Setting Administrative controls* Environmental controls† Respiratory-protection controls§

Settings in Which Patients with Suspected or Confirmed Infectious Tuberculosis (TB) Disease are not Expected to be Encountered

Triage only: Initial evaluation of patients who will transfer to another setting

- Implement a written infection-control plan for triage of patients with suspected or confirmed TB disease. Update annually.
- Promptly recognize and transfer patients with suspected or confirmed TB disease to a facility that treats persons with TB disease.
- Before transferring the patient out of this setting, hold the patient in an area separate from health-care workers (HCWs) and other persons.
- Settings in which patients with suspected or confirmed TB disease are rarely seen and not treated do not need an airborne infection isolation (AII) room.
- Place any patient with suspected or confirmed TB disease in an All room if available or in a separate room with the door closed, away from others and not in a waiting area.
- Air-cleaning technologies (e.g., high efficiency particulate air [HEPA] filtration and ultraviolet germicidal irradiation [UVGI] can be used to increase the number of equivalent air changes per hour [ACH]). (see Supplement, Environmental Controls).
- Settings in which patients with suspected or confirmed TB disease are rarely seen and not treated do not need a respiratory-protection program.
- If the patient has signs or symptoms of infectious TB disease (positive acid-fast bacilli [AFB] sputum smear result), consider having the patient wear a surgical or procedure mask (if possible) during transport, in waiting areas, or when others are present.

Inpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered

- Perform an annual risk assessment for the setting.
- Implement a written infection-control plan for the setting and evaluate and update annually.
- Provide TB training, education, and screening for HCWs as part of the infection-control plan.
- Establish protocols for problem evaluation.
- When possible, postpone nonurgent procedures that might put HCWs at risk for possible exposure to M. tuberculosis until patients are determined to not have TB disease or are noninfectious.
- Collaborate with state or local health departments when appropriate.

- In settings with a high volume of patients with suspected or confirmed TB disease, at least one room should meet requirements for an All room (see Supplement, Environmental Controls).
- Air-cleaning technologies (e.g., HEPA filtration and UVGI) can be used to increase the number of equivalent ACH (see Supplement, Environmental Controls).
- For HCWs, visitors, and others entering the All room of a patient with suspected or confirmed infectious TB disease, at least N95 disposable respirators should be worn.
- If the patient has signs or symptoms of infectious TB disease consider having the patient wear a surgical or procedure mask, if possible, (e.g., if patient is not using a breathing circuit) during transport, in waiting areas, or when others are present.

Patient rooms

- Place patients with suspected or confirmed TB disease in an AII room.
- At least one inpatient room should meet requirements for an AII room to be used for patients with suspected or confirmed infectious TB disease (see Supplement, Environmental Controls).
- Air-cleaning technologies (e.g., HEPA filtration and UVGI) can be used to increase the number of equivalent ACH (see Supplement, Environmental Controls; Table 2).
- For HCWs, visitors, and others entering the All room of a patient with suspected or confirmed infectious TB disease, at least N95 disposable respirators should be worn.
- Persons infected with human immunodeficiency virus (HIV) or who have other immunocompromising conditions should especially avoid exposure to persons with TB disease.
- If the patient has signs or symptoms of infectious TB disease (positive AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible, (e.g., if patient is not using a breathing circuit) during transport, in waiting areas, or when others are present.

Administrative controls Environmental controls† Respiratory-protection controls§ Setting Inpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered • For HCWs, visitors, ¶ and others **Emergency departments** • Implement a written infection-control · In settings classified as medium risk entering the AII room of a patient (EDs) plan for triage of patients with or potential ongoing transmission, at suspected or confirmed TB disease. least one room should meet with suspected or confirmed TB Update annually. requirements for an All room to be disease, at least N95 disposable · Patients with signs or symptoms of used for patients with suspected or respirators should be worn. infectious TB disease should be confirmed infectious TB disease · If the patient has signs or symptoms moved to an All room as soon as (see Supplement, Environmental of infectious TB disease (positive possible. Controls; Table 2). AFB sputum smear result), consider Air-cleaning technologies (e.g., having the patient wear a surgical or HEPA filtration and UVGI) can be procedure mask, if possible, (e.g., if used to increase the number of patient is not using a breathing equivalent ACH (see Supplement, circuit) during transport, in waiting Environmental Controls). areas, or when others are present. For HCWs, visitors, [¶] and others Intensive care units (ICUs) · Place patients with suspected or · In settings with a high volume of patients with suspected or confirmed confirmed infectious TB disease in entering the AII room of a patient an All room, separate from HCWs TB disease, at least one room with suspected or confirmed and other patients, if possible. should meet requirements for an AII infectious TB disease, at least N95 room to be used for such patients disposable respirators should be (see Supplement, Environmental If the patient has signs or symptoms Controls; Table 2). Bacterial filters should be used of infectious TB disease and is routinely in breathing circuits of suspected of being contagious patients with suspected or confirmed (positive AFB sputum smear result), TB disease and should filter consider having the patient wear a particles 0.3 µm in size in unloaded surgical or procedure mask, if and loaded situations with a filter possible (e.g., if patient is not using efficiency of ≥95%. a breathing circuit) during transport, in waiting areas, or when others are present. Surgical suites · Schedule a patient with suspected · If a surgical suite has an operating · For HCWs present during surgery of or confirmed TB disease for surgery room (OR) with an anteroom, that a patient with suspected or when a minimum number of HCWs room should be used for TB cases. confirmed infectious TB disease, at and other patients are present, and If surgery is needed, use a room or least N95 disposable respirators, suite of rooms that meet unvalved, should be worn. as the last surgical case of the day to maximize the time available for requirements for AII rooms (see · Standard surgical or procedure removal of airborne contamination Supplement, Environmental masks for HCWs might not have (see Supplement, Environmental Controls). fitting or filtering capacity for Controls; Table 1). For • If an All or comparable room is not adequate protection. postoperative recovery, place available for surgery or · If the patient has signs or symptoms patients in a room that meets postoperative recovery, air-cleaning of infectious TB disease (positive technologies (e.g., HEPA filtration requirements for an AII room. AFB sputum smear result), consider and UVGI) can be used to increase having the patient wear a surgical or the number of equivalent ACH (see procedure mask, if possible, before Supplement, Environmental and after the procedure. Controls). Valved or positive-pressure · If the health-care setting has an respirators should not be used anteroom, reversible flow rooms because they do not protect the (OR or isolation) are not sterile surgical field. recommended by the American Institute of Architects or American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. Bacterial filters should be used routinely in breathing circuits of patients with suspected or confirmed TB disease and should filter particles 0.3 µm in size in an unloaded and loaded situation with a filter efficiency of >95%.

Administrative controls Environmental controls† Respiratory-protection controls§ Setting Inpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered Laboratories** Conduct a laboratory-specific risk Environmental controls should meet For laboratory workers who assessment. requirements for clinical manipulate clinical specimens (from In general, biosafety level (BSL)-2 microbiology laboratories in patients with suspected or confirmed practices, procedures, containment accordance with guidelines by infectious TB disease) outside of a equipment, and facilities are Biosafety in Microbiological and BSC, at least N95 disposable required for nonaerosol-producing Biomedical Laboratories (BMBL) respirators should be worn. manipulations of clinical specimens. and the AIA. Perform all manipulation of clinical BSL-3 practices, procedures, and containment equipment might be specimens that could result in necessary for certain aerosolaerosolization in a certified class I or generating or aerosol-producing II biosafety cabinet (BSC). manipulations. Bronchoscopy suites†† • Use a dedicated room to perform Bronchoscopy suites should meet For HCWs present during bronchoscopy procedures. requirements for an All room to be bronchoscopic procedures of a patient with suspected or confirmed If a patient with suspected or used for patients with suspected or confirmed infectious TB disease confirmed infectious TB disease infectious TB disease, at least N95 (see Supplement, Environmental disposable respirators should be must undergo bronchoscopy, schedule the procedure when a Controls; Table 2). worn. Protection greater than an minimum number of HCWs and · Air-cleaning technologies (e.g., N95 (e.g., a full-facepiece HEPA filtration and UVGI) can be other patients are present, and elastomeric respirator or powered schedule the patient at the end of used to increase the number of air-purifying respirator (PAPR) equivalent ACH (see Supplement, should be considered. the day. Do not allow another procedure to Environmental Controls). · If the patient has signs or symptoms be performed in the bronchoscopy · Closing ventilatory circuitry and of infectious TB disease (positive suite until sufficient time has minimizing opening of such circuitry AFB sputum smear result), consider elapsed for adequate removal of M. of intubated and mechanically having the patient wear a surgical or tuberculosis-contaminated air (see ventilated patients might minimize procedure mask, if possible, before Supplement, Environmental and after the procedure. Controls; Table 1). Keep patients with suspected or confirmed infectious TB disease in the bronchoscopy suite until coughing subsides. Sputum induction and • Implement a written infection-control · Perform sputum induction and • For HCWs present during sputum induction and inhalation therapy of a inhalation therapy rooms plan in the setting. Update annually. inhalation therapy in booths with Use a dedicated room to perform special ventilation, if possible. If patient with suspected or confirmed booths are not available, sputum infectious TB disease, a respirator sputum induction and inhalation with a level of protection of at least induction or inhalation therapy Schedule sputum induction and rooms should meet requirements for N95 disposable respirators should inhalation therapy when a minimum an All room to be used for patients be worn. Respiratory protection greater than an N95 (e.g., a fullnumber of HCWs and other patients with suspected or confirmed are present, and schedule the infectious TB disease (see facepiece elastomeric respirator or patient at the end of the day. Supplement, Environmental PAPR) should be considered (see Controls; Table 2). Supplement, Respiratory Do not perform another procedure in a booth or room where sputum · Air-cleaning technologies (e.g., Protection). induction or inhalation therapy on a HEPA filtration and UVGI) can be · If the patient has signs or symptoms patient with suspected or confirmed used to increase the number of of infectious TB disease (positive equivalent ACH (see Supplement, infectious TB disease was AFB sputum smear result), consider performed until sufficient time has having the patient wear a surgical or Environmental Controls). elapsed for adequate removal of M. · Keep patients with suspected or procedure mask, if possible, before tuberculosis-contaminated air (see confirmed infectious TB disease in and after the procedure. Supplement, Environmental the sputum induction or inhalation Controls; Table 1). therapy room after sputum collection or inhalation therapy until coughing subsides.

Setting Administrative controls* Environmental controls† Respiratory-protection controls§

Inpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered

Autopsy suites

- Ensure proper coordination between attending physician(s) and pathologist(s) for proper infection control and specimen collection during autopsies performed on bodies with suspected or confirmed infectious TB disease.
- Allow sufficient time to elapse for adequate removal of *M*.
 tuberculosis-contaminated air (see Supplement, Environmental Controls; Table 1) before performing another procedure.
- Autopsy suites should meet ACH requirements for an All room to be used for bodies with suspected or confirmed TB disease (see Supplement, Environmental Controls; Table 2).
- Air-cleaning technologies (e.g., HEPA filtration and UVGI) can be used to increase the number of equivalent ACH (see Supplement, Environmental Controls).
- Consider using local exhaust ventilation to reduce exposures to infectious aerosols and vapors from embalming fluids.
- For HCWs present during autopsy on bodies with suspected or confirmed infectious TB disease, a respirator with a level of protection of at least an N95 disposable respirator should be worn. Protection greater than an N95 (e.g., a full-facepiece elastomeric respirator or PAPR) should be considered (see Supplement, Respiratory Protection), especially if aerosol generation is likely.
- If another procedure cannot be delayed until sufficient time has elapsed for adequate removal of *M. tuberculosis*contaminated air, staff should continue wearing respiratory protection while in the room (see Supplement, Environmental Controls; Table 1).

Embalming rooms

- Implement a written infection-control plan in the setting. Update annually.
- Embalming rooms should meet ACH requirements for an All room to be used for bodies with suspected or confirmed TB disease (see Supplement, Environmental Controls: Table 2).
- Air-cleaning technologies (e.g., HEPA filtration and UVGI) can be used to increase the number of equivalent ACH (see Supplement, Environmental Controls).
- For staff present during embalming procedures on bodies with suspected or confirmed infectious TB disease, a respirator with a level of protection of at least N95 disposable respirators should be worn.
 Protection greater than an N95 (e.g., a full-facepiece elastomeric respirator or PAPR) should be considered (see Supplement, Respiratory Protection), especially if aerosol generation is likely.
- If another procedure cannot be delayed until sufficient time has elapsed for adequate removal of M. tuberculosis-contaminated air, staff should continue wearing respiratory protection while in the room.

Outpatient Settings§§ in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered

- Perform an annual risk assessment for the setting.
- Develop and implement a written infection-control plan for the setting and evaluate and update annually.
- Provide TB training, education, and screening for HCWs as part of the infection-control plan.
- Establish protocols for problem evaluation.
- Collaborate with state or local health departments when appropriate.
- Environmental controls should be implemented based on the types of activities that are performed.
- Patients with suspected or confirmed infectious TB disease requiring transport should be transported as discussed below under Emergency Medical Services (EMS).
- For HCWs, visitors, [¶] and others entering an All room of a patient with suspected or confirmed infectious TB disease, at least N95 disposable respirators should be worn.
- If the patient has signs or symptoms of infectious TB disease (positive AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible (e.g., if patient is not using a breathing circuit), during transport, in waiting areas, or when others are present.
- If risk assessment indicates that respiratory protection is needed, drivers or HCWs who are transporting patients with suspected or confirmed infectious TB disease in an enclosed vehicle should wear at least an N95 disposable respirator. The risk assessment should consider the potential for shared air.

Administrative controls Environmental controls† Respiratory-protection controls§ Setting Outpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered TB treatment facilities ¶¶ \bullet For HCWs, visitors, \P and others · If patients with TB disease are Physically separate immunosuppressed patients from treated in the clinic, at least one entering the AII room of a patient room should meet requirements for with suspected or confirmed those with suspected or confirmed infectious TB disease, at least N95 infectious TB. an All room (see Supplement, Schedule appointments to avoid Environmental Controls; Table 2). disposable respirators should be exposing HIV-infected or other Air-cleaning technologies (e.g., severely immunocompromised HEPA filtration and UVGI) can be · If the patient has signs or symptoms of infectious TB disease (positive persons to M. tuberculosis. used to increase the number of equivalent ACH (see Supplement, AFB sputum smear result), consider Environmental Controls). having the patient wear a surgical or • Perform all cough-inducing or procedure mask, if possible, during aerosol-generating procedures by transport, in waiting areas, or when using environmental controls (e.g., others are present. booth) or in an AII room. Keep patients in the booth or AII room until coughing subsides. Do not allow another patient to enter the booth or All room until sufficient time has elapsed for adequate removal of M. tuberculosiscontaminated air (see Supplement, Environmental Controls; Table 1). Medical offices and · Implement a written infection-· In medical offices or ambulatory-· For HCWs in medical offices or ambulatory-care settings control plan in the setting. Update care settings where patients with TB ambulatory care settings with annually. disease are treated, at least one patients with suspected or confirmed room should meet requirements for infectious TB disease, at least N95 an All room to be used for patients disposable respirators should be with suspected or confirmed infectious TB disease (see • If the patient has signs or symptoms Supplement, Environmental of infectious TB disease (positive Controls; Table 2). AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible, during transport, in waiting areas, or when others are present. For HCWs, visitors,[¶] and others Dialysis units · Schedule dialysis for patients with · Perform dialysis for patients with suspected or confirmed infectious entering the AII room of a patient TB disease when a minimum number of HCWs and other TB disease in a room that meets with suspected or confirmed patients are present and at the end requirements for an All room (see infectious TB disease, at least N95 of the day to maximize the time Supplement, Environmental disposable respirators should be available for removal of airborne Controls; Table 2). worn. contamination (see Supplement, · Air-cleaning technologies (e.g., · If the patient has signs or symptoms Environmental Controls; Table 1). HEPA filtration and UVGI) can be of infectious TB disease (positive used to increase the number of AFB sputum smear result), consider having the patient wear a surgical or equivalent ACH (see Supplement, Environmental Controls). procedure mask, if possible, during transport, in waiting areas, or when others are present. · If risk assessment indicates the need for respiratory protection, drivers or HCWs who are transporting patients with suspected or confirmed infectious TB disease in an enclosed vehicle should wear at least an N95 disposable respirator. The risk assessment should consider the potential for shared air.

Setting Administrative controls* Environmental controls† Respiratory-protection controls§

Outpatient Settings in Which Patients with Suspected or Confirmed Infectious TB Disease are Expected to be Encountered

Dental-care settings

- If possible, postpone dental procedures of patients with suspected or confirmed infectious TB disease until the patient is determined not to have TB disease or to be noninfectious.
- Treat patients with suspected or confirmed infectious TB disease in a room that meets requirements for an AII room (see Supplement, Environmental Controls; Table 2).
- Air-cleaning technologies such as HEPA filtration and (e.g., HEPA filtration and UVGI) can be used to increase the number of equivalent ACH (see Supplement, Environmental Controls).
- For dental staff performing procedures on a patient with suspected or confirmed infectious TB disease, at least N95 disposable respirators should be worn.

Nontraditional Facility-Based Settings

- Perform an annual risk assessment for the setting.
- Develop and implement a written infection-control plan for the setting and evaluate and update annually.
- Provide TB training, education, and screening for HCWs as part of the infection-control plan.
- Establish protocols for problem evaluation.
- Collaborate with state or local health departments when appropriate.
- Environmental controls should be implemented based on the types of activities that are performed (see Supplement, Environmental Controls).
- Patients with suspected or confirmed infectious TB disease requiring transport should be transported as discussed in the EMS section.
- For HCWs, visitors, and others entering the All room of a patient with suspected or confirmed infectious TB disease, at least N95 disposable respirators should be worn.
- If the patient has signs or symptoms of infectious TB disease (positive AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible (e.g., if patient is not using a breathing circuit), during transport, in waiting areas, or when others are present.

EMS

- Include exposed emergency medical HCWs in the contact investigation of patients with TB disease if administrative, environmental, and respiratoryprotection controls for TB infection control were not followed.
- Patients with suspected or confirmed infectious TB disease requiring transport should be transported in an ambulance whenever possible. The ambulance ventilation system should be operated in the non-recirculating mode, and the maximum amount of outdoor air should be provided to facilitate dilution. If the vehicle has a rear exhaust fan, use this fan during transport. Airflow should be from the cab (front of vehicle), over the patient, and out the rear exhaust fan.
- If an ambulance is not used, the ventilation system for the vehicle should bring in as much outdoor air as possible, and the system should be set to non-recirculating. If possible, physically isolate the cab from the rest of the vehicle and have the patient sit in the back.
- If risk assessment indicates the need for respiratory protection, drivers or HCWs who are transporting patients with suspected or confirmed infectious TB disease in an enclosed vehicle should wear at least an N95 disposable respirator. The risk assessment should consider the potential for shared air.
- If the patient has signs or symptoms of infectious TB disease (positive AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible, during transport, in waiting areas, or when others are present.

Appendix A. (Continued) Administrative, environmental, and respiratory-protection controls for selected health-care settings Administrative controls Environmental controls† Respiratory-protection controls§ Setting **Nontraditional Facility-Based Settings** Medical settings in • Follow recommendations for · At least one room should meet For HCWs or others entering the AII correctional facilities inpatient and outpatient settings as requirements for an AII room (see room of a patient with suspected or appropriate. In waiting rooms or Supplement, Environmental confirmed infectious TB disease, at areas, follow recommendations for Controls; Table 2). least N95 disposable respirators TB treatment facilities. · Air-cleaning technologies (e.g., should be worn. · If possible, postpone transporting HEPA filtration and UVGI) can be If the patient has signs or symptoms patients with suspected or used to increase the number of of infectious TB disease (positive confirmed infectious TB disease equivalent ACH (see Supplement, AFB sputum smear result), consider until they are determined not to Environmental Controls). having the patient wear a surgical or have TB disease or to be When transporting patients with procedure mask, if possible, during noninfectious. suspected or confirmed infectious transport, in waiting areas, or when TB disease in a vehicle (ideally an others are present. ambulance), if possible, physically isolate the cab (the front seat) from rest of the vehicle, have the patient sit in the back seat, and open the windows. Home-based health-care Patients and household members · Do not perform cough-inducing or For HCWs entering the homes of and outreach settings should be educated regarding the aerosol-generating procedures patients with suspected or confirmed importance of taking medications, unless appropriate environmental infectious TB disease, at least N95 respiratory hygiene and cough controls are in place (see disposable. respirators should be etiquette procedures, and proper Supplement, Environmental worn. medical evaluation. Controls), or perform those For HCWs transporting patients with If possible, postpone transporting procedures outside, if possible. suspected or confirmed infectious patients with suspected or TB disease in a vehicle, consider at confirmed infectious TB disease least an N95 disposable respirator. until they are determined not to · If the patient has signs or symptoms have TB disease or to be of infectious TB disease (positive noninfectious. AFB sputum smear result), consider Certain patients can be instructed having the patient wear a surgical or to remain at home until they are procedure mask, if possible, during transport, in waiting areas, or when determined not to have TB disease or to be noninfectious. others are present. · Patients with suspected or · Do not perform cough-inducing or Long-term-care settings If the patient has signs or symptoms (e.g., hospices and skilled confirmed infectious TB disease aerosol-generating procedures of infectious TB disease (positive

nursing facilities)

- should not be treated in a longterm-care setting, unless proper administrative and environmental controls and a respiratoryprotection program are in place.
- unless appropriate infection controls are in place (see Supplement, Environmental Controls), or perform those procedures outside, if possible.
- AFB sputum smear result), consider having the patient wear a surgical or procedure mask, if possible, during transport, in waiting areas, or when others are present.
- Administrative controls must be implemented to ensure the effectiveness of environmental controls and respiratory-protection programs, and should be in place for all settings where patients with suspected or confirmed TB disease are expected to be encountered. Administrative controls include a written TB infection-control plan (which should be reassessed at least annually), assignment of responsibility for the plan, setting risk assessment, HCW risk classification, HCW training and education, and a TB screening program to test HCWs for infection with M. tuberculosis.
- † Environmental controls include local exhaust and general ventilation (i.e., achieving negative pressure), using All rooms, and air-cleaning methods (i.e., HEPA filtration and UVGI).
- § All settings where patients with suspected or confirmed TB disease will be encountered need to have a respiratory-protection program. A respiratoryprotection program might not be necessary for settings where patients with TB disease are not encountered or where a procedure exists for the prompt transfer of patients with suspected or confirmed TB disease to a setting where they can be evaluated.
- 1 Visitors with suspected or confirmed TB disease should not have contact with patients, including contact with those who have suspected or confirmed TB disease.
- ** Laboratories that are not based in inpatient settings should observe the same TB infection-control measures as laboratories in inpatient settings.
- †† Certain bronchoscopy suites are built to have positive pressure.
- §§ Although the majority of these settings are routinely considered "outpatient," they might be part of inpatient services in certain settings. If so, follow the recommendations for inpatient settings for patient rooms.
- $^{
 m III}$ TB treatment facilities can include TB clinics, infectious disease clinics, or pulmonary clinics.