Environmental Risk Assessment for Congregate Settings

Facility Name: _____

Assessor's Name: _____

Assessment Date: _____

The following questionnaire is an environmental risk assessment tool for congregate settings initiating a contact investigation (CI). The questions in this assessment are based on environmental factors relevant to tuberculosis control and prevention within the facility. The assessment's primary purpose is to gather environmental information prior to initiating a contact investigation for a patient diagnosed with tuberculosis disease.

If possible, investigators are encouraged to consult with the following officials when completing this assessment and planning their contact investigation:

- The facility's administrator
- A member of the facility's health care team
- An occupational health professional
- An infection control specialist
- A representative from the local health department
- A representative of the facilities maintenance staff or someone with knowledge of the facilities HVAC system

PART 1: INDEX PATIENT QUESTIONS

Please complete the following questions about the infectious patient (called index patient) for which the contact investigation is recommended.

MARKERS FOR CASE INFECTIOUSNESS[1]	
1) Is this case diagnosed with pulmonary, laryngeal, or pleural TB disease?	☐ Yes ☐ **No, CI Not Warranted**[2]
2) Does this patient's chest radiograph show evidence of cavitary TB disease?	☐ Yes ☐ No ☐Unknown
3) Are the nucleic acid amplification (NAAT) and/or smear tests positive for this patient?	☐ Yes ☐ No ☐Unknown
PERIOD OF INFECTIOUSNESS	
5) What is the estimated infectious period for this index patient? *Infectious Period Calculation Tool (Form #TB-425) is available at http://www.dshs.texas.gov/IDCU/disease/tb/forms/	Start Date:_____ End Date: _____ ☐Ongoing
6) For what period was the index patient at this facility? (dd/mm/yyyy) If index patient is an employee or volunteer, please use their start date as their "Entry Date", and use "Leave Date" to indicate when their sick leave began, or when they left	Entry Date: Time: ☐ AM ☐ PM Leave Date: Time: ☐ AM ☐PM ☐transferred to another facility ☐released or discharged ☐sick leave ☐other ☐NA (currently at facility)
7) If index patient is an employee or volunteer, what was their general shift while potentially infectious?	Clock in: ☐AM ☐PM Clock out: ☐AM ☐PM Days: ☐S ☐M ☐T ☐W ☐T ☐F ☐S ☐NA
8) Was patient placed in respiratory isolation (in an airborne infection isolation room) at this facility? If yes, please provide start date.	☐ Yes ☐ No Date_____
9) Was the airborne infection isolation room the patient was housed in inspected and meeting AII room standards according to facility records?	☐ Yes ☐ No ☐NA ☐No records

[1] Questions 1-3 relate to the infectiousness of the index case, and "yes" responses are markers for infectiousness. Cases with cavitary TB disease are typically more infectious compared to counterparts with no cavitation. Smear results are used to clinically determine active TB disease presence, and a positive smear indicates a case is infectious. [1][2]

[2] TB of the lungs and/or airways (pulmonary and laryngeal) is infectious, while TB at other sites is generally not. A contact investigation is generally not warranted unless the case is infectious. The rare exception is potential transmission of extra pulmonary TB through an invasive medical procedure (autopsy, embalming, and irrigation of abscess) [1][2]

PART 2: POINTS OF EXPOSURE QUESTIONS

Please complete the following questions related to selected potential points of TB exposure. Different areas in the facility may uniquely influence the transmission of disease, and multiple sites in the facility can be assessed as potential exposure points (such as the cafeteria, gym, or break room).

INTRODUCTION		
1) What room/area is being assessed? (i.e. Laundry Room) ☐: _____ ☐Whole Facility		
2) Did patient spend extended periods of time at this site while potentially infectious, or does this site share air space with an area where the patient spent extended periods of time?[3]		
☐Yes	☐No	
3) Which of the following is true for this site? (Check all that apply) ☐Site is the size of a bedroom or smaller[4] ☐Site is a congregate area used by a large number of staff and clients[5] ☐Site is used for client housing[6] ☐Site is frequented by clients with a high risk of progressing to TB disease if infected[7] ☐Site is used for high risk respiratory procedures such as sputum induction[8] ☐None of the above		
VENTILATION AND FILTRATION		
4) Are there fans, windows, or skylights present? Please note if fans do not run or if windows are sealed shut.		
☐No	☐Yes	
5) What general ventilation methods are present at this exposure site?		
☐None	☐Recirculation system	☐Single-pass system
6) If a recirculation system, is <u>all</u> room air recirculated through a HEPA filter?		
☐No	☐Yes	

3 Various factors, such as case infectiousness, can impact the contact's risk of TB infection from a given exposure. [1][2] It should also be noted that contacts at the same site may have different frequencies and durations of exposure to the case. Please see the Social Interview tool and the Contact Tracking form (TB-340) to help maintain contact specific information.

4 The concentration of TB germs in the room air has the potential to increase faster in smaller confined spaces. [3][1] Room size can also influence how close the case was to their contact(s). Extra priority may be warranted for contacts with extensive TB exposure in a small or confined space (a bedroom, cell, or car) especially if this area has poor ventilation and air filtering. [2]

5 Congregate areas can allow for a large number of people to be exposed to TB. Contacts from congregate areas can also be harder for the case to identify or report [2]. Extra priority may be warranted for addressing poor ventilation and air filtration in congregate areas especially for facilities that serve populations at high risk for TB.

6 Those who've shared a dorm or cell with a case would be considered high priority contacts due to their amount of exposure. [2] Extra priority may be warranted for addressing poor ventilation and filtration in bedrooms and dorms especially for facilities that serve populations at high risk for TB. Suspected or confirmed cases of TB should be housed by themselves in an airborne infection isolation room. [1]

7 Individuals at increased risk of progressing to TB disease if infected include those that are: 1) Diagnosed with HIV or other immunosuppressive medical conditions such as diabetes, 2) 5 years of age or younger, and 3) On corticosteroids treatments (i.e. TNFα antagonists). Contacts that are at increased risk of progressing to TB should be considered high priority regardless of the environment they were exposed in. [1][2]

8 The CDC guidelines recommends that high risk respiratory procedures be performed in rooms that are at negative pressure and have adequate ventilation for 12 or more air changes per hour. [1] Airflow direction should also be from the staff to the patient. [3]

7) Is room air partially or wholly exhausted outdoors?		
☐No	☐Yes	
8) Is outdoor air supplied to the room?		
☐No	☐Yes	
9) What air cleaning methods are present at this exposure site? (Check all that apply)		
☐Lent Filter ☐None	☑Pleated Filter	☐UVGI (Ultraviolet Germicidal Irradiation) ☐HEPA (High Efficiency Particulate Air)
AIRFLOW AND HUMIDITY		
10) What is the estimated ACH (Air Changes per Hour)? ☐Unknown		
☐<6 APH	☐6-11 APH	☐≥12 APH
11) Does the average humidity of the exposure site fluctuate over 60%? ☐Unknown		
☐ Yes	☐ No	
12) Is the site at positive, neutral, or negative pressure to adjacent areas? ☐Unknown		
☐ Positive	☐ Neutral	☐Negative
13) What is the directional airflow of the exposure site? ☐Unknown		
☐ Air flows from client area toward staff area (i.e. registration desk or interviewer chair in an exam room)	☐ There is not a distinct staff or client area ☐ No directional airflow, or airflow direction changes	☐ Air flows from staff area toward client area (i.e waiting area or interviewee chair in an exam room)

OTHER CONSIDERATIONS[9]	
14) Was the general ventilation systems running while patient was present?	☐ Yes ☐ No ☐NA ☐Unknown
15) Were air cleaning systems running, or filters installed, while patient was present?	☐ Yes ☐ No ☐NA ☐Unknown
16) Are environmental controls regularly checked and maintained by a professional with results recorded in maintenance log?	☐ Yes ☐ No ☐NA ☐Unknown

[9] The assessment team should note if environmental controls, such as the ventilation and air cleaning systems, are fully functioning and maintained. Environmental controls that were not running, or had not been installed, at the time the case was present at the site may not be applicable for the purposes of that cases contact investigation. Environmental controls that are not fully functioning or maintained could also be an identified concern for the facilities infection control program.

Environmental Risk Assessment Summary

Use Table 1 as a summary of the environmental control measures that help to reduce the risk of TB transmission within a facility. The table references the questions related to that environmental control. Please note that environmental controls do not completely eliminate the possibility of transmission. Other non-environmental factors must always be considered.

Table 1: IDENTIFYING ENVIRONMENTAL CONTROLS THAT CAN PREVENT TB TRANSMISSION	
High Efficiency Particulate Air (HEPA) Filter Part 2: Questions 6 and 9	• HEPA filters can filter all particles and droplet nuclei that transmit TB and can be used to provide clean air [3] ○ the units setting (High, Medium, or Low), the size of the room, and the size of the HEPA unit can impact how quickly the HEPA unit is able to supply clean air to an entire room [3] • HEPA filters can be used to increase airflow and ACH [1][3] • Room air being recirculated entirely through a HEPA filter is an equivalent of exhausting air entirely outdoors [1][3]

Ultraviolet Germicidal Irradiation (UVGI)
 	
Part 2: Questions 9 and 11
	• UVGI units can kill or deactivate most circulating TB germs and be used to provide clean air [3]
	  ○ UVGI can be used to increase equivalent ACH of a room [1]
	  ○ UVGI units clean the air within a certain local range and rely on air mixing to disperse the clean air [3]
	  ○ UVGI may not be as effective where ambient humidity is greater than 60% [3]

Exhausting air wholly or partially outdoors (i.e. Single-Pass Ventilation) Part 2: Questions 4,5,6, and 7	• A single-pass ventilation system that exhaust room air wholly outdoors is considered best practice for TB control, and is recommended for Airborne Infection Isolation Rooms [3] ○ Room air being recirculated entirely through a HEPA filter is an equivalent of exhausting air entirely outdoors [3] • Exhausting room air outdoors reduces (or can eliminate) the risk that TB germs will be recirculated [1][3] • Exhausting air partially or wholly outdoors can also help to put the room at negative pressure to adjacent spaces [3]
Suppling outdoor air to the room Part 2: Question 4 and 8	• Outdoor air can be a source of clear air to the room [3] • If an AII Room does have windows they should be well sealed to prevent pressure leaks and help keep the room at negative pressure [3]
Directing airflow to begin at staff area and end toward potentially sick clients Part 2: Question 13	• Airflow directs potential TB germs away from staff and can help reduce the risk that staff will become infected [3] • Recommended for sputum induction booths and waiting areas [3]

Use Table 2 as a summary of the environmental conditions that can promote TB transmission within the facility. The table references the assessment questions related to these environmental conditions. Contacts exposed to an active TB patient under the environmental conditions described in Table 2 are potentially at greater risk of infection, thus warranting increased priority during a contact investigation. Sites where these conditions are identified might also be considered as needs areas for the facilities infection control plan. These conditions do not guarantee TB transmission will occur, and other non-environmental factors should always be considered.

Table 2:
IDENTIFYING ENVIRONMENT CONDITIONS THAT CAN PROMOTE TB TRANSMISSION

Poor or Inadequate Ventilation
 	
Part 2: Question 5 and 10
 	
(Note: Especially in small or confined spaces and congregate areas)
	• Poor ventilation means TB germs are not circulated out or dispersed as effectively so they persist in environment for longer periods of time [1]
	• Poor ventilation is indicated by:
	  ○ Limited air changes per hour or ACH (i.e. ACH < 6)
	  ○ Stuffy or stale feeling in the room
	  ○ Longer periods of time for smoke from smoke test to clear out [3]
	• Poor ventilation can reduce how effectively room air is filtered [3]
	• The CDC recommends
	  ○ ACH of ≥12 for any room used to house suspected or confirmed TB patients, or that is used to perform high risk respiratory procedures such as sputum inductions. The CDC allows 6 ACH for existing pre-1994 AIIRs, but recommends that this be increased to 12 ACH "where feasible" [1][3]
	  ○ ACH of ≥10 for clinic waiting areas and rooms [3]

Poor Filtration (lack of clean air supply)
 	
Part 2: Question 9
 	
(Note: Especially in small or confined spaces and congregate areas)
	• Poor filtration means TB germs are not filtered and removed as effectively so they persist in environment for longer periods of time
	• Filter capacity is measured using MERV* (minimum efficiency reporting value)
	  ○ Lent filters do not have the efficiency to remove particles and droplet nuclei that transmit TB [3]
	  ○ Pleated filters have the efficiency to remove around half of the particles and droplets nuclei that transmit TB [3]
	• Poorly maintained filters can reduce ventilation and room ACH [3]

Positive pressure in areas where negative pressure to adjacent spaces is recommended
 	
Part 2: Question 12
	• TB germs within a room at positive pressure will naturally move out of the room toward adjacent spaces (from higher to lower pressure) [3]
	• The CDC recommends that the following areas be at negative pressure to adjacent spaces [3]
	  ○ Airborne Infection Isolation room (AII room)
	  ○ Rooms that house suspected or confirmed TB patients (if not an AII room)
	  ○ Rooms used for high risk respiratory procedures (if not an AII room)
	  ○ Exam rooms (negative or neutral pressure)

Works Cited

[1] P. A. Jensen, L. A. Lambert, M. F. Iademarco and R. Ridzon, "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings," Centers for DIsease Control and Prevention Morbidity and Mortality Weekly Report, 2005.

[2] National Tuberculosis Controllers Association, "Guidelines for the invertigation of contacts of persons with infectious tuberculosis," Centers for Disease Control Morbidity and Mortality Weekly Report (MMWR), 2005.

[3] Curry International Tuberculosis Center, "Tuberculosis infection control: a practical manual for preventing TB," 2011. [Online]. Available: www.currytbcenter.ucsf.edu.