

## **9.0 TUBERCULOSIS EXPOSURE CONTROL PLAN (excerpt from Biosafety Manual)**

### **9.1 Purpose**

To achieve early detection, isolation, and treatment of persons with active TB and to minimize the risk of TB transmission.

### **9.2 Hierarchy of Control Measures**

- I Use of administrative measures to reduce the risk of exposure to persons. with suspected o
- II Use of engineering controls to prevent the spread and reduce the concentration of infectious droplet nuclei.
- III Use of personal respiratory protective equipment.

### **9.3 Scope**

The plan covers all patients, classified employees, staff, faculty, medical staff and educational appointees (including students and volunteers) of UTHSC-H.

### **9.4 Risk Assessment for Health Care Workers**

An initial risk assessment to evaluate the risk of TB transmission will be done by UT Employee Health Services with the assistance of the IBC and EHS. This will cover all parts of the facility. This will include all clinics where TB patients may receive care or cough-inducing procedures may be performed, and individual groups of health care workers that work throughout the facility.

Each specific area and occupational category will be classified as high, intermediate or low risk based on the number of active or infectious TB patients admitted to the area and other risk factors. If data is not available, all acute areas and occupational groups likely to encounter active TB patients will be considered as high risk.

The frequency of risk assessment and skin testing will be determined on the basis of the most recent risk assessment. Low risk groups will be reassessed every 12 months, intermediate risk groups every 6 months, and high risk groups every 3 months.

Representatives of the IBC will inspect the facility, review data, and make recommendations regarding changes in the TB Exposure Control Plan at least annually or as necessary to update the plan in response to documented nosocomial transmission of TB.

Following each risk assessment, the IBC, in conjunction with other appropriate health care workers will review all TB Control policies to assure that they are effective and meet current needs.

***Analysis of Health Care Workers TB Skin Test Screening Data:***

Results of employee TB (PPD) testing will be kept in a retrievable aggregate database.

*PPD conversion rate will be calculated as follows:*

A = # health care workers with new positive skin tests in each area or group

B = # health care workers with negative skin tests in each area or group

$$\% \text{ Conversion} = \frac{A}{A+B} \times 100$$

To identify areas where the risk of occupational PPD test conversion may be increasing, PPD test conversion rates for each area will be compared to rates in areas without occupational exposure to active TB and to previous rates in the same area.

Any time a cluster of PPD test conversions is noted, further evaluation is indicated.

The frequency of PPD testing is determined by the risk assessment.

Areas in which cough-inducing procedures are performed on patients who may have active TB will, at the minimum, be considered intermediate risk.

***Review of Patient Medical Records:***

The medical records of patients diagnosed with active TB will be reviewed for the risk assessment and to determine whether any employee exposures occurred.

***Case Surveillance:***

Data on the number of active TB cases among patients and health care workers will be collected, reviewed and used to:

- Identify the number of isolation rooms required.
- Recognize clusters of nosocomial transmission.
- Assess the level of potential occupational risk.
- Monitor drug susceptibility characteristics of *M. tuberculosis* isolates.

### ***Observation of Infection Control Practices:***

1. Compliance is considered to be a standard of performance and will be included in the annual performance evaluation for all employees with potential for exposure.
2. Recommended practices are stated in this plan, copies of which are located in each department in the safety manual.
3. Strategies for monitoring of compliance:
  - a. Follow-up on the report of an employee's failure to comply with the required protective measures will be the responsibility of the employee's supervisory staff.
  - b. Follow-up of problems identified through informal reports, complaints from staff, quality assurance or safety reports, minutes from committees, employee questionnaires, staff logs, and comments received during evaluation of education and training programs will be the responsibility of the affected department's supervisory staff. Significant issues will be forwarded to the IBC.

Noncompliance will be reported to an employee's immediate supervisor for evaluation and follow-up.

## **9.5 Administrative Controls**

1. **Initial assessment:** Patients will be assessed for possible infectious TB at the site of initial presentation (Emergency Center, Outpatient clinics, Observation areas etc.) following the procedure for handling suspected TB patients. Health care workers who are the first points of contact should ask the following questions which will help recognize and detect patients with signs and symptoms suggestive of TB:
  - a. Have you had a cough of 2 or more weeks duration?
  - b. Has this cough been productive of sputum? Is it blood stained?
  - c. Have you had fever, night sweats, unintentional weight loss, lethargy or weakness?
  - d. Do you or any of your family have TB now, or a history of TB?
    - At this time, it should be determined if a patient is a member of a high risk group.

- For those patients whose assessments indicate suspected infectious TB, follow established TB protocol for proper actions.

## **2. Physician Referral:**

Referring physicians or facilities should be questioned as to the patient's possible TB status, in order to facilitate the patient's admission into appropriate isolation and care.

## **3. Bacteriologic Screening:**

Harris County TB Control will be notified of all positive AFB direct smears and cultures.

## **4. Management of Pediatric Patients with Known or Suspected Infectious TB:**

- a. Pediatric patients with suspected or confirmed TB should be evaluated for potential infectiousness on the basis of symptoms: sputum AFB smears, radiologic findings, and other criteria. Those with cavitary pulmonary or laryngeal TB should be placed in Airborne Precautions until they are determined to be non-infectious.
- b. Parents and relatives of pediatric patients suspected of having TB should be assessed as soon as possible for the presence of TB and should be asked to wear a mask at all times when in the facility until their status is known.
- c. Parents should have chest x-rays and PPD tests placed and it should be documented that they are not considered to be infectious before they may discontinue use of a mask.

## **5. Management of Patients with Suspected Tuberculosis in Ambulatory Care**

### **Settings and Emergency Centers:**

- a. Refer to Administrative Controls initial assessment section.
- b. Place patient with suspected infectious TB in Airborne Precautions in separate negative pressure room or demistifier tent if available. If separate waiting/exam room is unavailable or if patient requires transportation to ancillary departments, patient should wear a mask.
- c. Schedule patient to minimize exposure to other patients.

- d. Patients should be instructed to cover their mouth with tissues if it is necessary for them to clear respiratory secretions, and to then reapply the mask. Patients should also be told how to dispose of the tissues.
- e. If patients are known to be non-compliant with TB medications, institute Airborne Precautions until they are documented to be non-infectious.
- f. Patients with previously diagnosed TB infections should be considered to be infectious until the physician determines otherwise.

## **6. PPD Skin Testing:**

- a. Administration of tuberculin test (Mantoux):
  - 1) 0.1 ml of PPD will be injected into either the volar or dorsal surface of the arm. Anergy panels should be ordered in addition to PPD testing for immunocompromised patients where TB is suspected.
  - 2) Tuberculin is injected just beneath the surface of the skin.
  - 3) Discrete, pale elevation of the skin 6-10 mm should be produced.
- b. Reading of the skin test
  - 1) Trained personnel will read the test between 48-72 hours and record results on the appropriate form which will then be placed in the patient's chart.
  - 2) Presence or absence of induration is to be assessed, (not redness or erythema), and should be recorded in millimeters.

## **7. Treatment Guidelines:**

Patients who have confirmed active TB or are considered highly likely to have active TB should be started on appropriate treatment promptly, according to current guidelines.

While the patient is in the hospital, anti-tuberculosis drugs will be administered by directly observed therapy, in which a health care worker observes the patient ingesting the medications. All patients should be discharged on outpatient directly observed therapy. Arrangements for this will be made in collaboration with the Harris County TB Control Department at 713-599-3600.

## **8. Cough - Inducing Procedures:**

- a. Cough-inducing procedures should not be performed on patients who may have infectious TB unless absolutely necessary. These cough-inducing procedures include endotracheal intubation and suctioning, diagnostic sputum induction, aerosol treatments (including pentamidine therapy), and bronchoscopy. Other procedures that may generate aerosols, e.g. irrigation of TB abscesses, homogenizing or lyophilizing tissue, are also included in these recommendations.
- b. All cough inducing procedures performed on patients who may have infectious TB should be performed using local exhaust ventilation devices, e.g. booths, or if that is not feasible, in a negative air flow room that meets TB ventilation requirements (i.e. isolation rooms).
- c. Health care workers should wear a hospital-approved respirator or mask when present in rooms where cough-inducing procedures are being performed on patients who have, or are at high risk of having infectious TB.
- d. After completion of cough-inducing procedures, patients with known or suspected TB should remain in the isolation room or enclosure and not return to common waiting areas until coughing subsides. They should be given tissues and instructed to cover their mouth and nose when coughing. If they must recover from their sedatives or anesthesia following procedures such as bronchoscopy, they should be monitored in a separate isolation room, and not in recovery rooms with other patients.
- e. Before the booth, enclosure, or room is used for another patient, adequate time should be allowed to pass so that any droplet nuclei that have been expelled into the air are removed. This time will vary according to the efficiency of the ventilation or filtration used, but is generally 20 minutes.
- f. If performing bronchoscopy in positive pressure rooms, such as operating rooms, if unavoidable, TB infection should be ruled out before the procedure. If bronchoscopy is being performed for diagnosis of pulmonary disease on patients that may have infectious TB, it should be performed in a room that meets TB isolation ventilation requirements.
- g. Before prophylactic aerosolized pentamidine therapy is initiated, all patients should be screened for active TB. Screening should include medical history, PPD, and chest x-ray.

- h. Before each subsequent aerosolized pentamidine treatment, patients should be screened for symptoms suggestive of TB. If such symptoms are elicited, a diagnostic evaluation for TB should be initiated.
- i. For patients with suspected or confirmed active TB, it is preferable to use oral instead of aerosolized, prophylaxis for pneumocystic pneumonia if clinically practical.
- j. Harris County TB Control Center should be notified (713-599-3600) for contact investigation prior to discharge; especially when children are in the household.

## **9. Other Infection Control Measures:**

Any required infection control measures must be followed to ensure compliance with the OSHA standards and/or current guidelines for preventing the transmission of *M. tuberculosis*.

### **9.6 Engineering Controls**

- 1. Prevention of nosocomial transmission. Patient rooms and areas where patients with suspected or confirmed TB are treated should be at negative pressure to adjacent areas, have at least 6 air changes per hour, be directly exhausted to the outside or have air recirculated through a HEPA filtration system with 99.7% filtration. Patient isolation rooms are required to have negative pressure relative to the surrounding areas.
- 2. Monitoring of isolation rooms for negative pressure when used for TB isolation should be done routinely, per current guidelines or standards.
- 3. HEPA filters should be monitored and changed routinely, per current guidelines or standards.
- 4. The need for supplemental ventilation, or air cleaning will be periodically reassessed as a part of the risk assessment.

### **9.7 Respiratory Protection**

- 1. In the following circumstances, health care workers should wear a NIOSH approved high efficiency particulate air (HEPA) respirator or an approved N-95 respirator:
  - a. when entering rooms housing patients with suspected or confirmed infectious TB

- b. when performing high risk procedures on patients who have suspected or confirmed infectious TB. Examples of these include administration of aerosolized medications, bronchoscopy, sputum induction, endotracheal intubation and suctioning procedures, and autopsies.
  - c. emergency medical response personnel or others who must transport, in a closed vehicle, an individual with suspected or confirmed infectious TB.
2. Qualitative or quantitative fit testing must be performed for each respirator wearer. The results of such fit testing must be maintained in a retrievable aggregate database.
  3. Medical surveillance will be performed on all potential HEPA respirator wearers.
  4. Disposable HEPA respirators should be discarded per hospital policy current guidelines.
  5. Multi-user reusable HEPA respirators should be cleaned and filters checked and/or changed per hospital policy or current guidelines.
  6. Designated user reusable HEPA respirators should be cleaned and filters checked and/or changed per hospital policy or current guidelines.
  7. HEPA respiratory wearers should perform check to insure proper fit prior to each use.
  8. Facial hair that interferes with the seal of the mask, must be removed.

## **9.8 Health Care Workers Tuberculosis Screening Program**

1. Health care workers should have a Tuberculin PPD (Mantoux) on employment and at appropriate intervals as determined by UT Employee/Student Health Services.
2. Individuals with a previous history of a positive TB skin test should not continue to undergo skin testing. However, a baseline chest x-ray should be on file in the employee's health record.
3. All health care workers with a history of a positive skin test should either have a chest x-ray on employment or when they initially convert to a positive skin test.
4. Tuberculin PPD is not contraindicated for pregnant employees.

5. Health care workers who previously received BCG vaccine as a child should receive a baseline TB skin test. If positive, the employee should have a chest x-ray.
6. Health care workers with immunosuppression should follow guidelines employed by the UT Employee/Student Health Services. Because these individuals may be at higher risk for acquisition of TB and rapid progression to active disease, voluntary reassignment to lower risk areas may be advisable.

### **9.9 Health Care Workers with TB Infection or Active Disease**

1. Health care workers with positive PPDs and no symptoms of active diseases should continue work as usual and be counseled to notify UT Employee/Student Health Services if symptoms develop and to seek medical evaluation.
2. Health care workers with infectious TB should notify UT Employee/Student Health Services and be excluded from work until documented to be noninfectious and substantial improvement in symptoms. Clearance from Student and Employee Health is required to return to work. UT Employee/Student Health Services will monitor compliance with medications. Noncompliant health-care workers should be excluded from work until therapy is re-instituted and the individual assessed to be noninfectious.
3. Health care workers with TB at sites other than the lung or larynx usually do not need to be excluded from work if concurrent pulmonary TB has been excluded. (except exuding skin lesions).
4. All information provided by health care workers regarding their health status will be treated confidentially.

### **9.10 Education and Training**

All health care workers should receive initial employment and annual education about TB that is appropriate to their job category.

The following is an outline of the materials to be covered:

1. The basic concepts of TB transmission, pathogenesis, and diagnosis, including the difference between latent TB infection and active TB disease, the signs and symptoms of TB, and the possibility of secondary inoculation in the person with a positive PPD test. Collection of specimens for AFB cultures should be included.

2. The potential for occupational exposure to patients with infectious TB, including the prevalence of TB in the community and nationwide, situations with increased risk of exposure to TB (bronchoscopy, autopsy, etc.) and working with people reported to have high risk for TB.
3. Appropriate isolation measures (negative pressure rooms etc.)
4. The principles and practices of infection control that reduce the risk of transmission of TB, including the hierarchy of TB infection control measures, and exposure control plan. Include Respiratory/Airborne Precautions, Transportation of TB patients, and required Personal Protective Equipment.
5. The purpose of PPD testing, the significance of a positive result and the importance of participation in the skin test program.
6. The principles of preventive therapy of latent TB infection, indications, use and effectiveness, including the potential adverse effects of the drugs.
7. The responsibility of the employee to seek medical evaluation promptly if symptoms develop that may be due to TB or if PPD test conversion occurs in order to receive appropriate evaluation and therapy and to prevent transmission of TB to patients and other employees.
8. The principles of drug therapy for active TB. This should include the practice of direct observed therapy in the hospital and community.
9. The importance of notifying the appropriate group (Student and Employee Health, etc.) if diagnosed with active TB so appropriate contact investigation can be instituted.
10. The responsibilities of the institution to maintain the confidentiality of the employee while assuring that the employee with TB receives appropriate therapy and is non-infectious before returning to duty.
11. The higher risk posed by TB to individuals with HIV infection or other causes of severely impaired cell-mediated immunity including:
  - a. the more frequent and rapid development of clinical TB after infection with *Mycobacterium tuberculosis* (MTB).
  - b. the differences in the clinical presentation of disease.

- c. the high mortality rate associated with MDR-TB (M. tuberculosis organisms that are resistant to more than one anti-TB drug) disease in such individuals.
- 12. The potential development of cutaneous anergy as immune function declines (measured by CD4 and T-lymphocyte counts).
- 13. The institution's policy on voluntary work reassignment options for immunocompromised employees.
- 14. Respiratory Training to include:
  - a. define HEPA respirator and why OSHA requires it's use.
  - b. when to use a respirator (in room care of TB patient, bronchoscopy etc).
  - c. recognize the respirators used for TB.
  - d. describe how to clean and inspect the respirator.
  - e. describe how long to use respirator.
  - f. describe how to fit a respirator.
  - g. demonstrate a respirator fit-check.
  - h. medical surveillance requirement of respirator program.
  - i. describe the OSHA requirements for the program.