

# Tuberculosis and Homelessness

## **Workshop on Tuberculosis and Homelessness: Infection Control Measures in Homeless Shelters and Other Overnight Facilities That Provide Shelter**

**Summary of the Workshop Held September 28–29, 2015**

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National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention  
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## 1.0 SUMMARY

### 1.1 Background

Approximately 1% of the population of the United States experiences homelessness every year. Although the majority of persons experiencing homelessness reestablish housing within 1 year, on any given night, approximately 550,000 persons in the United States are without a permanent home. Persons experiencing homelessness have higher rates of morbidity and mortality, and they have dramatically lower life expectancy. Mortality rates among persons experiencing homelessness are substantially higher than among the general population. Factors contributing to these higher rates of premature death include inadequate or interrupted access to medical care, crowded living conditions, mental illness, substance use, and chronic diseases, including diabetes mellitus and human immunodeficiency virus (HIV) infection. These risk factors can increase both the likelihood of exposure to *Mycobacterium tuberculosis* and suffering from tuberculosis (TB) disease. An association between homelessness and TB has been recognized for decades. Approximately 5% of persons with TB reported having been homeless within the year before diagnosis, and this proportion has remained similar despite decreases in overall TB rates. During recent years, public health authorities have focused on TB control and prevention among persons experiencing homelessness, because many of the largest TB outbreaks have involved such persons.

TB outbreaks involving persons experiencing homelessness often involve more cases than other outbreak for 2 potential reasons. First, TB diagnoses are often delayed among persons experiencing homelessness, leading to longer infectious periods (i.e., time during which a patient is contagious). Second, these outbreaks often occur in congregate settings (e.g., homeless overnight facilities); these settings are conducive to *M. tuberculosis* transmission when contagious persons share airspace with many persons who have medical and social risk-factors for TB disease after becoming infected with *M. tuberculosis*. Nonetheless, *M. tuberculosis* transmission can be interrupted through effective infection control within these congregate settings. However, implementation of infection control procedures among homeless facilities in the United States is not universal.

To address challenges associated with TB control among persons experiencing homelessness, the Centers for Disease Control and Prevention's Division of TB Elimination hosted a workshop on TB and homelessness in September 2015. The workshop brought together public health officials, staff from homeless facilities, and other stakeholders to understand and discuss barriers to and strategies for implementing infection control measures in facilities providing services to homeless persons and to highlight resources available to prevent and reduce homelessness.

## 1.2 Key Messages Derived from the Workshop

### 1.2.1 Preventing TB Transmission in Homeless Facilities

- TB control in such congregate settings as homeless facilities depends on effective infection control measures that include administrative, respiratory, and environmental controls. Administrative controls are foundational for preventing *M. tuberculosis* transmission in homeless facilities.
- Prompt case finding and effective treatment of persons with TB disease are the most important measures for preventing the spread of TB. Evaluating symptomatic clients in homeless facilities for TB disease facilitates early diagnoses, which are critical for interrupting transmission, because effective treatment reduces contagiousness. Thorough contact investigations should be conducted for every person with diagnosed TB disease to identify additional TB cases and persons with latent TB infection.
- Finding asymptomatic patients with latent TB infection provides opportunities to prevent future TB cases by treating persons with latent TB infection which, in turn, also prevents *M. tuberculosis* transmission.
- Treating TB infection and disease among persons experiencing homelessness is complicated by such factors as frequent relocation, comorbidities (e.g., mental illness and substance abuse), and mistrust of the health care system. Therefore, establishing partnerships among key stakeholders is essential for ensuring an effective, coordinated response; fostering these relationships before a TB outbreak occurs is imperative.
- Education regarding TB control in homeless facilities should be provided to staff, volunteers, and clients at regular intervals. This education should include posters, reading material, trainings, and other media that are easily comprehended.
- Systematic approaches for collection, organization, analysis, and dissemination of data are foundational for managing TB control and prevention activities. Optimal data management requires efforts from all stakeholders.
- Addressing stigma is essential for optimizing TB control efforts. Stigma that arises in part because of the association of TB with poverty, marginalized populations, and other stigmatizing conditions (e.g., HIV), can have a substantial impact on a person's willingness to access care and adhere to treatment plans.

### 1.2.2 Primary and Secondary Interventions to Prevent and Reduce Homelessness

- Workshop participants from different federal agencies presented an overview of resources specifically designed to improve health care for persons experiencing homelessness and to prevent and reduce homelessness.

- The [National Health Care for the Homeless Council](#) can help connect homeless facilities or TB control programs with health care for persons experiencing homelessness.
- The [United States Interagency Council on Homelessness](#) focuses on homelessness as a public health crisis and uses an epidemiologic approach for understanding the root causes of homelessness.
- The [Continuum of Care Program](#) (CoC) is a US Department of Housing and Urban Development (HUD) competitive grant program that funds regional or local planning bodies that coordinate housing and services funding for persons and families experiencing homelessness.
- HUD's [Emergency Solutions Grants Program](#) provides funds to metropolitan cities, urban counties, territories, and states for emergency shelters for persons and families experiencing homelessness.
- Despite a provision for housing support in the 1992 recommendations from CDC and the [Advisory Council for the Elimination of Tuberculosis](#) that were focused on prevention and control of TB among homeless persons, many TB control programs do not have this option available for homeless patients.

### 1.3 Conclusion

Multiple challenges surrounding TB control among persons experiencing homelessness were discussed during the 2015 workshop. Barriers and challenges to implementing infection control measures, along with strategies for addressing those obstacles, were presented. Also presented were resources available for preventing and reducing homelessness. This report summarizes key messages from the workshop.

## 2.0 GLOSSARY OF TERMS USED IN THIS REPORT

**administrative controls:** management measures that are intended to reduce the risk for exposure to persons with infectious tuberculosis (TB). Examples include a written TB control policy; TB screening requirements for clients, staff, and volunteers; sign-in and bed tracking systems; and referral of symptomatic clients or those at high risk for TB evaluation.

**congregate setting:** a location in which groups of usually unrelated persons reside in close physical proximity.

**environmental controls:** measures adopted for preventing the spread and reducing the concentration of infectious respiratory droplets.

**interferon gamma assay release (IGRA):** blood test that measures a person's immune reactivity to the bacteria that causes TB by measuring the amount of interferon-gamma in the blood.

**latent TB infection (LTBI):** a condition in which a person has been infected by *Mycobacterium tuberculosis*, the bacterium that causes TB, but does not have any signs or symptoms of TB disease.

**person experiencing homelessness:** a person living in a place not meant for human habitation, an emergency shelter, or transitional housing; or a person who is exiting an institution where he or she temporarily resided or is unstably housed.

**respiratory controls:** use of personal protective equipment (e.g., surgical masks) to reduce risk for exposure to infectious respiratory droplets that have been expelled into the air from a patient with infectious TB disease.

**TB disease:** a condition in which *M. tuberculosis* is actively multiplying in the body and causing illness.

**tuberculin skin test (TST):** a test using an intradermal injection of purified protein derivative to elicit a raised wheal on the skin if *M. tuberculosis* is present in the body.



### 3.0 INTRODUCTION

Approximately 1% of the US population experiences homelessness every year.<sup>1</sup> Although the majority of persons experiencing homelessness reestablish housing within 1 year, on any given night, approximately 550,000 persons in the United States are without a permanent home).<sup>1,2</sup> This number includes 84,000 chronically homeless persons, 40,000 veterans, and 194,000 persons in families with children, plus another 35,000 unaccompanied children and youth.<sup>2</sup> Homelessness is highly concentrated in certain areas and is economically costly in terms of support services for jails, detoxification programs, overnight homeless facilities, and hospitals.

Mortality rates among persons experiencing homelessness are 4–9 times higher than among the general population.<sup>3,4</sup> Factors contributing to higher rates of premature death include inadequate or interrupted access to care, living in crowded conditions, mental illness, substance use, and chronic diseases, including diabetes mellitus and human immunodeficiency (HIV) infection.<sup>3,4</sup> These risk factors can increase both the likelihood of exposure to *Mycobacterium tuberculosis*, the causative agent of tuberculosis (TB), and subsequently experiencing TB disease.

*M. tuberculosis* is transmitted in respiratory droplets spread through the air. TB usually affects the lungs, but other sites of disease are also possible (e.g., the kidneys and the central nervous system). TB is curable, but can be fatal without timely diagnosis and treatment. Furthermore, untreated, contagious persons can transmit *M. tuberculosis* to others. Common symptoms of TB disease include cough, fever, night sweats, and weight loss. TB treatment requires adherence to regimens consisting of multiple medications over an extended period.

TB has been associated with homelessness for decades. Although only approximately 1% of persons are homeless, approximately 5% of persons with diagnosed TB reported having been homeless within the year before diagnosis; this proportion has not changed despite decreases in TB incidence.<sup>5</sup> During recent years, public health authorities have focused on TB control and prevention among persons experiencing homelessness, because many of the largest TB outbreaks often involve such persons.<sup>5,6</sup>

To address the challenges associated with TB control among persons experiencing homelessness, the Centers for Disease Control and Prevention (CDC)/National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention's (NCHHSTP) Division of Tuberculosis Elimination (DTBE) hosted a workshop on TB and homelessness on September 28–29, 2015. During the workshop, attendees learned about TB and homelessness, participated in discussions with health department TB control program staff and homeless service providers, reviewed examples of transmission

control measures that are associated with interrupting TB transmission, and discussed specific challenges faced by health department TB control programs throughout the United States ([Appendix A](#)).

Approximately 120 participants from 14 states and the District of Columbia attended the workshop, including 32 representatives from homeless facilities (e.g., overnight homeless facilities), 55 from national organizations, including federal agencies, and 48 from state and local TB control programs ([Appendix B](#)). This report provides a record of the participants' observations of barriers and challenges faced in addressing TB control among persons experiencing homelessness, as well as a guide for strategies that can be used to address these barriers and challenges. It also provides information discussed during the workshop about resources available for preventing and reducing homelessness.

### 3.1 Background

DTBE's National TB Surveillance System (NTSS) collects information on each newly reported case of TB disease in the United States. Demographic data collected includes housing status; that is, a person is reported as homeless if he or she has not had a home or stable residence any time within the 12 months before diagnosis of TB (e.g., is not paying rent, does not own a home, and is not steadily living with relatives or friends). Persons in unstable housing situations (e.g., alternating between multiple residences for short stays of uncertain duration) might also be considered homeless.<sup>7</sup> The proportion of patients with TB who are reported as having been homeless within the 12 months before diagnosis in a given year has remained stable for the past decade at approximately 4%–6% of US TB cases, or approximately 350–600 TB cases/year.<sup>8</sup>

Outbreaks are characterized by more new TB cases in a given area or population related by recent *M. tuberculosis* transmission. Upon request from state or local jurisdictions, CDC provides assistance to areas experiencing TB outbreaks. Since 2012, CDC has provided onsite assistance with 22 TB outbreak investigations, including 5 involving persons experiencing homelessness (personal communication, Krista Powell, Lead, Outbreak Investigations Team/Surveillance, Epidemiology and Outbreak Investigations Branch/DTBE/NCHHSTP/CDC, September 28, 2015). Investigations involving persons experiencing homelessness identified more TB cases and substantially more contacts (i.e., persons potentially exposed to another person with TB disease) than investigations not involving persons experiencing homelessness. Among the 5 investigations involving persons experiencing homelessness, an average of 45 cases and >5,000 contacts/outbreak were identified (personal communication, Krista Powell, Lead, Outbreak Investigations Team/Surveillance, Epidemiology and Outbreak Investigations Branch/DTBE/NCHHSTP/CDC, September 28, 2015). Each of these investigations involved

overnight homeless facilities. Conversely, outbreaks that did not involve persons experiencing homelessness had <10 cases on average and 350 contacts/outbreak (personal communication, Krista Powell, Lead, Outbreak Investigations Team/Surveillance, Epidemiology and Outbreak Investigations Branch/DTBE/NCHHSTP/CDC, September 28, 2015). TB transmission within homeless facilities is preventable, but specific strategies for preventing TB transmission are not consistently implemented in these facilities.<sup>9,10</sup> Because of the size and severity of TB outbreaks involving persons experiencing homelessness in homeless facilities, the workshop focused on promoting awareness of practices for preventing TB transmission among this vulnerable population ([Box 1](#)) in congregate settings.

### **Box 1. Priority Activities for Tuberculosis Control Among Homeless Persons**

- Prompt separation, evaluation, diagnosis, and reporting of all persons with tuberculosis (TB) symptoms.
- Recommended and complete treatment for all persons with medically diagnosed TB disease.
- Treatment of TB infection for persons living with human immunodeficiency virus infection or other medical conditions that increase the risk for TB (e.g., diabetes).
- Identification, examination, and treatment of all persons with previously inadequately treated TB disease, with latent TB infection, or recently exposed to infectious TB.

**Adapted from:** Centers for Disease Control and Prevention. Prevention and control of tuberculosis among homeless persons: recommendations of the Advisory Council

## 4.0 PREVENTING TB TRANSMISSION IN HOMELESS FACILITIES

### 4.1 Infection Control Measures

Infection control measures are intended to reduce transmission of contagious diseases by limiting exposure to persons with infectious disease. We present 3 strategies for addressing infection control.

#### 4.1.1 *Administrative Controls and Strategies*

Administrative controls are management measures designed to reduce the risk for exposure to persons with infectious TB. Of the 3 types of infection control measures, administrative controls are the most fundamental and work particularly well when homeless facilities in a community collaborate with a TB control program to implement certain core measures, including the following:

- assigning responsibilities for TB infection control to a point-person at each facility;
- conducting TB risk assessments for these facilities;
  - An example of a risk assessment worksheet for health care facilities that can be modified for use at a homeless facility is available at [https://www.cdc.gov/tb/publications/guidelines/AppendixB\\_092706.pdf](https://www.cdc.gov/tb/publications/guidelines/AppendixB_092706.pdf).
- developing a written TB infection control plan for each facility.
  - This plan should include procedures for systematically evaluating clients, staff, and volunteers for TB disease and infection (see additional details in the following discussion). Evaluations for TB should include regular queries to staff and clients regarding whether they have symptoms compatible with TB disease; further medical evaluation should be facilitated for persons with any TB symptoms.
  - Requiring TB diagnostic evaluations for clients who stay longer than a defined period (e.g., after staying 1 day, 3 days, or 1 week) helps ensure all clients have been evaluated and treated, if necessary, for TB disease and infection. This helps minimize exposures to infectious TB within the facility. The grace period during which clients can obtain services without verification of TB diagnostic evaluations can differ by site and should be decided in consultation with the local TB control program. Usage of a shared platform for storing test results might facilitate result verification and prevent duplication of efforts.
- maintaining bed maps and tracking bed assignments, ideally in a searchable electronic format (e.g., a spreadsheet) rather than paper records to facilitate contact investigations if a TB case is reported;
- maintaining as much space as possible between beds and positioning beds head to toe to reduce the possibility of transmission;

- posting signs and informational posters for client awareness and cough monitoring (e.g., see [https://www.cdc.gov/flu/pdf/protect/cdc\\_cough.pdf](https://www.cdc.gov/flu/pdf/protect/cdc_cough.pdf));
- considering use of a cough log to document which persons are coughing, particularly at night, so that they can be referred for medical evaluation (e.g., see [https://www.tn.gov/content/dam/tn/health/documents/tuberculosis\\_guidelines/TB\\_FJCSheter\\_s.pdf](https://www.tn.gov/content/dam/tn/health/documents/tuberculosis_guidelines/TB_FJCSheter_s.pdf)); and
- providing ongoing education to staff, volunteers, and clients (see additional details in the following discussion).

#### 4.1.1.1 Systematic Diagnostic Evaluations for TB Disease and Infection

Treating latent TB infection (LTBI) not only prevents future TB cases,<sup>11</sup> but it might also interrupt future *M. tuberculosis* transmission because it prevents the latent infection from becoming active, contagious TB.

Two tests for TB infection are available: either (a) the tuberculin skin test (TST) or (b) interferon-gamma release assays (IGRA). Both tests help differentiate persons with *M. tuberculosis* infection from those who do not have it. All clients with positive tests for TB infection should be evaluated for TB disease, but a negative test for TB infection does not always exclude the diagnosis of TB disease or LTBI. Decisions regarding patient management should always incorporate epidemiologic, historical, and other clinical information in addition to TST or IGRA results.<sup>12</sup>

Systematically evaluating facility clients for TB is an essential component of strategies for interrupting potential TB transmission.<sup>13,14</sup> Screening for TB symptoms can be performed by using a standardized questionnaire that can be completed during client intake by agency staff or volunteers. Clients with symptoms compatible with TB should be separated from others until a medical evaluation for TB disease has been performed. They should remain separated until TB disease has been excluded or the patient is not contagious.

During the workshop, representatives from different organizations voiced concerns regarding barriers to establishing systematic evaluation of clients for TB ([Box 2](#)). Those barriers are outlined in the following sections along with recommendations for addressing them.

#### 4.1.1.2 Barriers to Implementing Systematic Evaluation of Clients for TB in Homeless Facilities

- Introducing a screening system where one has not been used before is difficult.
- Shelter clients and directors are often facing multiple, enormous challenges.

- Resources are limited.
- Confusion exists about which test is best for screening homeless clients for TB.
- Case finding through on-site symptom screening is resource-intensive and challenging because (a) clients do not always report TB symptoms and (b) shelter operators might not learn until later that clients with TB disease have stayed at the shelter.
- TB spreads when known contacts are evaluated, found to be infected, but are not treated; sometimes health care providers do not check for previous positive TB tests when they are evaluating a patient who has TB disease.
- Social distancing is difficult in a small shelter environment.
- Avoiding duplication of screenings is difficult (e.g., the same person gets screened and rescreened).

### **Box 2. Systematic Diagnostic Evaluations — Workshop Participant Voices**

- “We had a volunteer in a soup kitchen who went to the [emergency department] four times with ‘necrotizing pneumonia’ before [he or she was] evaluated for TB.”
- “We have less control over our space if it’s rented or contracted. We also find that transmission can occur during the day, when clients are socializing or watching TV together.”
- “We have people dying of all kinds of things, and TB just [isn’t] in the top 10 for me. It still seems like sort of a historic thing to me.”
- “What if the facility is an emergency shelter for victims of the sex trafficking industry or domestic violence? We have few resources and lack databases and access to medical care.”
- “We often hear in TB control that ‘a decision to screen is a decision to treat,’ but what does that mean for screening programs that identify cases of TB infection but do not have enough resources for treating them all?”

#### **4.1.1.3 Strategies for Introducing Systematic Evaluation of Clients for TB**

- Develop close associations between the TB control program and homeless facilities, even in the absence of a TB outbreak.
- Provide continual education (because shelters have high staff and volunteer turnover) about testing for TB infection.
- Train facility staff and volunteers in implementing cough monitoring and symptom screening.
- Create and implement general infection prevention guidelines for homeless facilities.
- Require proof of TB diagnostic evaluations for all staff and volunteers (e.g., annually).

#### 4.1.1.4 Strategies for Prioritizing Resource Usage

- Ensure those at highest risk for having TB disease or infection are evaluated first (see <https://www.cdc.gov/tb/topic/testing/whobetested.htm>).
- Consider on-site clinical services at the homeless facility for providing testing and screening.
- Assist clients in obtaining medical screening if not offered on-site; for example, certain clients are unaware that they have medical insurance, and staff or volunteers can help clients identify and use these resources.

#### 4.1.1.5 Strategies for Selecting Testing Methods

- Coordinate with the TB control program to ensure successful implementation of a TB testing program in a homeless facility.
- Use up-to-date recommendations regarding targeted testing and treatment (see <https://www.cdc.gov/tb/topic/testing/tbtesttypes.htm> or <https://www.cdc.gov/tb/topic/treatment/default.htm>).
- For persons who are at risk for loss to follow-up after a TST (i.e., those who do not return for readings), consider using IGRAs. These tests do not require that clients return to have their test results interpreted (although the results are not back from the laboratory for several days). Moreover, the same blood draw can be used for other tests (e.g., HIV, syphilis, or hepatitis C). Consider having local health department personnel on-site at homeless facilities to help with interpretation and communication of test results.
- Be aware that IGRAs are also preferred for persons who have received bacille Calmette-Guérin (BCG) vaccination or therapy.
- Among facilities with HIV-infected clients, be aware that those clients might not disclose their status and that TSTs are less reliable in identifying TB infection among persons who are immunocompromised.
- During an outbreak or in a community with high TB prevalence, including chest radiograph or even sputum collection can improve screening results; however, mass chest radiograph screenings can be expensive and yield limited results.

#### 4.1.1.6 Strategies for Managing Testing Results

- Rather than “decision to treat,” think “intention to engage.” That means working individually with clients to decide what works for them. For certain clients, short-term incentives and enablers are motivating; others will need longer-term enablers.
- Establish practices that incentivize TB screening and enable treatment. For example, offer vouchers for fast-food restaurants to participants who agree to be screened, or provide TB services (e.g., directly observed treatment [DOT] for LTBI) at meal-delivery sites.

- Emphasize the importance of having regular TB screening results to provide a baseline negative result for persons who might become infected later.
- Work with primary care clinics and shelters to create a data management system for recording who has been screened.
- Ensure the health department has access to the data management system (see section in this report on Homeless Management Information System or HMIS) so that staff can update infection clearances.

#### 4.1.1.7 TB Education for Staff, Volunteers, and Clients

Although many persons have heard of TB, few report knowing much about the disease.<sup>15</sup> For this reason, ensuring all staff, volunteers, and clients receive thorough education about TB when they begin working or staying at the facility and on an ongoing basis is crucial. Information shared should include that TB is treatable and curable and that taking certain steps can prevent transmission of TB in homeless facilities. ([Box 3](#)).

#### Box 3. Example of Education in Action

During an outbreak in a large city, health educators and medical students assisted with education efforts at shelters that had housed TB patients by

- identifying the leading health concerns of shelter clients and whom the clients had seen for health care;
- identifying gaps in knowledge among shelter staff, volunteers, and clients; and
- creating posters with information about the local outbreak and instructions for obtaining TB evaluation and treatment at the county health department, and displaying them both at the shelter and at places where clients usually sought care.

In collaboration with CDC, the National Health Care for the Homeless Council, [United States Interagency Council on Homelessness](#), and other health and social services organizations, the [Curry International Tuberculosis Center](#) has developed the “Homelessness and TB Toolkit,” which provides links to many educational resources (see also <http://www.currytbcenter.ucsf.edu/products/view/homelessness-and-tb-toolkit>). Examples include

- brochures and cover-your-cough posters in different languages;
- an 18-minute training video, “[Shelters and TB: What Staff Need to Know](#)” (2<sup>nd</sup> ed.); and
- an online, hour-long course for new staff and volunteers, CDC’s “[TB 101](#)”



### 4.1.2 Respiratory Controls and Strategies

Respiratory controls reduce TB transmission from symptomatic persons until medical evaluations can be completed. Strategies include the following:

- Encourage all homeless shelter staff, volunteers, or clients who are coughing to wear a surgical mask. (Masks worn by *uninfected* persons will not provide adequate protection from infection.) Asking a client to wear a mask might make him or her feel offended and singled out. As with all clients, a client who is coughing should be treated with dignity and respect.
- Provide disposable paper or cloth surgical masks to any symptomatic person.
- Separate those coughing until medically evaluated and found to be free of disease or are no longer contagious.
- Encourage staff and volunteers who are coughing to stay home until they are no longer coughing.

### 4.1.3 Environmental Controls and Strategies

Environmental controls can be helpful when used in conjunction with, but not in place of, administrative and respiratory controls to reduce TB transmission (see also <https://www.cdc.gov/niosh/docs/2009-105/default.html>). Environmental strategies include the following:

- Ensure optimal ventilation of congregate spaces, either mechanically or naturally.
- Install air-cleaning methods (e.g., ultraviolet germicidal irradiation [UVGI] or high-efficiency particulate air [HEPA] filters). These systems must be correctly installed and maintained and adequately sized for the intended room.
- Consider using partial air recirculation systems, but note that if the air is not filtered (UVGI or HEPA), contaminated air will be recirculated.

## 4.2 TB Contact Investigations Involving Persons Experiencing Homelessness

Early case finding and effective treatment for persons with TB disease are the most important measures for preventing spread of TB in the community, but treating recently infected contacts is also crucial for preventing additional TB cases. Contact investigations are the systematic processes through which persons exposed during the infectious period of a TB patient's illness are identified, located, and evaluated for TB infection and disease. Evaluations of contacts usually are based on a brief medical history and careful symptom review; this is followed by a TST or IGRA, with chest radiographs for those who are symptomatic or who have TST results of an induration measuring  $\geq 5$  mm or a positive IGRA. A thorough contact investigation should be performed for every infectious TB case.<sup>16</sup>

Contact investigation strategies can be divided into 2 categories.

- ***Traditional Name-Based Approach*** — Identifies potential contacts present during an infectious period through an interview with the TB patient.
- ***Location-Based Approach*** — Identifies potential contacts present during an infectious period on the basis of third-party rosters (e.g., jail, prison, or shelter logs).

Contact investigations can be challenging in homeless facilities. Some expected difficulties include the following:

- locating the patient and contacts because of frequent relocation;
- episodic incarceration;
- migration from 1 jurisdiction to another;
- psychiatric illnesses, including substance use disorders, that hinder communication or participation; and
- competing priorities (e.g., other medical conditions or personal problems that they might be more concerned about).

Although some TB programs have used mass screenings (i.e., testing everyone present in a given time and place, regardless of whether those persons were exposed to someone with infectious disease) to identify exposed persons, whenever feasible case-finding efforts during TB outbreaks should prioritize the identification of persons with known exposures in congregate settings. Mass screenings can strain limited resources, attract persons with little or no recent TB exposure, and often present challenges in data management and interpretation.<sup>16</sup> When names or locations of specific contacts are unknown, interviews with the patient and potential contacts should focus on social networks and settings, including correctional facilities ([Box 4](#)).<sup>17</sup>

#### **Box 4. Contact Investigations — Workshop Participant Voices**

- “I can share a story about two shelters on the same campus. One was amenable to health department ‘TB sweeps [mass screening of shelter residents with sputum sample collection],’ and has a ‘cough, cough, and spit’ requirement. The other has an ‘open-door policy’ and was more resistant to [the] health department’s coming on-site. But that all changed when the second shelter had their first case.”
- “No one at our shelter will name the people they have spent time with. Even if they are willing to share them, they may not know their real names.”

#### **4.2.1 Barriers to Conducting Contact Investigations in Homeless Facilities**

- Difficulty locating clients.
- Difficulty eliciting information about contacts.

#### 4.2.2 Strategies for Conducting Contact Investigations in Homeless Facilities

- If the source patient is unable to provide names, ask him or her to describe contacts or to provide nicknames or street names.
- Enlist medical providers to offer on-site evaluations at homeless service facilities.

### 4.3 Addressing Stigma

Stigmatization is the process of negative discrimination against persons who have certain physical, behavioral, or social attributes. Health conditions like TB have been socially stigmatizing to varying degrees throughout history; moreover, as with other health problems, stigma contributes to a hidden burden of illness.<sup>18</sup>

Persons experiencing homelessness are also subject to stigma regardless of their personal circumstances or health conditions. In jurisdictions where TB is especially prevalent in congregate settings (e.g., overnight homeless facilities), this additional stigma can be strongly associated with an already marginalized population. The fear of stigma can inhibit persons from being willing participants in surveillance or screening programs, further deter persons from seeking and accepting medical care, or increase suspicion around such interventions as LTBI treatment. TB control measures for persons experiencing homelessness must consider potential stigmatization and — through use of inclusive language, strict adherence to rules protecting privacy, and education — work to fight stigma associated with TB and with homelessness ([Box 5](#)).

#### Box 5. Addressing Stigma — Workshop Participant Voices

- “We found [that] telling clients ‘*It’s all about you, and we want to protect you*’ to be a very helpful approach.”

#### 4.3.1 Strategies for Addressing Stigma

- Collaborate with a consumer advisory board comprising persons experiencing homelessness.
- Survey homeless persons to determine what approaches work best for them.
- Consider using approaches that include
  - offering medical evaluations to everyone and including other types of health screening in conjunction with TB testing;

- having nonprofit groups or other trusted sources explain the necessity of screening for TB;
- providing on-site TB education;
- offering education regarding the importance of complying with new shelter screening policies;
- providing a window (e.g., 3–7 days) during which clients must receive health screening;
- locating alternative sites for TB education and testing;
- having medical staff on-site at shelters to conduct screenings; and
- providing shelters with support for building on-site clinics to provide screenings.

#### 4.4 Establishing Partnerships for Addressing TB Control Among Persons Experiencing Homelessness

TB control programs and homeless facilities address different needs of persons experiencing homelessness, but can work together to promote TB control ([Box 6](#)).

##### Box 6. Establishing Partnerships — Workshop Participant Voices

- “Smaller shelters and bunkhouses are a bit more off-the-grid and really just focused on making money. They are less willing to work with us.”
- “Our health department [staff worry] about sharing information about transmission because they think it looks like they’ve done a bad job in TB control.”

##### 4.4.1 Barriers to Establishing Partnerships

- Difficulty getting buy-in from nontraditional partners.
- Concerns regarding sharing of personally identifiable information.
- Aligning priorities of different facilities, particularly those that are smaller or less willing to collaborate.

##### 4.4.2 Strategies for Establishing Partnerships

- Find allies among community health providers, other homeless facilities, or nongovernmental agencies (i.e., form a type of task force [[Box 7](#)]).
- Determine if homeless facilities, TB control programs, or partner agencies are providing TB control services in the community.
- Learn from collaborations where the responsibility and reporting of screening results is shared among partners.

- Coordinate with TB control programs to establish systems for identifying and following up with persons who test positive for TB disease or LTBI.
- Establish a working relationship or memorandum of understanding with partner agencies (e.g., local TB control program, state or territorial health department, [National Health Care for the Homeless Council](#), or HUD's [CoC Program](#)).
- Use de-identified local data (e.g., diagrams showing timelines and patient connections) to explain the problem and risks to stakeholders.
- Establish regular information sharing sessions with multiple stakeholders, including clients and staff, boards of directors, community leaders, and other public health officials.
- Educate staff and volunteers, who can help ensure information reaches clients.
- Maintain a point of contact at each shelter who can update staff, volunteers, and clients about protocols.

#### Box 7. Example of a Tuberculosis Control Task Force

Task force membership might include

- homeless overnight facility and other service providers,
- transitional housing providers,
- state department of health staff,
- county department of health staff,
- regional Continuum of Care staff,
- regional Commission on Homelessness staff, and
- local medical school instructors and students.

## 4.5 Data Management

Many different organizations collect clinical and demographic information about persons experiencing homelessness. Such information as TB test results, past medical history (e.g., HIV or other immunocompromising conditions), clinical case characteristics, and facility rosters are often useful during routine TB control efforts (e.g., contact and outbreak investigations). Although merging information from different sources might be useful for public health decision making, lack of standardization among systems complicates efforts to do this. Furthermore, data confidentiality policies and procedures must be respected, particularly when using data from different systems. Despite these challenges, demographic and clinical data as well as such information as facility rosters can contribute substantially to TB control. Having these data helps prioritize limited resources because it allows TB control programs and partners to focus resources on contacts of persons with infectious disease. Data management is the overall

organization of information that maintains the integrity of the data collected. A systematic, consistent approach to data collection, organization, analysis, and dissemination is required. Possible sources of information and the data that might be available are described in the following sections.

#### ***4.5.1 Health Department TB Control Programs***

TB control programs collect information about patients with TB disease, contacts of patients with TB disease, and TB infection test results. Specific data elements that will be helpful include personal identifiers (to link information available from all sources for a specific person), infectious periods for each person with active TB disease, contacts and their association (including relationship or location), results and dates of any chest radiographs, dates of TB infection tests and results, and dates of any TB infection treatment.

#### ***4.5.2 Overnight Homeless Facilities — Electronic Registration or Bed Maps***

Electronic registration and bed maps help overnight homeless facilities track clients who are using the facility's services. These electronic records can facilitate location-based contact investigations, allowing TB control staff to identify persons most likely to have had substantial contact with a patient with infectious illness and who require additional evaluation. Furthermore, data from overnight facilities can help identify other persons who might have been exposed to a person with infectious disease. Databases that track the dates when each person stayed can also help quantify how much exposure a person might have had to the person with infectious TB.

#### ***4.5.3 Homeless Management Information System***

National data regarding homelessness are crucial for guiding key national policy decisions. The [Homeless Management Information System](#) (HMIS) is a federally funded, locally administered, electronic data collection system that stores person-level information about those who use homeless services.

HMIS is also intended for guiding local decision-making. For example, HMIS can support both coordinated entry processes and client case plans among participating homeless facilities. HMIS also has been used in emergency situations (e.g., post-Hurricane Katrina shelters in 2005) to assist in information sharing.

HMIS is a requirement only for shelters that receive federal funding. However, strategies are available for encouraging non-federally funded agencies to use the system as well. For example, one TB control program provides training for homeless facility staff and offers proof of TB

screening cards that can be barcoded to facilitate client intake. That same card might be used across all participating homeless facilities, thus decreasing the need for data entry.

During a TB outbreak, HMIS can serve as a centralized repository for dates and locations of persons who have stayed at overnight facilities and for monitoring who might need to be screened for TB infection. For example, clients who have been identified as exposed to a patient with TB disease can be flagged as needing a TB evaluation.

#### ***4.5.4 Barriers to Establishing Electronic Data Systems***

- Cost.
- Lack of information technology expertise.
- Insufficient staffing.
- Fragmented and inconsistent policies among shelters.
- Concerns regarding client privacy.
- Uncertainty regarding who should have access to data.
- Impediments to the intake process.

#### ***4.5.5 Strategies for Establishing Electronic Data Systems***

- Allow sufficient time for setting up a system, including implementing HMIS cards.
- Engage all stakeholders early to create buy-in and promote understanding of the need for efficient data management. Consider moving ahead with those in agreement, but continue reaching out to agencies who did not initially agree and offer them additional opportunities for engagement.
- Be creative about obtaining resources needed for implementing a data system, including leveraging existing funding sources (e.g., HUD-funded programs).
- Consider data system operators' needs for substantial training and support.
- Provide clear guidance and support for shelters when asking them to change their intake protocols.
- Understand how the system can and cannot share information across agencies.
- Include data-entry fields that are meaningful to users.
  - Consider if needed data already exist.
  - Determine whether data are of sufficient quality to pursue adding to the new system.
- Integrate new steps into existing workflow processes as much as possible.
- Identify and address ways that workflow processes need to change (e.g., timeliness of data entry).

- If using HMIS in emergency situations only, be sure mutual agreement exists among partners about what constitutes an emergency.
  - Identify strategies that are effective and sustainable so that they continue even after an immediate crisis abates. For example, incorporate plans into written standards.
  - Clearly understand your privacy and data-sharing requirements for partner agencies.
    - o No client is required to share information before receiving services.
    - o Clients sign consent forms for sharing TB data among partners.
    - o Clients have the right to opt out of being in HMIS, but each facility is required to ask them for consent and to provide aggregated data.
    - o Only designated users should have access to the system.
- Protecting the relationships between staff and clients while introducing electronic systems is crucial.



## 5.0 PRIMARY AND SECONDARY INTERVENTIONS FOR PREVENTING AND REDUCING HOMELESSNESS

Homelessness and poor health are inextricably intertwined.<sup>19</sup> Homelessness places persons at risk for poor health and complicates efforts to treat illnesses and injuries. Neither health care financing nor the structure of the health care delivery system are attuned to the particular needs of homeless persons. Thus, persons experiencing homelessness suffer illnesses at 3–6 times the rates experienced by others, have higher mortality rates, and have dramatically lower life expectancy.<sup>3,4</sup> However, efforts to improve health care for persons experiencing homelessness and to address the public health implications of homelessness are chief components of preventing the spread of infectious diseases, including TB.

Workshop participants from different federal agencies presented a broad overview of resources specifically designed to improve health care for persons experiencing homelessness and to prevent and reduce homelessness.

### 5.1 Addressing Homelessness as a Public Health Problem

- The [National Healthcare for the Homeless Council](#) works with federally qualified health centers, which are funded by the Health Resources and Services Administration and can help connect facilities or TB control programs with health care providers.
  - Approximately 260 Healthcare for the Homeless groups provide patient-centered primary care homes across the country.
- The [United States Interagency Council on Homelessness](#), comprising 19 federal agencies, focuses on homelessness as a public health crisis and uses an epidemiologic approach for understanding its root causes.
  - A growing number of reports indicate that stable housing is associated with lower health care costs.<sup>20–23</sup>
  - A substantial decrease (47% during 2010–2016) in the number of veterans who are homeless is associated with the first strategic plan by the US Department of Veterans Affairs to end homelessness, implemented in 2010.<sup>24</sup>
  - HUD’s Special Needs Assistance Programs have flexibility in how they use their resources and are encouraged by the United States Interagency Council on Homelessness to focus on areas where homelessness is concentrated.
  - Addressing homelessness as an emergency situation can allow surge response by local jurisdictions with access to more resources.

## 5.2 Housing Resources

### 5.2.1 HUD Programs

- **CoC Program.** The [CoC Program](#) consists of regional or local planning bodies (Continuums of Care) that coordinate housing and services' funding for persons and families experiencing homelessness ([Box 8](#)).
  - Continuums of Care receive approximately \$1.9 billion in funding annually, which is distributed through a competitive grants program, with federal money awarded to local planning bodies (states, counties, or cities) to be shared among subgrants to local nonprofit organizations. Grantees have flexibility and local autonomy for deciding what to prioritize.
  - Continuums of Care require that multiple stakeholders, including hospitals and law enforcement, are included. In certain areas, jails also are included.
  - Continuums of Care grants can be used to find housing for TB patients.

#### Box 8. Continuum of Care Program Components

- Permanent housing
- Transitional housing
- Supportive services only
- Homeless Management Information System
- Homelessness prevention

- **Emergency Solutions Grants Program.** The [Emergency Solutions Grants Program](#) (ESG) provides funds to metropolitan cities, urban counties, territories, and states to provide emergency shelter for homeless persons and families to prevent homelessness ([Box 9](#)).
  - ESG awardees receive approximately \$300 million annually and can fill gaps left by the CoC Program (e.g., supporting emergency shelters).
  - ESG is a flexible funding resource that can help pay for street outreach to provide essential blankets and food. It can also be used to support a licensed health care provider for providing on-site emergency health care and mental health services, as well as transportation to an emergency department.
  - ESG awardees are required to collaborate with the local CoC regarding how to allocate funds.

For those interested in addressing TB among persons experiencing homelessness in their community, they can write that component into their CoC or ESG plan to provide services for

- housing for TB patients,
- TB screening in homeless facilities,
- shelter staff and volunteer training regarding cough monitoring and symptom screening; and
- electronic shelter registration systems (e.g., HMIS).

#### **Box 9. Emergency Solutions Grants Program Components**

- Street outreach
- Emergency shelters
- Homelessness prevention
- Rapid re-housing
- Homeless Management Information System

### **5.2.2 Housing First and Housing Support Interventions**

Housing First is a model intervention that was first established in the United States in the early 1990s. As the name indicates, the emphasis is on getting clients into housing at an early stage — the assumption being that persons with physical, mental health, or substance use problems are better able to address their needs after housing has been established. These services are still provided, but housing is not predicated on successful patient engagement.<sup>25</sup>

Such interventions as Housing First are associated with improved HIV treatment adherence, improved overall health outcomes, cost savings, and improved patient experience.<sup>26-28</sup> Studies have also reported that providing housing or shelter to homeless TB patients improves adherence to TB therapy and cost savings among that population.<sup>29,30</sup>

### **5.2.3 Barriers to Housing TB Patients**

- Despite a provision for housing support in the 1992 recommendations, many TB control programs do not have this option available for homeless patients.<sup>31</sup>
- No standard approach for housing homeless TB patients exists.
- If an outbreak occurs, time does not permit developing a system for housing patients because that can take months.
- Funding to support systems for providing housing might erode after an outbreak has been brought under control.
- Housing might be located in neighborhoods where drug use and other illicit activity occur.

#### 5.2.4 Strategies for Housing TB Patients

- Establish a housing contract to ensure that patients receiving TB treatment have a place to live. For example, a large urban TB control program contracts with the American Lung Association (ALA) to house homeless patients. ALA staff and volunteers
  - educate property owners and managers to facilitate participation;
    - o Options for housing include hotels or motels in urban areas or mobile homes in more rural areas; all housing options must comply with public health standards (e.g., individual ventilation systems).
  - establish a conduct code that is signed by each client (e.g., no visitors while still contagious, being available for DOT, and no illicit drugs);
  - pay for clients' rent and utilities and provide each client with a move-in kit with personal items and cleaning supplies, clothing, non-TB transportation (e.g., to go to the Social Security office to obtain identification cards), and food; and
  - visit clients weekly (health department staff visit daily);
- Explore alternative funding sources for providing housing.
  - Many TB clients are coinfecting with HIV, and TB control programs might qualify for receipt of Ryan White funding support (<https://hab.hrsa.gov/about-ryan-white-hiv-aids-program/about-ryan-white-hiv-aids-program>).
- Consider alternative locations for TB housing. For example, one TB control program located a small rural motel that was in the process of going out of business and used it for housing TB patients. The county health department provided transportation back and forth between the motel and a shelter.
- Ensure housing plans are in place so that the community is prepared in the event of an outbreak.

## 6.0 REFERENCES

1. National Law Center on Homelessness and Poverty (NLCHP). Homelessness in America: overview of data and causes. Washington, DC: NLCHP; [undated].  
[https://www.nlchp.org/documents/Homeless\\_Stats\\_Fact\\_Sheet](https://www.nlchp.org/documents/Homeless_Stats_Fact_Sheet).
2. Henry M, Watt R, Rosenthal L, Shivji A. Part 1—Point-in-time estimates of homelessness. In: Annual homeless assessment report (AHAR) to Congress. Washington, DC: US Department of Housing and Urban Development; 2016.  
<https://www.hudexchange.info/resources/documents/2016-AHAR-Part-1.pdf>.
3. Baggett TP, Hwang SW, O’Connell JJ, et al. Mortality among homeless adults in Boston: shifts in causes of death over a 15-year period. *JAMA Intern Med* 2013;173:189–95. doi: 10.1001/jamainternmed.2013.1604.
4. Morrison DS. Homelessness as an independent risk factor for mortality: results from a retrospective cohort study. *Int J Epidemiol* 2009;38:877–83. doi: 10.1093/ije/dyp160.
5. Bamrah S, Yelk Woodruff RS, Powell K, Ghosh S, Kammerer JS, Haddad MB. Tuberculosis among the homeless, United States, 1994–2010. *Int J Tuberc Lung Dis* 2013;17:1414–9. doi: 10.5588/ijtld.13.0270.
6. Moonan PK, Ghosh S, Oeltmann JE, Kammerer JS, Cowan LS, Navin TR. Using genotyping and geospatial scanning to estimate recent *Mycobacterium tuberculosis* transmission, United States. *Emerg Infect Dis* 2012;18:458–65. doi: 10.3201/eid1803.111107.
7. Centers for Disease Control and Prevention (CDC). CDC tuberculosis surveillance data training. Report of verified case of tuberculosis (RVCT): self-study modules participant manual. Atlanta, GA: US Department of Health and Human Services, CDC; 2009.  
<https://stacks.cdc.gov/view/cdc/11756>.
8. Centers for Disease Control and Prevention (CDC). Reported tuberculosis in the United States, 2015. Atlanta, GA: US Department of Health and Human Services, CDC; 2016.  
<https://www.cdc.gov/tb/statistics/reports/2015/default.htm>.
9. Azevedo MJ, Conwill DE, Lawrence S, et al. Tuberculosis containment among the homeless in metropolitan Jackson, Mississippi. *J Miss State Med Assoc* 2015;56:243–8.
10. Powell KM, VenderEnde DS, Holland DP, et al. Outbreak of drug-resistant *Mycobacterium tuberculosis* among homeless people in Atlanta, Georgia, 2008–2015. *Pub Health Rep* 2017;132:231–40. doi: 10.1177/0033354917694008.
11. Centers for Disease Control and Prevention. Screening for tuberculosis and tuberculosis infection in high-risk populations: recommendations of the Advisory Council for the Elimination of Tuberculosis. *MMWR Recomm Rep* 1995;44(No. RR-11):19–34.
12. Kong P, Tapy J, Calixto P, et al. Skin-test screening and tuberculosis transmission among the homeless. *Emerg Infect Dis* 2002;8:1280–4. doi: 10.3201/eid0811.020306.

13. Rendleman N. Mandated TB screening in a community of homeless people. *Am J Prev Med* 1999;17:108–13.
14. Centers for Disease Control and Prevention (CDC)/National Center for HIV/AIDS, Viral Hepatitis, STD, and TB. Core curriculum on tuberculosis: what the clinician should know. 6<sup>th</sup> ed. Atlanta, GA: US Department of Health and Human Services, CDC; 2013. [https://www.cdc.gov/tb/education/corecurr/pdf/corecurr\\_all.pdf](https://www.cdc.gov/tb/education/corecurr/pdf/corecurr_all.pdf).
15. Marks SM, DeLuca N, Walton W. Knowledge, attitudes and risk perceptions about tuberculosis: US National Health Interview Survey. *Int J Tuberc Lung Dis* 2008;12:1261–7.
16. Mindra G, Wortham JM, Haddad MB, Powell KM. Tuberculosis outbreaks in the United States, 2009–2015. *Public Health Rep* 2017;132:157–63. doi: 10.1177/0033354916688270.
17. Centers for Disease Control and Prevention. Guidelines for the investigation of contacts of persons with infectious tuberculosis: recommendations from the National Tuberculosis Controllers Association and CDC. *MMWR Recomm Rep* 2005;54(No. RR-15):1–37.
18. Barrett RL. Health-related stigma and discrimination. *International Encyclopedia of Public Health* 2008:269–72. <http://www.sciencedirect.com/science/article/pii/B9780123739605001416>.
19. National Health Care for the Homeless Council. Housing is health care. Nashville, TN: National Health Care for the Homeless Council; 2011. <http://www.nhchc.org/wp-content/uploads/2011/10/Housing-is-Health-Care.pdf>.
20. Larimer ME, Malone DK, Garner MD, et al. Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. *JAMA* 2009;301:1349–57. doi: 10.1001/jama.2009.414.
21. Perlman J, Parvensky J. Denver Housing First Collaborative: cost benefit analysis and program outcomes report. Denver, CO: Colorado Coalition for the Homeless; 2006. [https://shnny.org/uploads/Supportive\\_Housing\\_in\\_Denver.pdf](https://shnny.org/uploads/Supportive_Housing_in_Denver.pdf).
22. Mondello M, Gass AB, McLaughlin T, Shore N. Cost of homelessness: cost analysis of permanent supportive housing. Portland, ME: Maine Department of Health and Human Services; 2007. [https://shnny.org/uploads/Supportive\\_Housing\\_in\\_Maine.pdf](https://shnny.org/uploads/Supportive_Housing_in_Maine.pdf).
23. Guerin P. City of Albuquerque Housing First cost study: final report. Albuquerque, NM: University of New Mexico; 2011. <http://isr.unm.edu/reports/2011/city-of-albuquerque-housing-first-cost-study-final-report..pdf>.
24. US Department of Veterans Affairs (VA). VA is working to end homelessness among veterans. Washington, DC: VA; 2017. [https://www.va.gov/HOMELESS/about\\_the\\_initiative.asp](https://www.va.gov/HOMELESS/about_the_initiative.asp).
25. United States Interagency Council on Homelessness (USICH). Housing First. Washington, DC: USICH; 2017. <https://www.usich.gov/solutions/housing/housing-first>.

26. Aidala AA, Wilson MG, Shubert V, et al. Housing status, medical care, and health outcomes among people living with HIV/AIDS: a systematic review. *Am J Public Health* 2016;106:e1–23. doi: 10.2105/AJPH.2015.302905.
27. Wolitski RJ, Kidder DP, Pals SL, et al. Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS Behav* 2010;14:493–503. doi: 10.1007/s10461-009-9643-x.
28. Aidala AA, Lee G, Abramson DM, Messeri P, Siegler A. Housing need, housing assistance, and connection to HIV medical care. *AIDS Behav* 2007;11(6 Suppl):101–15.
29. LoBue PA, Cass R, Lobo D, Moser K, Catanzaro A. Development of housing programs to aid in the treatment of tuberculosis in homeless individuals: a pilot study. *Chest* 1999;115:218–23.
30. Marco A, Caylà JA, Serra M, et al. Predictors of adherence to tuberculosis treatment in a supervised therapy programme for prisoners before and after release. *Eur Respir J* 1998;12:967–71.
31. Centers for Disease Control and Prevention. Prevention and control of tuberculosis among homeless persons: recommendations of the Advisory Council for the Elimination of Tuberculosis. *MMWR Recomm Rep* 1992;41(No. RR-5):13–23.

## 7.0 APPENDIX A: WORKSHOP AGENDA

**Day 1, September 28, 2015**

### **Morning Session I, 8:30–10:00 a.m., Welcome and Introduction of the Problem**

**Moderator:** Thomas Navin, Chief, Surveillance, Epidemiology, and Outbreak Investigations Branch, Division of Tuberculosis Elimination (DTBE), Centers for Disease Control and Prevention (CDC)

<b>Time</b>	<b>Topic</b>	<b>Speakers and panelists</b>
8:30–8:40 a.m.	Welcome	Phil LoBue, Division Director, DTBE, CDC
8:40–8:55 a.m.	Introductions	Sapna Morris, Medical Officer, Field Services Branch, DTBE, CDC
8:55–9:05 a.m.	An Introduction to the Problem from the National Perspective	Krista Powell, Team Lead, Surveillance, Epidemiology, and Outbreak Investigations Branch, DTBE, CDC
9:05–9:45 a.m.	An Introduction to the Problem from the Local Perspective: the Experience in Hinds County, Mississippi	Donald Franklin, Special Projects Officer, Mississippi State Department of Health, Jackson, Mississippi  Rosalind Yarber, Social Services Director, Jackson Metro Area Salvation Army, Jackson, Mississippi

**Break, 9:45–10:00 a.m.**

### **Morning Session II, 10:00 a.m.–12:00 p.m., Overview of Infection Control Measures and Partnerships**

**Moderator:** Thomas Navin, Branch Chief, Surveillance, Epidemiology, and Outbreak Investigations Branch, DTBE, CDC

<b>Time</b>	<b>Topic</b>	<b>Speakers and panelists</b>
10:00–10:20 a.m.	What Are Infection Control Measures and Why Do We Need Them?	Krista Powell
10:20–11:45 a.m.	Establishing and Formalizing Partnerships Among Stakeholders	Tom Andrews, President, Mercy Care, Atlanta, Georgia  Heta Patel, Communicable Disease Specialist Supervisor, Fulton County Department of Health and Wellness, Atlanta, Georgia  Masa Narita, TB Control Officer, Public Health – Seattle & King County, Seattle, Washington



Time	Topic	Speakers and panelists
		Christopher White, Rapid Transitions Program Manager, The Salvation Army William Booth Center, Seattle, Washington  John Bernardo, Tuberculosis Control Officer, Massachusetts Department of Public Health, Boston, Massachusetts
11:45 a.m.–12:00 p.m.	Morning Wrap-Up	Thomas Navin

**Afternoon Session I, 1:00 p.m.–2:45 p.m., Establishing Key Infection Control Measures in Facilities**

Time	Topic	Session Notes
12:00–12:15 p.m.	Break	Please pick up lunch and return to Building 8, Room 1 A/B/C. Preordered lunches will be delivered to the meeting room.
12:15–12:45 p.m.	Discussion with a Patient	A patient who was homeless at the time of TB diagnosis will discuss the impact of diagnosis and treatment.
12:45–1:00 p.m.	Break	We will have a short break after the conclusion of the patient’s presentation.

Time	Topic	Speakers and panelists
1:00–2:15 p.m.	Administrative Measures  (Examples include written TB policy, TB screening requirements, sign-in and bed-tracking systems, or referral of symptomatic clients)	Randall Reves, Medical Director, TB Control Program, Denver Public Health Department, Denver, Colorado  Carolyn Bargman, Public Health Nurse, Denver Metro TB Clinic/Boulder County Public Health, Denver, Colorado
2:15–2:45 p.m.	Respiratory Measures  (Examples include monitoring for cough, distribution of masks to persons with cough, or separation/isolation of persons at high risk or symptomatic persons until TB evaluations are complete)	Group discussion

**Afternoon Session II, 3:00–5:00 p.m., Establishing Key Infection Control Measures, Education, and Environmental Control Measures**

**Moderator:** Krista Powell, Team Lead, Surveillance, Epidemiology, and Outbreak Investigations Branch, DTBE, CDC

<b>Time</b>	<b>Topic</b>	<b>Speakers and panelists</b>
3:00–3:30 p.m.	Homeless Management Information System	Lorena McDowell, Deputy Director, Programs & Grant Management, Partners for HOME/Atlanta Continuum-of-Care, Atlanta, Georgia Lindsey Stillman, Project Manager, The Cloudburst Group, Atlanta, Georgia  David Canavan, Managing Director, Canavan Associates, Atlanta, Georgia
3:30–4:20 p.m.	Educating Everyone in Your Facility	Amera Khan, Team Lead, Communications, Education, and Behavioral Studies Branch, DTBE, CDC  Neela Goswami, Infectious Diseases, Emory University, Atlanta, Georgia  Kourtney Floyd, Nurse TB Consultant, Georgia Department of Public Health, Atlanta, Georgia  Tabatha Ball, Director of Health Service Operations, Jacksonville, Florida
4:20–4:50 p.m.	Environmental Control Measures as an Adjunct to Other Measures	Garry Blackwelder, Infection Control Team, Division of Global HIV and TB, CDC
4:50–5:00 p.m.	Day 1 Wrap-Up	Moderator, Krista Powell

**Day 2, September 29, 2015**

**Morning Session I, 8:30 a.m.–12:00 p.m., Housing as a Health Care Intervention for Patients with TB**

**Moderator:** Sapna Morris, Medical Officer, Field Services Branch, DTBE, CDC

<b>Time</b>	<b>Topic</b>	<b>Speakers and panelists</b>
8:30–8:50 a.m.	Examples of Housing-Support Programs and Partnerships Used by TB Control Programs	Sapna Morris
8:50–9:20 a.m.	How to Work with Your Continuum of Care Program to Provide Housing	Susan Ziff, US Department of Housing and Urban Development, Washington, DC  Marlisa Grogan, Special Needs Assistant Specialist, US Department of Housing and Urban Development, Washington, DC
9:20–9:40 a.m.	Evidence for Housing as a Health Care Intervention	John Lozier, Executive Director, Health Care for the Homeless Council, Nashville, Tennessee
9:40 AM–10:00 AM	Homelessness as a Public Health Problem	Richard Cho, Deputy Director, US Interagency Council on Homelessness, Washington, DC

**Morning Session II, 10:15 a.m.–12:00 p.m., Strategies and Barriers to Implementation of Infection Control Measures**

**Moderator:** Sapna Morris, Medical Officer, Field Services Branch, DTBE, CDC

<b>Time</b>	<b>Topic</b>	<b>Speakers and panelists</b>
10:15–11:45 a.m.	Strategies and Barriers to Implementation of Infection Control Measures and Lessons Learned	Round table discussions moderated by Sapna Morris
11:45 a.m.–12:00 p.m.	Day 2 Wrap-Up	Moderator, Sapna Morris

## 8.0 APPENDIX B: WORKSHOP ATTENDEES, PRESENTERS, AND PLANNERS, SEPTEMBER 28–29, 2015

### Workshop Attendees

**Sheanne Allen**

*Washington State Department of Health*

**Tom Andrews**

*Saint Joseph's Mercy Care Services*

**Carlota Arriozola**

*City of Houston TB Control*

**LuVette Baldwin**

*American Lung Association of Georgia*

**Tabatha Ball**

*IM Sulzbacher Center for the Homeless*

**Carolyn Bargman**

*Denver Public Health*

**Mark Bashor**

*Central Night Shelter, Inc.*

**Anita Beaty**

*Metro Atlanta Task Force for the Homeless,  
Inc.*

**John Bernardo**

*Boston University School of Medicine*

**Shawnese Blount**

*Fulton County Department of Health and  
Wellness*

**Harriet Leigh Boone**

*Municipality of Anchorage, DHHS*

**Lisa Caldeira**

*Catholic Social Services*

**David Canavan**

*Housing and Urban Development, SNAPS  
Office*

**Dean Carpenter**

*Neighborhood Services Organization*

**Richard Cho**

*United States Interagency Council on  
Homelessness*

**Michael Cobb**

*Hesed House*

**Tammy Cooper**

*Wayne State University*

**Maria Christina Cuevas**

*Los Angeles County TB Control Program*

**Jason Cummins**

*Tennessee Department of Health*

**Peter Davidson**

*Michigan Department of Health & Human  
Services*

**Brian Davis**

*Northeast Ohio Coalition for the Homeless*

**Valerie Dawson**

*Metro Atlanta Task Force for the Homeless,  
Inc.*

**Jayme Day**

*National Alliance to End Homelessness*

**Lauren DiMiceli**

*Georgia Department of Public Health*

**Rupali Doshi**

*Health Resources and Services  
Administration*

**Bridget Dunlap**  
*Centers for Disease Control and Prevention/  
Fulton County Department of Health and  
Wellness*

**Andrew Eke**  
*Fulton County Department of Health and  
Wellness*

**Kortney Floyd**  
*Georgia Department of Public Health*

**Anne Marie France**  
*Centers for Disease Control and Prevention*

**Donald Franklin**  
*Office of TB and Refugee Health*

**Maria Galvis**  
*Arizona State Health Department*

**Mary Green**  
*TB Control Florida DOH*

**Marlisa Grogan**  
*Housing and Urban Development*

**Maryam Haddad**  
*Centers for Disease Control and Prevention*

**Troy Harris**  
*Metro Atlanta Task Force for the Homeless,  
Inc.*

**Antoinette Hayes-Triplett**  
*Tampa Hillsborough Homeless Initiative*

**Leslie Henry**  
*California Department of Public Health*

**Kem Hobbs**  
*Metro Atlanta Red Shield Services*

**Donna Hope Wegener**  
*National TB Controllers Association*

**Quanetha Hunt**  
*Volunteers of America Los Angeles*

**Hayedeh Jahansouz**  
*The Bridge*

**Paul Johnson**  
*Atlanta City Baptist Rescue Mission*

**Dana Kissner**  
*Harper University Hospital Pulmonary  
Critical Care*

**Barbara Kuntz**  
*Dallas County Health and Human Services*

**Andrea (Lynn) Latham**  
*Georgia Department of Public Health*

**Veronica Lepper**  
*Volunteers of America*

**Jylmarie Lewis**  
*Florida Department of Health*

**John Lozier**  
*National Healthcare for the Homeless  
Council*

**Jana Lynch**  
*The Salvation Army*

**Eva Margolies (Retired)**  
*Centers for Disease Control and Prevention*

**Ernest Martinez**  
*Houston Department of Health*

**Bill Matson**  
*Pathways Community Network Institute*

**Greg Matthews**  
*Shelby County Health Dept*

**Marjorie McDermott**  
*Georgia Department of Health*

**Lorena McDowell**  
*City of Atlanta/Partners for Home*

**William Miller**  
*Friends of the Homeless*

**Bradford Milton**  
*Substance Abuse and Mental Health  
Services Administration*

**David Munson**  
*Boston Healthcare for the Homeless  
Program*

**Masa Narita**  
*Public Health for Seattle & King County TB  
Clinic*

**Elizabeth Osborn**  
*United States Interagency Council on  
Homelessness*

**John Parvensky**  
*Colorado Coalition/National Coalition for  
the Homeless*

**Heta Patel**  
*Fulton County Department of Health and  
Wellness*

**Antoine Perrymon**  
*Georgia Department of Public Health*

**Dajuana Phillip**  
*Fulton County Department of Health and  
Wellness*

**Stephanie Quinn**  
*American Lung Association of Georgia*

**Susan Ray**  
*Georgia Department of Public Health and  
Emory University School of Medicine*

**Laura Reeves**  
*Florida Department of Health*

**Randall Reves**  
*Denver Public Health*

**Errol Robinson**  
*New York City Department of Health*

**Janika Robinson**  
*Fulton County Department of Health and  
Wellness*

**Raiza Ruiz**  
*Texas Department of State Health Services*

**Titilola (Lola) Rush**  
*DeKalb County Board of Health*

**Mike Sage**  
*Stop TB USA*

**Rose Marie Sales**  
*Georgia Department of Public Health*

**Kristina Schaller**  
*Maricopa County Department of Public  
Health*

**Michael Sheppard**  
*Atlanta Mission*

**Bella Siangonya**  
*DeKalb County Board of Health*

**Benjamin Silk**  
*Centers for Disease Control and Prevention*

**Nicole Simpson**

*Fulton County Department of Health and Wellness*

**Carmen Springer**

*Anchorage Coalition to End Homelessness*

**Jane Stenson**

*Catholic Charities of USA*

**Lindsey Stillman**

*Cloudburst Group*

**Carrie Storrs**

*Illinois Department of Public Health*

**Frederick Sullivan**

*The Atlanta Recovery Center*

**Jeanne Sullivan Meissner**

*New York City Department of Health*

**Laura Tarin**

*Circle The City*

**Courtney Turner**

*Centers for Disease Control and Prevention*

**Christopher White**

*Salvation Army*

**Carol Wick**

*Harbor House*

**Ashley Williams**

*City of Atlanta/Partners for Home*

**Samantha Williams**

*Centers for Disease Control and Prevention*

**Preston Witt**

*Harmony House, Inc.*

**Jonathan Wortham**

*Centers for Disease Control and Prevention*

**Rosalind Yarber**

*The Salvation Army*

**Susan Ziff**

*Housing and Urban Development*

**Workshop Planners**

**Sandy Althomsons**

*Centers for Disease Control and Prevention*

**Sapna Bamrah Morris**

*Centers for Disease Control and Prevention*

**Sherry Brown**

*Centers for Disease Control and Prevention*

**Krista Powell**

*Centers for Disease Control and Prevention*