospitals, clinics, medical/health centers, alcohol/drug treatment centers, nursing homes, laboratories, and correctional facilities should notify appropriate health departments about confirmed and suspected TB cases as quickly as possible. The development of a reporting system that includes all pharmacies that dispense antituberculosis drugs should also be considered.

Treatment and Adherence

The availability of TB health-care services and related transportation are frequently a problem in high-incidence and socioeconomically disadvantaged areas. Attracting competent health-care staff in some of these areas is sometimes a major obstacle. In addition, it is often difficult to establish and maintain rapport needed for effective diagnosis, treatment, and prophylaxis of patients with TB in at-risk areas and population groups. For many patients, a variety of health and socioeconomic-related problems (e.g., unemployment, low income, homelessness, lack of or limited access to health care, language barriers, and alcohol and drug abuse) may limit their ability to adhere to recommendations for treatment or to obtain other needed medical care. Much of their time and effort is understandably devoted to meeting day-to-day economic and survival needs, such as food, shelter, clothing, and safety. Nonadherence is a serious problem that can lead to treatment failure, drug resistance, continuing transmission of infection, increasing disability, and death (*3*). These are challenges that should be met with new and innovative strategies.

1. Quality TB treatment services and related transportation should be available at no cost to patients.

2. CDC should recruit, train, and assign a cadre of TB physicians, nurses, social workers, and public health advisors to work in high-incidence areas where TB is increasing and where it is extremely difficult to attract and retain qualified staff. The specific objective for these assignments should be to stabilize and begin to reduce the case rates within 3 years of assignment. As target rates are achieved in these areas, reassignment to other areas can be made.
3. Special treatment-housing centers should be established in cities with large numbers of persons at risk of TB who are homeless. These centers should provide continuous shelter, food, and treatment for homeless persons diagnosed with TB for the duration of their prescribed therapy regimen. The shelter and food act as incentives for patients to remain compliant with treatment. When patients complete their prescribed regimens or do not comply with therapy, they can be discharged from the centers and new patients admitted. The effectiveness of this concept has been demonstrated by existing programs in New York City and Denver. The resources necessary to establish similar centers might be shared through agreements between federal agencies (e.g., U.S. Department of Housing and Urban Development, Health Resources and Services Administration, or CDC), state/local agencies, or private organizations. Many identified at-risk areas contain properties that are federally owned and are suitable for conversion to treatment-housing centers.
4. Specific strategies for improving adherence to treatment regimens by individual patients or groups of patients should be established for each identified high-risk community and population group. These strategies should be broad-based and reflect an understanding of the difficulties associated with behavioral change and be sensitive and responsive to the patients' beliefs, cultures, and environments. This allows for the identification and removal of specific barriers to adherence.
5. Health-care providers of TB services should take the time to explain to patients, in simple language that is culturally and linguistically appropriate, the specific adherence behaviors expected. Patients must first know what is expected of them before they can comply.
6. Patient education and appointment reminders must be culturally sensitive and linguistically appropriate and should be used to effectively influence the cooperation of patients seeking TB services. Whenever possible, patients should be given reminders for pending appointments in person or by telephone. This removes any doubt about whether the patients received the messages. Patients also can be counseled over the telephone, thereby helping them overcome scheduling, transportation, or other problems that interfere with adherence.
7. Directly observed therapy should be considered for all TB patients.
8. Trained nurses or community outreach workers with the same cultural and linguistic background as the patients should help design treatment plans, administer directly observed therapy, and assist patients and health-care providers to identify and overcome obstacles to adherence.
9. Outreach workers should act as extensions of the clinician and nurse by locating patients, reminding them of appointments, resolving basic problems, encouraging adherence, delivering medication, observing its ingestion, and identifying, tracing, and examining contacts. They should also serve as a

liaison between the clinic staff and the patient by helping to bridge cultural and linguistic gaps and by educating patients. Such employees can greatly enhance TB control efforts among at-risk populations.

10. Additional federal, state, local, and private resources will be required to increase the number of outreach workers. These outreach workers should be recruited and hired from the areas and communities being identified for service. They should have a knowledge of and be sensitive to the culture and language of the population to be served.

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Prevention and Control of Tuberculosis Among Homeless Persons

Recommendations of the Advisory Council for the Elimination of Tuberculosis

Summary

Because tuberculosis (TB) is a major problem among homeless persons, the Advisory Council for the Elimination of Tuberculosis has developed recommendations to assist health-care providers, health departments, shelter operators and workers, social service agencies, and homeless persons prevent and control TB in this population. TB should be suspected in any homeless person with a fever and a productive cough of more than 1–3 weeks' duration, and appropriate diagnostic studies should be undertaken. Confirmed or suspected TB in a homeless person should be immediately reported to the health department so that a treatment plan can be decided upon and potentially exposed persons located and examined. Patients with TB should be counseled and voluntarily tested for human immunodeficiency virus (HIV) infection because TB treatment recommendations are different for HIV-seropositive and HIV-seronegative persons (1). TB therapy should be directly observed whenever possible. This may require the establishment of special shelters or other long-term-care arrangements for homeless persons with TB. For each person with an infectious case, an investigation should be conducted to identify exposed persons, and those found to be infected should be considered for preventive therapy. Shelter staff should receive a tuberculin skin test when they start work and every 6–12 months thereafter. Those with positive skin test results should be considered for preventive therapy according to current guidelines. Shelters for the homeless should be adequately ventilated. The installation of ultraviolet lamps also may be useful to further reduce the risk of TB transmission.

INTRODUCTION

Since the early 1900s (*2*), tuberculosis (TB) has been recognized as an important health problem among homeless persons and among residents of inexpensive lodging houses, night shelters, single-room occupancy hotels, and common hostels. Subsequent reports have continued to call attention to this problem, especially in the United Kingdom (*3–11*). With the increase in homelessness in the United States during the 1980s, TB among homeless persons became a subject of heightened interest and concern (*12–24*).

There is no universally agreed-upon definition of homelessness; in general, however, the homeless can be defined as persons who do not have customary and regular access to a conventional dwelling or residence (*25*). The exact number of homeless persons at any given time is not known, and reported estimates have varied widely. According to the Urban Institute, there may have been more than 1 million persons in the United States who were homeless at some time during 1987 (*26*).

From a national perspective, the overall incidence of active TB and the prevalence of latent tuberculous infection among the homeless are unknown. Based on screening at selected clinics and shelters, the prevalence of clinically active disease ranges from 1.6% to 6.8% and the prevalence of latent TB infection ranges from 18% to 51% (*12,13,15–17*). Clinical data from the National Health Care for the Homeless project indicated a point prevalence of active TB of 968/100,000 homeless adults (*27*). However, because of the selective nature of these screening activities, it is not appropriate to extrapolate these reported prevalence rates nationwide or to "special populations," such as single-parent families or runaway children (*28*).

Although shelters and other inexpensive housing for the homeless are vital to the survival of these persons, there is substantial potential for TB transmission in such facilities (*18*), especially in the winter when shelters are likely to be more crowded and ventilation from the outside may be diminished.

The recommendations in this document are intended for the entire medical community and the public, but are particularly targeted to health department TB-control programs and to those who provide health care and other services to homeless persons. Health departments and shelter operators are encouraged to implement these recommendations whenever applicable.

ASSESSMENT OF THE MAGNITUDE OF THE PROBLEM

Communities should assess the nature and magnitude of the TB problem in their area, specifically, the incidence and prevalence of TB among persons who are homeless. All patients with TB should be specifically asked whether they are homeless or live at a single-room occupancy hotel, shelter, or lodging house since they may not volunteer such information. Health departments should maintain, and regularly update, listings of single-room occupancy hotels and homeless shelters so that patients' addresses can be checked against these listings. Shelters should be encouraged to maintain lists of names of persons staying there. This will facilitate health department searches for patients in need of diagnostic or therapeutic services.

PRIORITIES FOR TB SERVICES

Priorities for TB prevention and control activities among homeless persons have been established on the basis of their clinical and public health importance and their cost-effectiveness (see box).

Priorities for Tuberculosis Prevention and Control Activities Among Homeless Persons

1. The highest priority should be given to a) detection, evaluation, and reporting of homeless persons who have current symptoms of active TB and b) completion of an appropriate course of treatment by those diagnosed with active TB.
2. The second priority should be screening and preventive therapy for homeless persons who have, or are suspected of having, human immunodeficiency virus (HIV) infection.
3. The third priority should be the examination and appropriate treatment of persons with recent TB that has been inadequately treated.
4. The fourth priority should be screening and appropriate treatment of persons exposed to an infectious (sputum-positive) case of TB. Because contacts are difficult to define in a shelter population, it is usually necessary to screen all residents of a shelter when an infectious case is identified.
5. The fifth priority should be screening and preventive therapy for homeless persons with known medical conditions that increase the risk of TB, e.g., diabetes mellitus (*29*).

CASE FINDING

Educational materials on TB should be developed for shelter clients, shelter employees, and volunteers. This material should address the mode of spread, the common signs and symptoms, and methods for treatment and prevention. Information on local resources for TB care should be made available to shelter staff and guests.

TB case finding should be part of the regular health care provided to homeless persons. Shelter staff and others providing services can assist in case finding by identifying persons with a persistent cough and ensuring that suspected cases are quickly evaluated by a health-care provider. If this evaluation cannot be done at the shelter, immediate transportation to a health-care facility should be provided.

If the clinical evaluation of a symptomatic person is consistent with TB, appropriate diagnostic tests (e.g., sputum smears and cultures and chest radiographs) should be done as quickly as possible. A homeless patient will usually need to be hospitalized at least until the diagnostic evaluation is complete and effective therapy instituted.

Routine tuberculin skin test screening of asymptomatic homeless persons for TB is not an efficient way to find new cases. Chest radiographic screening of homeless persons may be useful during outbreak investigations.

CASE REPORTING

The diagnosis of TB in a homeless patient may occur during diagnosis and treatment of an unrelated problem or during incarceration in a jail or prison. When a

homeless person is suspected of or diagnosed as having TB, the health department should be notified promptly so that appropriate follow-up can be arranged. Delay or failure to notify the health department of a case of confirmed or suspected TB may result in the patient's being lost to follow-up, a failure to initiate appropriate treatment, and continuing transmission of tuberculosis in the community.

CASE MANAGEMENT

Homeless patients with newly diagnosed infectious TB should be appropriately housed to allow initial therapy to be fully supervised and to preclude continuing transmission of TB in the community. Ideally, homeless persons with active TB should be housed in a special shelter, halfway house, or other long-term treatment facility until therapy is complete or more permanent housing is identified. It is also important that ancillary services, such as substance abuse treatment and evaluation and treatment of HIV disease, be offered in these facilities.

A health department staff member should visit a homeless person with suspected or confirmed TB, in the hospital or elsewhere, as soon as possible after the diagnosis is suspected or made. The health department worker should make an assessment of the likelihood of adherence to therapy, if treatment is to be given on an outpatient basis. During the initial visit, the treatment plan should be discussed and the patient's cooperation elicited.

Arrangements for the patient's first visit to the clinic or other place of intended outpatient care should be made before the patient is discharged from the hospital. Details about personal activities, friends, and favorite gathering places, which may assist in locating the patient in the field, should be included in the chart. A physical description of the patient should also be included in the chart to assist field workers in locating the person. It is essential that rapport between the patient and the health department staff be established and maintained.

The homeless person with TB may not view TB as the highest priority concern. Other concerns—e.g., shelter, food, and safety—are likely to be of greater priority. Thus, the involvement of social workers on the treatment team to assist in solving these other problems is important for achieving successful treatment of TB.

Treatment must be carefully monitored. Failure of patients to take TB medications as prescribed can result in relapses, drug resistance, further transmission of TB, and death. For most patients, it is desirable that a health-care worker or other responsible adult directly observe ingestion of medication. This allows careful monitoring for adherence to therapy and drug side effects. In addition, carrying medications may be dangerous for homeless persons; if others believe the medications are addictive or valuable, the homeless person may be robbed or assaulted.

Whenever possible, TB clinics should be located close to shelters or other places (e.g., soup kitchens) where homeless persons receive services. If this is not possible, transportation to the clinics should be provided. The clinic schedule should include hours that facilitate patient attendance. Incentives and enablers to encourage adherence should be used (*20–22,30*). These might include items such as food or food vouchers, cash, special lodging, transportation vouchers or tokens, articles of clothing, priority in food lines, and assistance in filing for benefits. In many communities, successful programs represent a cooperative community activity in which local merchants or American Lung Association affiliates provide the incentives.

Treatment outcomes are likely to be optimal if homeless patients have a reliable source of food and shelter throughout the course of therapy. Some communities have successfully used halfway houses and special shelters for this purpose. In areas lacking these alternatives, a longer period of hospitalization in an acute-care facility may be necessary. Long-term institutionalization may be essential for the management of mentally ill or seriously uncooperative patients. If, despite the efforts of health-care providers, any infectious patient (regardless of residential status) refuses treatment, temporary enforced isolation should be instituted in accordance with state and local public health laws and regulations. This option should be used when necessary after due legal process. Medicaid reimbursement for these services should be available in all states.

TREATMENT

A responsible person (e.g., physician, nurse, outreach worker) should observe the patient ingest medications to prevent treatment failure, the emergence of drug-resistant organisms, and continued transmission of infection (*31*). Provided there is adequate medical supervision, treatment can be given and observed by designated persons at the shelter or other location. All TB treatments of homeless persons should be free of charge to the patient.

Treatment should stress the use of intensive multidrug, bactericidal regimens for all eligible patients (*29*). Outpatient treatment should be a regimen that includes isoniazid and rifampin in addition to pyrazinamide and ethambutol for the first 2 months of therapy. Drug susceptibility tests should be initially obtained on positive cultures from all patients. If the organisms are susceptible to both isoniazid and rifampin, ethambutol can be discontinued and the second phase of therapy completed with an additional 4 months (if patient is HIV negative) or 7 months (if patient is HIV positive) of treatment with isoniazid and rifampin. Treatment can be given daily for the first 2 weeks to 2 months and either daily or twice weekly thereafter, or it can be given three times weekly from the beginning (*32*). Baseline laboratory tests should be done to detect conditions contraindicating certain drugs and to better assess any subsequent adverse drug reactions (*29*).

For patients with active pulmonary TB, sputum smears and cultures should be obtained at 2- to 4-week intervals until cultures become negative. Patients should be monitored for possible adverse drug effects by asking them about signs and symptoms. Appropriate laboratory studies should be obtained when indicated. Hospitalized patients who are initially found to have positive sputum smears or cultures can return to the shelter when there is bacteriologic and clinical evidence of a response to therapy, i.e., three consecutive daily negative sputum smears and asymptomatic status.

PREVENTION

Early case finding and effective treatment of persons with active TB are the most important measures for preventing spread of TB in the community. A thorough contact investigation should be done around every case (*33*). Although such investigations are difficult in shelters because of the transient nature of the population, they should always be attempted.

Contact investigations are usually based upon screening with the tuberculin skin test, followed by chest radiographs for those with skin test reactions ≥5 mm. Because of the high prevalence of TB among some homeless populations and because of the possibility of false-negative tuberculin skin test reactions due to disease or other factors, it may be useful to screen homeless populations with chest radiographs during an outbreak investigation.

Several factors in the shelter environment influence the likelihood of TB transmission. The absolute number and population density of persons sharing the same breathing space is an important transmission factor in shelters. If all other factors are constant, the size of the shelter population is directly proportional to the likelihood that someone with infectious TB will be present and that someone else will become infected (*34*). Conversely, the smaller and less crowded the shelter, the lower the risk.

The probability of transmission is affected by building ventilation. Ventilation should be at or above 25 cubic feet of outside air per minute per person. Recirculated air may contribute to transmission within a shelter. During periods of peak occupancy, it may be difficult to provide ventilation at adequate levels. Air quality consultants can determine the adequacy of ventilation and recommend improvements where necessary.

Because even optimal ventilation does not preclude TB transmission, supplemental upper room germicidal ultraviolet (UV) air disinfection may be useful to further reduce the chance of transmission (*35*). UV lamps may be useful when ongoing transmission of infection is demonstrated by the continuing occurrence of cases or skin test conversions. For safety and efficacy reasons, UV fixtures should be planned, installed, and monitored after installation by an experienced consultant. To avoid acute eye and skin injury, shelter staff and workers should be advised not to look at the tubes in UV fixtures, and exposure at eye level must be no greater than 0.2 microwatts per square centimeter over 8 hours. Nonreflective paint should be used in rooms where UV lamps are located.

Tuberculin skin test screening and isoniazid preventive therapy programs among homeless persons have been generally unproductive because of poor patient adherence to follow-up visits and treatment regimens (*36*). Screening should be undertaken only if there is a reasonable possibility that most infected persons identified will complete preventive treatment. Priorities for preventive therapy among TB-infected persons have been established (see box) (*29*).

Priorities for Preventive Therapy Among TB-infected Persons

1. Persons with HIV infection
2. Recent contacts of persons with infectious TB
3. Persons with recent skin test conversions
4. Persons with recent TB disease who have been inadequately treated
5. Persons with negative sputum cultures and stable fibrotic lesions on chest radiographs consistent with inactive TB
6. Persons with medical conditions that increase the risk of TB (*29*)

Incentives may also be used to improve adherence to preventive treatment. Twice-weekly directly observed isoniazid preventive therapy, given in a dose of 15 mg/kg, should be considered if the person cannot or will not comply with daily self-administered therapy. Although the efficacy of this regimen has not been proven in preventive therapy trials, extrapolation from clinical therapy trials suggests it would be effective (*37*).

Staff and regular volunteers in shelters for the homeless should receive a Mantoux tuberculin skin test when they start work and every 6 to 12 months thereafter. The two-step method of testing is generally recommended (*38*). Persons with positive reactions should be evaluated and considered for preventive therapy according to current American Thoracic Society/CDC guidelines (*29*). The results of staff and volunteer skin tests should be maintained in a central confidential file.

Clinical data on homeless clients (guests) should be maintained and shared between shelters.

HIV INFECTION AND TB

HIV infection is a major risk factor for the development of TB (*39*). An association between TB, HIV infection, and homelessness has been documented (*21,22,24*).

Persons with TB and HIV infection appear to respond to standard anti-TB drugs (*40–42*), but data on clinical and bacteriologic response among these patients are limited. When HIV infection is known or suspected, the recommended initial treatment regimen is the same as for non-HIV-infected persons. Patients treated with rifampin who are on methadone should have the methadone dosage increased to avoid withdrawal symptoms resulting from the interaction between the two drugs (*43*).

If the patient has drug-susceptible organisms, the continuation phase need include only isoniazid and rifampin. *If resistance to any of the drugs in the regimen is found, the treatment regimen should be appropriately revised in consultation with a specialist.* Treatment should be continued for a minimum of 9 months and for at least 6 months beyond documented culture conversion as evidenced by three negative cultures. If either isoniazid or rifampin is not or cannot be included in the regimen, therapy should continue at least 18 months and for at least 12 months after culture conversion.

All patients diagnosed with TB should be offered counseling and HIV-antibody testing. Previously published guidelines for counseling and testing and notification of sex partners and those who share needles with HIV-infected persons should be followed (*44*). Particular emphasis should be placed on offering counseling and HIV-antibody testing to persons with extrapulmonary TB and persons with TB in the age groups in which most HIV infections occur (i.e., those ages 25–44 years). Because homelessness may be a sequela of injecting drug use or HIV disease, information on

behaviors* associated with an increased risk or prevalence of HIV infection should be routinely sought from homeless persons. If HIV infection is considered a possibility, counseling and HIV-antibody testing should be strongly encouraged. *Because HIV infection is one of the strongest known risk factors for the progression of latent tuberculous infection to TB (39), the presence of HIV infection in a person with a positive tuberculin skin test (i.e., ≥5 mm induration) is an indication for preventive therapy regardless of that person's age.* The recommended therapy is isoniazid, 300 mg daily or 15 mg/kg twice weekly for 12 months. Preventive therapy should be started only after excluding active pulmonary or extrapulmonary TB.

HIV-infected persons, with or without acquired immunodeficiency syndrome (AIDS) or other HIV-related disease, should be given a Mantoux skin test consisting of 5 tuberculin units of purified protein derivative. Although false-negative results may result in these persons because of HIV-induced immunosuppression, positive tuberculin reactions are clinically meaningful. Persons with clinical AIDS or other HIV-related disease should receive a chest radiograph and be examined for evidence of extrapulmonary TB, regardless of the skin test reaction. If abnormalities are noted, additional diagnostic studies for TB should be undertaken.

ROLE OF THE HEALTH DEPARTMENT

Health departments must ensure the provision of essential TB supplies and services for homeless persons regardless of their ability to pay. Care should be readily accessible to homeless persons; this often means provision of services at a shelter. Whenever possible, outreach services should be provided by trained outreach workers with the same cultural, ethnic, and linguistic background as the homeless population being served.

Health departments should also ensure that expert TB medical consultation is available to the clinicians and nurses who provide health-care services to homeless persons.

State and local health departments should provide TB training to those who provide health-care services to homeless persons. (CDC has made training materials available to state health departments to assist in this training.)

There is a national network of primary health-care programs for the homeless as a result of the McKinney Homeless Assistance Act. The 109 community programs supported by the Bureau of Health Care Delivery and Assistance of the Health Resources and Services Administration are appropriate partners for local health agencies in controlling TB among the homeless.

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*Based on seroprevalence studies, behaviors that place a person at risk for HIV infection include injecting drug use and male homosexual contact. Other factors that increase the risk for HIV infection among adults include having received blood or clotting factor concentrate between 1978 and 1985 and having had sexual relations at any time since 1978 with a) a person known to be infected with HIV or to have AIDS, b) a man who has had sexual contact with another man, c) prostitutes, d) injecting drug users, or e) persons born in countries where most transmission of HIV is thought to occur through heterosexual sexual contact. Risk factors for HIV infection among infants and children include a) parents, especially the mother, with HIV infection or any of the adult risk factors, and b) receipt of blood or clotting factor concentrates between 1978 and 1985.

ROLE OF THE U.S. PUBLIC HEALTH SERVICE

The U.S. Public Health Service (PHS) should promote collaboration between health departments and those who provide health care to the homeless so that they can plan and implement TB prevention and control activities. The PHS should require documentation of such collaboration as part of applications from states and cities for federally funded grants and cooperative agreements. In addition, as part of routine site visits, PHS staff should review state and local TB activities and make recommendations for more effective collaborative programs.

CONCLUSIONS

Homeless persons suffer disproportionately from a variety of health problems, including TB. Detecting, treating, and preventing TB in this special population benefit not only persons who are homeless, but society at large. The goal of prevention and control of TB among the homeless is difficult and challenging, but it can be achieved.

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