

Michigan Municipal Workers' Compensation Fund

Safety and Health Resource Manual

MIOSHA's Tuberculosis Guidelines For Worker Protection from Mycobacterium (Occupational Health Program Directive No. 96-9)

In recent years, the incidence of Mycobacterium Tuberculosis (*M. tuberculosis*) has increased. People spread this disease through the air in minute droplets. A person who has this TB may generate these droplets when he or she coughs, speaks, sings, or spits. Workers who, in the course of their job duties, have close contact with persons with infectious tuberculosis disease are at an increased risk of infection with TB. Therefore, the Centers for Disease Control has issued guidelines for the identification of at-risk employees and for the actions employers can take to protect workers.

Under ACT 154 (the Michigan Occupational Safety & Health Act), employers have an obligation to protect their at risk employees from *M. tuberculosis*. MIOSHA inspectors may cite an employer under the General Duty Clause if workers have or may have an exposure to TB and the employer has not instituted an effective TB infection control program. MIOSHA uses the CDC guidelines as the standard for such a program. The employer may have a generic infection control program or one that is specific to TB.

According to the CDC, the following workplaces have a higher incidence of TB infection than the general population:

- health care settings (including EMS)
- correctional institutions (city jail, county jail, prison, or juvenile detention facility)
- homeless shelters
- long-term care facilities for the elderly
- drug treatment centers.

Workers in these type facilities may:

- Have a potential exposure to the exhaled air of a person with confirmed TB.
- Have potential exposure to persons who present symptoms consistent with TB. These symptoms may include a productive cough, coughing up blood, lethargy and/or weakness, night sweats, fever, loss of weight, and/or loss of appetite.
- Have exposure to high hazard procedures performed on individuals with confirmed or suspected TB. The procedures must have the potential to generate potentially infectious airborne respiratory secretions. Examples of such procedures are endotracheal intubation and suctioning procedures, autopsies, aerosolized medication treatment, bronchoscopy, and sputum induction.

The CDC's program cites the following as effective means of reducing workers' exposure to *M. tuberculosis*:

1. Early identification of persons with TB
2. Isolation and treatment of persons with TB.
3. Use of engineering and administrative procedures to reduce the risk of exposure.
4. Use of respiratory protection.

Early Identification of Persons With TB:

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Employers in workplaces that the CDC has identified as having a higher incidence of TB should establish a procedure for the early identification of individuals with active TB.

Medical Monitoring of At Risk Employees:

To protect their workers, CDC guidelines recommend that employers:

1. Provide an initial exam. Employers in covered workplaces should offer the TB Mantoux skin test -- at no cost to employees -- to all current employees and within 10 days of hiring to all new employees.

CDC recommends a two-step baseline for all new employees that have an initially negative PPD (purified protein derivative test) result.

2. Provide periodic evaluations. Employers shall conduct testing every three (3) months for workers in high risk areas. They shall provide testing every six (6) months for workers in intermediate risk areas, and annually for workers in low risk areas.

Workers with a documented positive TB skin test who have received treatment for the disease or preventive therapy for infection are exempt from the TB skin test. However, a health care professional must evaluate them if they develop symptoms.

3. Provide reassessment if an employee experiences an exposure or has a change in health. Employers should manage employees who experience exposure to an individual with active TB for whom infection control precautions were not taken according to CDC recommendations. Employers should immediately arrange for an evaluation of any employee who develops symptoms of TB disease.

Evaluation and Case Management of Infected Workers

Employers must provide evaluation and case management for infected workers at no cost to the employees. If a worker, who previously has had a negative test result, has a positive Mantoux skin test, the employer should arrange for appropriate physical, laboratory, and radiographic evaluations to determine if the employee has TB disease. The test should take place as soon as possible, normally within 72 hours.

Engineering Controls

Employers must institute engineering controls to reduce the likelihood of employee exposure to infectious TB disease. The major control is the placement of individuals with suspected or confirmed TB in a respiratory AFB (acid fast bacilli) isolation room. The employer must maintain the AFB isolation room under negative pressure to induce airflow into the room from all surrounding areas when the person who has or may have infectious TB is undergoing high hazard procedures.

Employers should test the direction of airflow into isolation and treatment rooms at least monthly. At a minimum, the employer must use smoke trails or some other means to verify that air is flowing from the corridor into the isolation or treatment room with the door closed. If the room has an anteroom, the employer must demonstrate airflow in the anteroom.

Additional requirements:

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- CDC guidelines recommend daily negative pressure checks if the ventilation system for the room is undergoing changes or when the room is used for TB isolation.
- Air exhausted from AFB isolation or treatment rooms must be vented directly outside. Recirculation should not take place. If recirculation of contaminated or potentially contaminated air is unavoidable, the employer must install HEPA filters in the duct system from the room to the general ventilation system.
- To avoid leakage, the employer must keep all potentially contaminated air that is carried via air ducts through the facility under negative pressure until its safe discharge outside. This means the discharge point must be away from occupied areas and air intake ducts. As an alternative, the employer must decontaminate the air using a recognized process (that is, high efficiency filtration) before recirculating it back into the isolation and/or treatment room.
- Employers must impose a purge time interval during which non-essential personnel may not enter the treatment or isolation room if:
 - high-risk procedures take place within an AFB isolation treatment or isolation room without benefit of source control ventilation or local exhaust such as a tent, hood, or booth, and
 - droplets are released into the environment (for example, the infected person coughs).

Training and Information

Employers must provide employees upon hiring with appropriate training. Training should assure that employees know:

- the hazard of TB transmission,
- the signs and symptoms of TB. Employees must be able to recognize and report to a designated person any patients or clients with symptoms suggestive of TB.
- appropriate medical surveillance and therapy,
- any on-site procedures and/or controls the employer has implemented to protect employees.

In addition, employers must provide employees with appropriate respiratory protection training. MIOSHA inspectors may cite employers for failure to provide such training under Rule 3502 (General Respiratory Protection).

The 1994 CDC Guidelines present standard performance criteria for TB respiratory protection. The only types that currently meet the protection standard are HEPA respirators. CDC guidelines specify that employees must wear HEPA respirators in the following circumstances:

1. They are entering rooms housing individuals with suspected or confirmed TB.
2. They are performing high hazard procedures on individuals with suspected or confirmed TB.
3. They are emergency medical response or other personnel who must transport individuals with suspected or confirmed TB in a closed vehicle.

Employers should refer to Rule 3502 for more information.

Accident Prevention Tags and Signs

Employers shall post appropriate warnings outside the AFB isolation room. Biological hazard warning tags must meet the requirements of Rule 4501 (5) (d). The sign and/or tags must use an

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appropriate signal word such as “special respiratory isolation” or “AFB isolation.” As an alternative, the sign may provide a description of necessary precautions that employees should take.

Employee Medical Records

Any records concerning employee exposure to TB, TB skin testing results, medical evaluations and treatments are employee medical records. Such records are confidential and the employer must maintain them separately from other employee records. Refer to Rule 325, §.3451-3476.

Recording and Reporting of Occupational Exposure to TB

The following recording and reporting requirements apply to the five high risk settings:

1. health care settings (including EMS),
 2. correctional institutions (city jail, county jail, prison, or juvenile detention facility),
 3. homeless shelters,
 4. long-term care facilities for the elderly,
 5. drug treatment centers.
- TB infections as indicated by a positive TB Mantoux skin test and TB disease that are recordable on the MIOSHA 300 Log.
 - A positive skin test for TB, even on baseline testing (except pre-employment screening), is recordable because there is a presumption of work-relatedness in the high-risk settings unless clear documentation exists that an outside exposure occurred.
 - Employers should update the original MIOSHA 300 Log entry if an employee's TB infection progresses to TB disease during the five year maintenance period.
 - Because it is clinically difficult to determine if TB disease resulted from the source indicated by the skin test conversion or from subsequent exposures, employers should enter only one case on the 300 Log.
 - An employer does not need to record a test that is positive on the 300 Log if the facility provides the Mantoux skin test within two weeks of employment.

The following information comes from the Centers for Disease Control, **MMWR** (Morbidity and Mortality Report), Vol. 39, RR-17 (December 7, 1990).

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Precautions for Specific Settings

Hospitals and Other Inpatient Facilities

Tuberculosis (AFB-Acid Fast Bacilli) Isolation Precautions

- In hospitals and other inpatient facilities, any patient suspected or known to have infectious tuberculosis should be placed in AFB isolation in a private room.
- ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.) and HRSA (Health Resources and Services Administration) have published recommendations for ventilation in AFB (Acid Fast Bacilli) isolation rooms. These recommendations specify that rooms should have at least six total air changes per hour, including at least two outside air changes per hour, with sufficient within-room air distribution to dilute or remove tuberculosis bacilli from locations where health-care-facility personnel or visitors are likely to be exposed.
- The direction of air flow should be set up and maintained so that air flows into the room from the hallway (negative pressure) to minimize possible spread of tuberculosis bacilli into the general health-care setting.
- The direction of air flow should be monitored while the room is being used for AFB isolation. The use of flutter strips provides a means of constantly observing the direction of air flow. Smoke tubes or smoke sticks are also a quick, simple means of determining the direction of air flow.
- Air from the room should be exhausted directly to the outside of the building and away from intake vents, people, and animals, in accordance with federal, state, and local regulations concerning environmental discharges. Germicidal UV lamps may be considered as a supplement to ventilation to further decrease the number of infectious droplet nuclei in the air.
- Isolation-room doors must be kept closed to maintain control over the direction of air flow.
- Optionally, a separate anteroom may serve as an airlock to minimize the potential for droplet nuclei to spread from the patient's area to adjacent areas. To work effectively, the anteroom must have directional airflow.
- Persons who enter a room in which AFB isolation precautions are in place should wear PRs (a disposable particulate respirator).
- The patient should remain in the isolation room with the door closed and should be instructed to cover nose and mouth with a tissue during coughing and sneezing. If the patient must leave the room (e.g., for a medical procedure that cannot be done at the bedside) while potentially infectious, s/he should wear a properly fitted surgical mask or valveless PR.
- AFB isolation precautions may be discontinued and the patient placed in a private room when s/he is improving clinically, cough has substantially decreased, and the number of organisms on sequential sputum smears is decreasing. Usually, this occurs within 2-3 weeks after tuberculosis medications are begun. Failure to take medications as prescribed and the presence of drug-resistant disease are the two most common reasons for a patient's remaining infectious. When a patient is likely to be infected with drug-resistant organisms, AFB precautions should be applied until the patient is improving and the sputum smear is negative for AFB. Placing a tuberculosis patient in a room with other patients is not advisable, especially immunosuppressed patients, until the sputum smear is free of bacilli on three consecutive days.

Transport, Radiology, And Treatment Rooms

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- When a patient who may have infectious tuberculosis must be transported outside the AFB isolation room, s/he should wear a properly fitted surgical mask or valveless PR.
- Ideally, an area in the treatment or radiology department should be specially ventilated for AFB isolation patients. If this is not possible, the patient should be returned to the isolation room as soon as is practical.
- Health-care-facility workers performing procedures on patients with potentially infectious tuberculosis should wear a PR, especially if the procedure itself induces cough
- Treatment rooms in which patients who have undiagnosed pulmonary disease and who are at high risk for active tuberculosis are evaluated should meet the ventilation standards for AFB isolation rooms. ASHRAE recommends that treatment rooms have at least six air changes per hour.
- Treatment rooms in which cough-inducing procedures are performed should meet the specifications outlined under procedure-specific precautions.

Intensive-Care Units (ICUS)

- ASHRAE recommends that ventilation in ICUs should provide at least six total air changes per hour, including at least two outside air changes per hour. If air is recirculated in the ICU, it should be passed through properly designed, installed, and maintained HEPA filters (high efficiency particulate air filter) before being recirculated.
- Installation of UV (ultraviolet) lamps might be considered in ICUs in which there is a high risk of tuberculosis transmission.
- Any ICU patient who may have infectious tuberculosis should be placed in a private room in which ventilation meets the recommendations for AFB isolation.
- Endotracheal suctioning of patients who may have infectious tuberculosis should be carried out as described under procedure-specific precautions.
- ICU patients with undiagnosed pulmonary symptoms who may have infectious tuberculosis should have respiratory secretions submitted for AFB smear and culture.

Emergency Rooms

- Ventilation in emergency rooms, including waiting areas, should be designed and maintained to reduce the risk of tuberculosis transmission. ASHRAE recommends that emergency room waiting areas have at least 10 air changes per hour.
- In facilities serving populations with a high incidence of tuberculosis, germicidal UV lamps and/or HEPA filters in the emergency room may provide additional benefit when used to supplement ventilation.

Laboratories

- Laboratories should adhere to previously published recommendations concerning control of tuberculosis transmission.

Autopsy Rooms

- ASHRAE recommends that autopsy rooms have ventilation that provides at least 12 total air changes per hour (40). In addition, these rooms should have good distribution of air flow in the room, negative pressure with respect to adjacent areas, and room air exhausted directly to the outside of the building. Personnel performing procedures that may aerosolize infectious particles (e.g., sawing, irrigating) should wear PRs.

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Hospices

- All tuberculosis-control recommendations for inpatient facilities apply to hospices.

Nursing homes

- Published recommendations for prevention and control of tuberculosis in nursing homes should be followed.

Correctional Facilities

- Published recommendations for prevention and control of tuberculosis in correctional facilities should be followed. Prison medical facilities should follow the recommendations outlined in this document. You can find the guidelines on the Internet at www.cdc.gov/nchstp/tb/pubs/maj_guide.

Ambulatory-Care Facilities

- Health-care employers in outpatient settings should be aware of the risk of tuberculosis among their patient population. They should be especially aware of the increased risk among persons who have both HIV infection and tuberculosis infection, and they should develop infection-control policies accordingly.
- Persons who have HIV infection or who are otherwise at risk for contracting tuberculosis should receive a tuberculin skin test, and the results should be noted in the patient's medical record. Tuberculosis diagnostic procedures should be initiated if signs and symptoms of tuberculosis develop.
- Ambulatory patients who have pulmonary symptoms of uncertain etiology should be instructed to cover their mouths and noses when coughing or sneezing; they should spend a minimum of time in common waiting areas.
- Personnel who are the first point of contact in facilities serving patients at risk for tuberculosis should be trained to recognize, and bring to the attention of the appropriate person, any patients with symptoms suggestive of tuberculosis, such as a productive cough of >3 weeks' duration, especially when accompanied by other tuberculosis symptoms, such as weight loss, fever, fatigue, and anorexia.
- Ventilation in clinics serving patients who are at high risk for tuberculosis should be designed and maintained to reduce the risk of tuberculosis transmission. This is particularly important if immunosuppressed patients are treated in the same or a nearby area. In some settings, enhanced ventilation or air-disinfection techniques (e.g., HEPA filters or germicidal UV lamps) may be appropriate for common areas such as waiting rooms. Air from clinics serving patients at high risk for tuberculosis should not be recirculated unless it is first passed through an effective high-efficiency filtration system.
- In outpatient settings where cough-inducing procedures are carried out, procedure-specific AFB precautions should be implemented.

Emergency Medical Services

- When emergency-medical-response personnel or others must transport patients with confirmed or suspected active tuberculosis, a mask or valveless PR should be fitted on the patient. If this is not possible, the worker should wear a PR. If feasible, the rear windows of the vehicle should be kept open and the heating and air conditioning system set on a non-recirculating cycle.

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- Emergency-response personnel should be routinely screened for tuberculosis at regular intervals. They should also be included in the follow-up of contacts of a patient with infectious tuberculosis.

Home-Health Services

- For persons visiting the home of patients with suspected or confirmed infectious tuberculosis, precautions may be necessary to prevent exposure to air-containing droplet nuclei until infectiousness has been eliminated by chemotherapy. These precautions include instructing patients to cover coughs and sneezes. The worker should wear a PR when entering the home or the patient's room.
- Respiratory precautions in the home may be discontinued when the patient is improving clinically, cough has decreased, and the number of organisms in the sputum smear is decreasing. Usually this occurs within 2-3 weeks after tuberculosis medications are begun. Failure to take medications as prescribed and the presence of drug-resistant disease are the two most common reasons for a patient's failure to improve clinically. Home healthcare personnel can assist in preventing tuberculosis transmission by educating the patient about the importance of taking medications as prescribed (unless adverse effects are seen).
- If immunocompromised persons or young children live in the home with a patient who has infectious pulmonary or laryngeal tuberculosis, temporary relocation should be considered until the patient has negative sputum smears.
- If cough-inducing procedures (such as AP) are performed in the home of a patient who may have infectious tuberculosis, they should be administered in a well-ventilated area away from other household members. Persons who perform these procedures should wear PRs while performing them.
- Home health-care workers should be included in an employer-sponsored tuberculosis screening and prevention program.
- Early identification and treatment of persons with tuberculosis is important. Home health-care personnel and patients who are at risk for contracting active tuberculosis should be reminded periodically of the importance of having pulmonary symptoms evaluated.
- Close contacts of any patient with active infectious tuberculosis should be evaluated for tuberculosis infection and managed according to CDC and American Thoracic Society guidelines.