UNMC TUBERCULOSIS EXPOSURE CONTROL PLAN

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UNMC
TUBERCULOSIS EXPOSURE CONTROL PLAN

Purpose

The purpose of the University of Nebraska Medical Center (UNMC) Tuberculosis (TB) Exposure Control Plan is to protect patients, visitors, staff, students, and researchers from transmission of TB and to comply with national recommendations for control of TB.

Introduction

In accordance with recommendations from the Centers for Disease Control and Prevention (CDC), the Tuberculosis Control Plan at UNMC is based on a hierarchy of the following control measures:

Administrative measures to reduce the risk of exposure to those with TB.

- Assigning responsibility for TB infection control in a setting;
- Conducting a TB risk assessment of the setting;
- Developing and instituting a written TB infection control plan to ensure prompt detection, airborne precautions, and treatment of persons who have suspected or confirmed TB disease;
- Ensuring timely lab testing and reporting of results;
- Implementing effective work practices;
- Ensuring proper cleaning and sterilization or disinfection of potentially contaminated equipment (usually endoscopes);
- Training and educating Health Care Workers (HCWs), students, researchers and staff regarding TB, with specific focus on prevention, transmission, and symptoms;
- Screening and evaluating workers with patient contact who are at risk for TB disease or who might be exposed to *M. tuberculosis* complex (i.e., TB screening program);
- Applying epidemiologic-based prevention principles;
- Using appropriate signage advising respiratory hygiene and cough etiquette; and
- Coordinating efforts with the local or state health department.

Environmental controls to prevent the spread and reduce the concentration of infectious droplet nuclei.

Primary controls:
- Direct source control using local exhaust ventilation and dilute and remove contaminated air by using general ventilation.

Secondary controls:
- Control direction of airflow and clean the air via filtration and/or ultraviolet irradiation.
**Respiratory-Protection controls** to reduce students, researchers and staff exposure to TB provide for:

- an appropriate [respiratory protection program](#), and
- education
- the practice of respiratory hygiene and cough etiquette

The goal of this hierarchy is to detect, isolate and treat those with active infectious TB to decrease the risk of transmitting the infection to HCWs, patients, students, researchers, visitors and others. In this control plan, HCW refers to all paid and unpaid persons working in within UNMC who have the potential for exposure to TB. The risk varies within UNMC, the patient population, the job category of the HCW, and the effectiveness of the control interventions. Risk is increased in areas where patients are cared for before diagnosis and initiation of TB precautions, where diagnostic or treatment procedures that stimulate coughing are done, or where research with infected animals is conducted.

**Relevance to Biologic Terrorism Preparedness**

Multi Drug Resistant (MDR) *M. tuberculosis* is classified as a category C agent of biologic terrorism. Following a TB Exposure Control Plan is essential for controlling transmission of *M. tuberculosis* in health-care settings. Additional information is at [http://www.bt.cdc.gov](http://www.bt.cdc.gov) and [http://idsociety.org/bt/toc.htm](http://idsociety.org/bt/toc.htm).

**Assignment of Responsibility**

Responsibility for carrying out the TB Exposure Control Plan is a joint effort of administration, the medical staff, department managers, patient care employees, Pulmonary Medicine/Respiratory Care, Facilities Management, Radiology, Pathology, Employee Health, Environmental Services, Research Labs, Risk Management and Safety and the Department of Healthcare Epidemiology.

**Risk Assessment**

The UNMC TB Exposure Control Plan is based on a careful assessment of the risk of TB transmission within the system (see Appendix 1). According to the risk assessment, UNMC is in a medium risk group for TB transmission. This requires at least annual purified protein derivative (PPD) testing of HCWs with patient contact, repeat risk assessment, evaluation of the ventilation system and assurance of negative air pressure in the airborne infection isolation (AII) room when in use for a patient presumed to have active TB.

**Detection of Patients who may have TB**

Preventing TB transmission relies on early detection of patients, who may have TB, prompt institution of TB precautions, and prompt initiation of effective treatment. A diagnosis of TB should be considered in any patient with:

- a persistent cough (greater than three week's duration)
- bloody sputum
- night sweats
- weight loss
- anorexia
• fever
• fatigue, or
• chest pain.

The history, physical examination, purified protein derivative/ tuberculin skin test (PPD/TST), Interferon Gamma-Release Assay (IGRA), chest radiograph and sputum culture with acid fast bacilli (AFB) smear may help in the diagnosis. It is the responsibility of the physician to notify HCWs if TB is suspected in a patient, particularly when an invasive procedure is scheduled, such as bronchoscopy. HCWs are to assess patients for the possibility of TB and take the appropriate precautions to protect themselves and others.

The Clinical Microbiology Laboratory immediately reports positive AFB smear test results to the patient's physician and Healthcare Epidemiology. The Radiology department is to promptly report suspicious radiographs to clinicians or Healthcare Epidemiology. The Department of Healthcare Epidemiology will notify the patient care providers. Positive culture results for *Mycobacterium tuberculosis* are also reported to the Douglas County Health Department by the Clinical Microbiology Laboratory or Healthcare Epidemiology.

**Management of Ambulatory Care Patients with Known or Suspected TB**

Measures are taken to identify patients with TB quickly. Those with signs or symptoms of TB are evaluated promptly to reduce time spent in waiting areas. Such patients will have TB precautions applied while they are being evaluated.

TB precautions in this setting consist of:
- placing patients in a separate waiting area from others with the door closed. A negative pressure room is preferred;
- assisting patients to use a surgical mask and instructing patients to keep it on (if patient can tolerate);
- giving the patients tissues and a waste receptacle and instructing them to cover the mouth and nose when coughing or sneezing, and
- assisting visitors to wear N 95 respiratory protection when in the same room as the patient.

Visitors will not be included in the respiratory protection program, and do not need to be fit tested in order to wear the N-95 respirator.

In those known to have TB, airborne infection precautions should be used until they are noninfectious. When possible, appointments are scheduled to minimize exposure to other persons. To avoid exposing HIV-infected or otherwise severely immunocompromised persons to *M. tuberculosis*, consider location and scheduling issues.

**Isolation for Infectious TB Patients**

**Evaluation**

Those suspected of TB should be aggressively evaluated if they have signs and symptoms suggesting TB.
**Treatment**

Patients who have confirmed active disease or who are likely to have active TB should receive appropriate treatment promptly. Care is coordinated with the health department, especially when planning for discharge of the patient or contact tracing.

**Isolation**

Patients suspected or known to have infectious TB are placed in airborne infection precautions. This consists of a private room with appropriate negative pressure ventilation. Registered nurses, physicians, physicians’ assistants, and Healthcare Epidemiology personnel may place patients in precautions.

Airborne infection precautions should be initiated when signs and symptoms of TB are present, when the history and physical examination reveal possible TB, when tests for AFB are ordered and the patient has clinical symptoms, or when laboratory or radiology tests indicate possible TB.

Airborne infection precautions may be initiated and discontinued at the direction of the patient's physician or by Healthcare Epidemiology. Isolation techniques are carried out according to the Nebraska Medical Center Isolation Precautions Policy, IC 4. These practices include the following elements:

1. Patients are placed in a private room with the door(s) closed. Patient care staff must call Facilities Management to set up the negative pressure room if a portable high efficiency particulate air (HEPA) unit is required (see Appendix 2). Setup is available 24 hours a day.
2. Patient-care staff should be aware of the room air monitor for the airborne infection isolation room. If the room air monitor alarms, patient care staff will attempt to correct the problem if possible (see Appendix 2). If the alarm continues or is not silenced by these actions, staff will notify Facilities Management immediately.
3. Patient care providers will educate patients about transmission of TB and the reasons for precautions. Patients are taught to cover their mouths and noses with a tissue when coughing or sneezing and discard the tissue directly into a waste receptacle.
4. Patients should remain in the airborne infection isolation room with all the doors to the room closed. An airborne isolation cart is ordered. An isolation stop sign is placed on the door frame (see Appendix 3). Isolation indicators (flagging) for the patient are also put in the computer system. Appropriate respirators (N95) are placed at the door. If possible, all procedures should be performed in the patient room. If this is not possible, a patient should wear a surgical mask when outside their room if medically possible, and be scheduled for activities or procedures during lulls in the workload to reduce their contact with others. Patients should spend as little time as possible outside the Airborne Isolation Room.
5. Ventilation in treatment/procedure rooms should be appropriate for airborne infection isolation or the patient should remain masked during the procedure, if possible. Bronchoscopies performed on patients suspected or known to have TB will be done in the patient room, if possible.
6. The number of people entering airborne infection isolation rooms is restricted. All those who enter the room, including visitors, must wear appropriate respiratory protection (N-95 respirators). Respirators are removed outside the patient room when exiting.

7. Airborne infection isolation rooms are single patient rooms with appropriate ventilation (at least six air changes per hour in existing units, and at least twelve air changes per hour in newly constructed areas). The rooms are at negative pressure to the halls and surrounding areas, and are monitored when used for TB patients. Patient care staff will follow the protocol outlined in Appendix 2 if the room air monitor alarms. Facilities Management is notified if the room is not at negative pressure. Facilities Management will correct deficiencies or ask to have the patient moved to a room meeting the special ventilation requirements. Facilities Management will review airflow of selected rooms at appropriate intervals. All doors to the rooms are kept closed to maintain negative airflow. Air is not recirculated into the general ventilation unless filtered through a HEPA filter.

8. Airborne infection precautions may be discontinued when the patient is on effective therapy (at least 2 weeks), is improving clinically, and has a sputum smear that is negative for AFB on three consecutive days, or is determined by the Hospital Epidemiologist to be non-infectious. Notify Healthcare Epidemiology before discontinuing airborne infection precautions.

9. Patients with multiple drug resistant TB (MDR-TB) are to be isolated or seen in an airborne isolation examination room for the duration of their hospitalization/visit.

10. Patients with active TB who have not completed therapy are placed in airborne infection precautions until they are noninfectious.

11. When isolation is discontinued, or the patient transfers to a new room, or the patient leaves, the patient care staff are to let the HEPA air filtering unit run with the room doors closed until 99.9% of particles are removed from the air. In most patient rooms with six air changes per hour, this will be 60 minutes. (See Appendix 4 for guidance on time required for removal of TB particles). Those needing to enter the room during that time are to wear N95 respirators. In rooms with portable HEPA units, Environmental Services (EVS) staff will disinfect the outside of the unit and the flexible duct hose using a disinfectant approved by TNMC Infection Control Committee. Patient care staff will notify Facilities Management, after the appropriate period of time has elapsed, to pick up the unit. If dividers are used to decrease noise from the unit, EVS staff will disinfect the dividers as well. Facilities Management will turn off the unit and the room air monitor. Facilities Management will remove the portable unit for storage.

12. If the patient is in isolation for suspected TB and is found not to have TB, isolation supplies, the signs and HEPA filter unit may simply be removed from the room.

13. Upon readmission to the hospital or clinic, patients with TB who have not had documented negative sputum smears should be placed in airborne infection precautions until they are determined to be noninfectious.

14. Any issues with Patient noncompliance will be dealt with according to Policy IC 7 - Healthcare Epidemiology Authority, Guidelines attachment. (See Appendix 9)
Engineering Controls
Fixed and portable ventilation systems, air pressure gradient monitoring devices, biosafety cabinets and ventilation system checks will be used to decrease exposure of HCWs to TB. A list of negative pressure rooms that may be used for isolation of TB patients is attached (see Appendix 2). Room pressure is to be monitored when the room is used for a suspected or known TB patient. HEPA filters will be checked and replaced by Facilities Management when needed as part of their preventive maintenance program. Used HEPA and pre-filters will be placed into a plastic trash bag; the bag will be tied shut and disposed of with general waste (not in biohazardous waste). Facilities Management staff will wear appropriate respirators when checking/repairing HEPA units or replacing filters used for TB.

Ventilation
Airflow and the number of air changes per hour are monitored in selected areas of UNMC by the Facilities Management staff at appropriate intervals. The ventilation system and direction of airflow is rechecked and verified when construction has been completed in an area or when work is performed on an air handler. Air changes in current TB patient rooms should be at least six per hour. Areas of new construction should have a minimum of twelve air changes per hour.

HEPA filtering unit
A HEPA filtration system is used in rooms designated to be airborne infection isolation areas. Preferably, air is exhausted outdoors, away from air intakes and people. If air is re-circulated into the general ventilation, it will pass through the HEPA filter first. The system helps establish negative airflow. Maintenance of the filters and ultraviolet lights contained in the HEPA unit will be done by Facilities Management according to manufacturers' instructions.

Ultra Violet (UV) Irradiation
UV light may be used to supplement the HEPA air purification system, but it does not substitute for proper ventilation.

Respiratory Protection
Disposable N 95 respirators or other approved devices are worn by HCWs (including students) when caring for patients with known or suspected TB, performing certain laboratory procedures, and when viewing or performing an autopsy. HCWs are fit-tested to achieve a face-seal leakage of <10%, and are instructed on how to wear the respirator. HCWs should not reuse a disposable N95 respirator. HCWs that use respiratory protection are included in UNMC respiratory protection program. The selection of respirators is made by Healthcare Epidemiology, Safety Leadership, and appropriate departments based on current data regarding safety, cost, regulations and the hospital's assessed TB risk.

HCWs who may be exposed to patients with TB should wear an appropriate fitting respirator. HCWs must be physically able to do their jobs while wearing the respirator. They will be reevaluated by their manager or designee annually at the time of PPD/TST for pertinent medical conditions that may limit their ability to tolerate the respirator.
Managers or designees will determine members of their staff who will be fit-tested so patient care needs and patient care support services are accommodated.

Employee Health coordinates the skin testing and respirator fit-testing of HCWs with the respective managers and will remind managers of their need to repeat the employee counseling and physical screening questionnaire of HCWs who may have exposure to patients with TB (see Appendix 6). If HCWs indicate they have medical conditions that may prevent their ability to tolerate use of the respirator, the manager will refer the HCWs to Employee Health for further evaluation. Recommendations will be made on a case-by-case basis.

Managers of each area will assume responsibility for obtaining appropriate respirators and fit-testing of the staff, personnel training, and documentation for their staff. The Medical Questionnaire for Respirator Users and respirator fit-test result for each HCW in the respiratory protection program is placed in the HCWs file maintained by Employee Health.

HCWs should be reevaluated for respiratory fit if they have had a change in facial features, weight loss or gain, or have repeated problems getting their respirator to fit properly.

**High-Hazard Procedures**
Procedures that increase the probability of droplet nuclei being expelled into the air include:

- endotracheal intubation and suctioning
- sputum induction
- bronchoscopy
- aerosol treatments (including Pentamidine)
- pulmonary function testing
- autopsy
- wound irrigation
- centrifuging/vortexing of specimens containing MTB
- handling of specimens or cultures containing MTB
- animal studies in which primates are experimentally or naturally infected with MTB complex (including *M. bovis*).

Procedures should be done only when necessary on a patient who is suspected to have TB. A room meeting the ventilation requirements should be used, and patients should be kept in the room away from other patients until coughing subsides or until recovered from sedatives or anesthesia. HCWs should wear designated respirators when present during these procedures if TB is suspected. Before the room is used for another patient, enough time should elapse so 99.9% of airborne contaminants are removed. (See Appendix 4) Persons entering the room before that time has elapsed should wear designated respirators. Respirators should be removed outside of the negative air flow room when exiting.
Education and Training of HCWs

It is the responsibility of the management and administration to see that HCWs receive education about TB that is appropriate to their job category. Training is to occur before their initial assignment (e.g., orientation) and at the annual mandatory education program or competency assessment. Training is to include:

- basic concepts of TB infection, transmission, pathogenesis, diagnosis
- signs and symptoms of TB, drug therapy for TB
- potential for occupational exposure to persons with TB
- prevalence of TB in the community and at UNMC
- situations with increased risk of exposure to TB
- use of airborne infection precautions and engineering controls
- ways to reduce transmission of TB
- purpose and importance of PPD/TST
- significance of a positive result
- principles and importance of drug therapy for active TB
- responsibility of the HCW to seek medical evaluation promptly if signs and symptoms of TB develop or if PPD test conversion occurs
- importance of notifying Employee Health if diagnosed with active TB so appropriate contact investigation can be instituted and to be sure therapy is effective before returning to duty
- confidentiality of records and individual counseling
- implications of TB in immunocompromised individuals and the possibility of work reassignment
- implications of drug resistant TB
- management of research animals infected with TB (as applicable)

Besides the general education program, those who wear TB respirators are instructed in the following:

- risks of TB transmission and infection
- engineering controls and work practices preventing transmission
- reasons for use of designated TB respirators, and when to use them,
- why this respirator was chosen, its functions and limitations,
- how to inspect, put on, and wear their respirators, and
- how to recognize an inadequately functioning respirator.

A copy of "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-care Settings, 2005" is kept in the Department of Healthcare Epidemiology for reference. This guideline can also be found online at [http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm).
HCW Counseling, Screening and Evaluation

A TB screening and prevention program is in place to identify, evaluate, and rule out TB in HCWs with patient contact. Those with a positive IGRA should be started on preventive therapy, if indicated. Effectiveness of current control practices is evaluated using this data.

**Counseling**
Employees are counseled by Employee Health regarding risks of caring for patients with communicable diseases, including TB, especially if HCWs are immunocompromised. The importance of following existing recommendations to reduce risk of exposure is emphasized. HCWs that are severely immunocompromised may consider a change in job setting to lower their risk.

**Screening Employees**
At the time of employment, all HCWs who may have patient contact, including those with a history of receiving Bacillus Calmette-Guerin (BCG) vaccine should receive a Mantoux PPD test or IGRA when applicable. A two-step PPD test should be performed if the HCW has not had a documented negative PPD during the preceding year. HCWs with documented history of a positive PPD should have an IGRA performed. Adequate treatment for disease, or adequate preventive therapy for infection is exempt from further testing. Routine X-rays are not required unless symptoms of TB develop. TB screening (by symptom review or chest radiograph) is continued as indicated.

**Screening Students: (See Appendix 6)**
1. **Tuberculosis Screening on Admission**
   a. **Category 1: Students who currently undergo yearly PPD testing**
      i. Students, who are currently tested every year, submit the last 2 years of negative test documentation unless they have had continuous enrollment at UNMC. Ideally, students should have a negative test within 6 months prior to registration.
   b. **Category 2: Students who have not had a PPD in the past 2 years**
      i. Students, who have NOT had PPD skin testing in the past 2 years, must have a 2-step PPD.
      ii. A 2 step PPD is defined as 2 negative skin tests placed at least 7 days apart and each having been read 48 hours-72 hours after placement. This must be completed within 6 months prior to registration.
   c. **Category 3: Students who were given BCG as a child but have not had a positive PPD**
      i. Students who were given BCG as a child and have not tested positive to the PPD skin test should have the two-step PPD skin test performed. If the PPD is positive, the student should have IGRA testing performed.
   d. **Category 4 : Students with a history of positive PPD**
i. If a student has had a positive skin test in the past (including those who received the BCG vaccine as a child), they must have documentation of a TB Interferon-Gamma Release Assay (IGRA) within 6 months prior to registration. IGRA blood testing will be used to meet the requirement for yearly TB screening.

Additional notes:
ii. Students with a history of a positive PPD, positive IGRA or history of tuberculosis should be screened promptly for signs and symptoms of active tuberculosis at the Student Health Center. They should also have a chest radiograph performed. If the screening is negative for symptoms of TB and the radiograph does not demonstrate evidence of active disease, the student will be allowed to enroll and engage in activities at UNMC. The student should be educated on symptoms of TB disease including fever, night sweats, dyspnea, cough, or hemoptysis; and asked to call the Student Health Center immediately if they experience any compatible symptoms.

2) Yearly Tuberculosis Screening
   a. All students must provide documentation of tuberculosis screening on a yearly basis.
   b. Students in Categories 1, 2 and 3 above are to submit a repeat PPD skin test
   c. Students in Category 4 should have annual IGRA testing performed

Screening based on the Risk Assessment:
According to The UNMC risk analysis, HCWs who have been designated as high risk by the TB Subcommittee will be tested at least every 12 months. If an increase in conversion rates is noted, testing will be done more frequently. PPD tests are administered, read, and interpreted by Employee Health or their designee according to current guidelines (see Appendix 7).

Results of PPD tests are recorded in the employee's health database. PPD conversions or development of disease are recorded on the HCW PPD test log of aggregate data (OSHA log) by the Workers Compensation Case Manager.

If PPD test conversions are identified, HCWs in the same work group are evaluated and tested to detect possible transmission in the area. If epidemiologically indicated, PPD testing is repeated in three months and risk is reevaluated (see Appendix 8).

HCWs that have documented exposure to patients with TB and terminate their employment are to have a PPD skin test within 30 days of termination of employment.
All costs for employee screening, diagnosis and therapy for TB because of job-related exposure will be borne by UNMC or third parties as appropriate.

Evaluation and management
HCWs with newly recognized positive PPD or IGRA are promptly evaluated for active TB. Those without active TB are evaluated for preventive therapy according to current guidelines. A chest radiograph is obtained. Repeat chest radiographs are done if symptoms develop that are consistent with TB. A history of possible exposure is obtained to detect the potential source. If the source is known, the drug susceptibility pattern is recorded in the HCWs medical record should the HCW develop active TB and require therapy.

HCWs with pulmonary or laryngeal TB are a risk to others while they are infectious and will be excluded from work until no longer infectious. Before returning to work, HCWs with contagious TB should have started adequate therapy, have resolution of cough, and be considered noninfectious. HCWs will be evaluated periodically by Employee Health or Student Health, as appropriate after returning to work to make sure they are still on their prescribed therapy and they remain AFB smear negative. HCWs that stop treatment without medical permission before the recommended course of therapy is completed will be excluded from work until treatment is resumed, adequate response to therapy is documented, and AFB smears remain negative. HCWS receiving preventive treatment for TB are allowed to continue working as usual. Evaluation and management of infected HCWs is coordinated with the HCWs' private physicians.

Problem Evaluation
PPD Conversions and Active TB in HCWs
If a positive skin test or interferon gamma-release assay in a HCW is identified:
- the HCW is promptly evaluated for active TB,
- the HCW is placed on drug therapy according to current guidelines,
- a history of possible exposure is obtained; if a source is known, the drug susceptibility patterns are used to determine appropriate drug therapy,
- if the history suggests exposure occurred outside the facility, no further investigation is required,
- other HCWs with similar exposure receive PPD tests to detect transmission,
- if exposure may have occurred in the facility, a search for the source will occur and possible reasons for the exposure will be evaluated (see Appendix 8).
- Interventions to correct the cause will be carried out and HCWs in the area will be screened in three months. If a HCW develops active TB, the above steps will be taken and the public health department will be notified.
**Person-to-person Transmission of TB**

Healthcare associated cases of TB will be investigated and will include contact investigation, problem evaluation and coordination with patient’s physician. HCWs are identified and evaluated according to Employee Health policies and procedures.

**Decontamination of Patient-care Equipment**

Cleaning, disinfection and sterilization of reusable patient care equipment is done according to The Nebraska Medical Center policies and procedures.

**Selected Areas of the Facility**

**Operating Rooms**

Elective procedures on patients with TB are delayed until the patient is no longer infectious. If procedures must be performed, they are done when a minimum number of people are present and at the end of the day. Doors to the operating room are kept closed and traffic is kept to a minimum. When general anesthesia is needed, a bacterial filter will be placed on the endotracheal tube or expiratory side of the breathing circuit of the anesthesia machine. Patients will be recovered in an area with appropriate air handling.

Portable HEPA units are not required in the operating room. Surgery patients whose procedure cannot be delayed should have it performed in an operating room with recommended ventilation controls.

**Autopsy**

Because TB is sometimes not diagnosed until the autopsy, those performing or assisting with autopsies (including students) are required to wear respirators for all autopsies. The room must have a minimum of 12 air changes per hour and be at negative pressure. After an autopsy is performed on a body with suspected or confirmed TB disease, allow adequate time to elapse to ensure removal of *M. tuberculosis*-contaminated room air before performing another procedure in the same room. (See Appendix 4) If time delay is not feasible, the autopsy staff should continue to wear respirators while they are in the room.

**Emergency Department**

If a patient with suspected or documented TB must be in common areas where there is no special ventilation they should wear a surgical mask. The attending HCWs should wear designated respirators with suspected TB patients. Place patient in recommended AII room as soon as possible. Patients should observe strict respiratory hygiene and cough etiquette procedures.

**Clinics and Ambulatory Care**

HCWs are responsible for wearing designated respirators when caring for those with possible TB until they are no longer infectious. Patients are greeted at the door with masks and placed in exam rooms as quickly as possible. HCWs should instruct patients to use tissues for coughing or sneezing, and discard the used tissue into a waste receptacle. (See Appendix 11 for Management of a Patient in DOC with Suspected/Documented *M.tuberculosis*.)
Pathology/Laboratory
Areas processing specimens for mycobacterial studies (AFB smears and cultures) require the use of Biosafety Level 3 practices, containment equipment, and facilities.
Laboratory activities involving the propagation and manipulation of cultures of any of the subspecies of *M. tuberculosis* complex are performed in a BSL-3 facility. ([Biosafety in Microbiological and Biomedical Laboratories recommendations, 5th Addition, 2007](#)). In the frozen section lab, the tubercle bacilli may be aerosolized in the preparation of frozen section processing. Capture devices on the cryostats do not use HEPA filter technology and cannot be relied on to prevent aerosolization of tubercle bacilli into the frozen section laboratory. The presence of a potentially infectious aerosol hazard requires the use of N95 respirators by all personnel in the room during frozen section processing of known or suspected TB cases, and afterward (approximately 30 minutes with 12 air changes per hour). Additionally, the “N95 Required” sign/door lock is activated, alerting those trying to enter the Frozen Section Lab of a potentially infectious case in process and the need for donning appropriate PPE before entering.

Pulmonary Function Testing and Bronchoscopy
Pulmonary Function Tests and Bronchoscopies performed on those who are suspected to have TB should be delayed if possible until the patient is noninfectious. If these tests must be performed while the patient is infectious, staff conducting the test should wear appropriate respirators.

Research Laboratories Working with *M. tuberculosis* complex
Research procedures involving *M. tuberculosis* complex should be evaluated and approved by the institutional Biosafety Committee. Large volumes and fluid suspensions of concentrated mycobacteria must be manipulated at BSL-3. Filtering exhaust laboratory air is not required however it may be prudent to install HEPA filters.

Research Involving Animals
All experiments involving *M. tuberculosis* or *M. bovis* in animals must be reviewed and approved by the IACUC and IBC committees. Most studies involving animals will be conducted at ABSL2 or ABSL3 containment levels, based on risk assessment. Comparative Medicine should be contacted for a list of current requirements to work with animals at UNMC.

Dental Facilities
Oral manipulations during dental procedures could stimulate coughing and dispersal of infectious particles. Patients and dental HCWs share the same air space for varying periods, which contributes to the potential for transmission of *M. tuberculosis* in dental settings. When taking a patient’s initial medical history and at periodic updates, dental HCWs should assess and document if the patient has signs and symptoms of pulmonary TB disease. If urgent dental care must be provided for a patient that has suspected or confirmed infectious TB disease, it should be provided in a setting that meets the requirements of an Airborne Isolation Room. The door to the procedure room is kept...
closed and traffic is kept to a minimum. Procedure should be performed when a minimum number of people are present and at the end of the day. An N95 respirator should be worn by all HCWs involved in performing the procedure. During clinical assessment and evaluation, a patient with suspected or confirmed TB disease should observe strict respiratory hygiene and cough etiquette which includes the wearing of a surgical mask, when possible. Non-urgent dental treatment should be postponed until a patient suspected or confirmed with TB disease is deemed to be noninfectious.

References:
Federal Register. Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Settings, 2005
Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, 2007
## Appendix 1

Risk classifications for health-care settings that serve communities with high incidence of tuberculosis (TB) and recommended frequency of screening for *Mycobacterium tuberculosis* infection among health-care workers (HCWs)*

<table>
<thead>
<tr>
<th>Setting</th>
<th>Low risk</th>
<th>Medium risk</th>
<th>Potential ongoing transmission†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient &lt;200 beds</td>
<td>&lt;3 TB patients/year</td>
<td>≥3 TB patients/year</td>
<td>Evidence of ongoing <em>M. tuberculosis</em> transmission, regardless of setting</td>
</tr>
<tr>
<td>Inpatient ≥200 beds</td>
<td>&lt;6 TB patients/year</td>
<td>≥6 TB patients/year</td>
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<tr>
<td>Outpatient and nontraditional facility-based</td>
<td>&lt;3 TB patients/year</td>
<td>≥3 TB patients/year</td>
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<tr>
<td>TB treatment facilities</td>
<td>Settings in which:</td>
<td>Settings in which:</td>
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<td></td>
<td>• persons who will be treated have been demonstrated to</td>
<td>• persons with TB disease</td>
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<td></td>
<td>have latent TB infection (LTBI) and not TB disease are encountered</td>
<td>are encountered</td>
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<td></td>
<td>• a system is in place to promptly detect and triage persons</td>
<td>• criteria for low risk is not otherwise met</td>
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<td></td>
<td>who have signs or symptoms of TB disease to a setting in which persons with TB disease are treated</td>
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<tr>
<td></td>
<td>• no cough-inducing or aerosol-generating procedures are performed</td>
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<tr>
<td>Laboratories</td>
<td>Laboratories in which clinical specimens that might contain</td>
<td>Laboratories in which clinical specimens that might contain</td>
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<tr>
<td></td>
<td><em>M. tuberculosis</em> are not manipulated</td>
<td><em>M. tuberculosis</em> are manipulated</td>
<td></td>
</tr>
</tbody>
</table>

### Recommendations for Screening Frequency

| Baseline two-step TST or one BAMT† | Yes, for all HCWs upon hire | Yes, for all HCWs upon hire | Yes, for all HCWs upon hire |
| Serial TST or BAMT screening of HCWs | No** | Every 12 months†† | As needed in the investigation of potential ongoing transmission§§ |
| TST or BAMT for HCWs upon unprotected exposure to *M. tuberculosis* | Perform a contact investigation (i.e., administer one TST as soon as possible at the time of exposure, and, if the TST result is negative, place another TST 8–10 weeks after the end of exposure to *M. tuberculosis*¶¶ |

* Health-care workers (HCWs) refers to all paid and unpaid persons working in health-care settings who have the potential for exposure to *M. tuberculosis* through air space shared with persons with TB disease.
† Settings that serve communities with a high incidence of TB disease or that treat populations at high risk (e.g., those with human immunodeficiency virus infection or other immune-compromising conditions) or that treat patients with drug-resistant TB disease might need to be classified as medium risk, even if they meet the low-risk criteria.
§ A classification of potential ongoing transmission should be applied to a specific group of HCWs or to a specific area of the health-care setting in which evidence of ongoing transmission is apparent, if such a group or area can be identified. Otherwise, a classification of potential ongoing transmission should be applied to the entire setting. The classification should be temporary and warrants immediate investigation and corrective steps after a determination has been made that ongoing transmission has ceased. The setting should be reclassified as medium risk, and the recommended timeframe for this medium risk classification is at least 1 year.
¶ All HCWs should have a baseline two-step tuberculin skin test (TST) or one blood assay for *M. tuberculosis* (BAMT) result at each new health-care setting, even if the setting is determined to be low risk. In certain settings, a choice might be made not to perform baseline TB screening or serial TB screening for HCWs who: 1) will never be in contact with or have shared air space with patients who have TB disease (e.g., telephonic operators who work in a separate building from patients); or 2) will never be in contact with clinical specimens that might contain *M. tuberculosis*. Establishment of a reliable baseline result can be beneficial if subsequent screening is needed after an unexpected exposure to *M. tuberculosis*.
¶¶ HCWs whose duties do not include contact with patients or TB specimens do not need to be included in the serial TB screening program.
†† The frequency of testing for *M. tuberculosis* will be determined by the risk assessment for the setting.
§§ During an investigation of potential ongoing transmission of *M. tuberculosis*, testing for *M. tuberculosis* infection should be performed every 8–10 weeks until losses in infection controls have been corrected and no further evidence of ongoing transmission is apparent.
| Procedures for contact investigations should not be confused with two-step TST, which is used for newly hired HCWs. |

Reference: Federal Register. Guidelines for Preventing the Transmission of *Mycobacterium Tuberculosis* in Health-Care Settings, 2005
# The Nebraska Medical Center Negative Pressure Rooms

<table>
<thead>
<tr>
<th>Unit</th>
<th>Room Number</th>
<th>Air Direction</th>
<th>Type of HEPA Unit</th>
<th>Fixed UV Light</th>
<th>Direction for Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Tower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Fixed UV Light</strong></td>
</tr>
<tr>
<td>PICU</td>
<td>5336 5350</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Turn on and set alarm</td>
</tr>
<tr>
<td>6UNS</td>
<td>6230</td>
<td>Negative</td>
<td>Portable</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>6 W</td>
<td>6434 6435 6436 6437 6453 6454</td>
<td>Negative</td>
<td>Portable</td>
<td>Yes</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>NBC Unit</td>
<td>7215 7219 7223 7225 7229</td>
<td>Negative</td>
<td>Fixed</td>
<td></td>
<td>If in alarm, call Facilities Management immediately.</td>
</tr>
<tr>
<td>LDRP</td>
<td>4222 4224 (room 9)</td>
<td>Neutral or Negative</td>
<td>Fixed</td>
<td>Yes</td>
<td>Switch for HEPA unit and UV light 4224 controls both rooms</td>
</tr>
<tr>
<td>LDPP</td>
<td>4309 4310 4311</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>No action required</td>
</tr>
<tr>
<td>Endoscopy</td>
<td>2413 G Room 4</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>No action required</td>
</tr>
<tr>
<td>University Tower</td>
<td>3281 (room 9)</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>No action required</td>
</tr>
<tr>
<td>Treatment Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Fixed UV Light</strong></td>
</tr>
<tr>
<td>Children's Pediatric Clinic side</td>
<td>Room 1 (1647)</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Turn on and set alarm</td>
</tr>
<tr>
<td>Peds Specialty side</td>
<td>Room 1 (1626A)</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Turn on and set alarm</td>
</tr>
<tr>
<td>Internal Medicine Clinic</td>
<td>Room 13</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Turn on and set alarm</td>
</tr>
<tr>
<td>Clarkson Tower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Fixed UV Light</strong></td>
</tr>
<tr>
<td>9 NW</td>
<td>9850 9853</td>
<td>Negative</td>
<td>Portable</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>800C</td>
<td>8809</td>
<td>Negative</td>
<td>Portable</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>850C</td>
<td>8859</td>
<td>Negative</td>
<td>Portable</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>8 TEL</td>
<td>8888</td>
<td>Negative</td>
<td>Portable</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>7 CSW</td>
<td>7801 7803 7805</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>6CSW</td>
<td>6801 6803 6805</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>5CSW</td>
<td>5801 5803</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>3CSW</td>
<td>3800</td>
<td>Negative</td>
<td>Fixed</td>
<td>No</td>
<td>Call FM for set up and take down</td>
</tr>
<tr>
<td>Location</td>
<td>Room(s)</td>
<td>Negative</td>
<td>Fixed</td>
<td>Action Required</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>NICU</td>
<td>285 286</td>
<td>Negative</td>
<td>Fixed</td>
<td>No Call FM and they will turn on alarm.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18273</td>
<td>Negative</td>
<td>Fixed</td>
<td>Turn on the switch for the HEPA unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18274 18247 18248 Decon Room (18221)</td>
<td>Negative</td>
<td>Fixed</td>
<td>Turn on fan when using room</td>
<td></td>
</tr>
<tr>
<td>Preop/PACU</td>
<td>28107 28108 28116 28117</td>
<td>Negative</td>
<td>Fixed</td>
<td>No action required</td>
<td></td>
</tr>
<tr>
<td>Cowdery Patient Care Center</td>
<td>3725 3726 3779 3781</td>
<td>Negative</td>
<td>Fixed</td>
<td>No action required</td>
<td></td>
</tr>
<tr>
<td>UNMC-P Specialty Care Clinic</td>
<td>Room 3</td>
<td>Negative</td>
<td>Fixed</td>
<td>Turn on and set alarm</td>
<td></td>
</tr>
<tr>
<td>UNMC-P Geriatrics Clinic</td>
<td>Room 8</td>
<td>Negative</td>
<td>Fixed</td>
<td>Turn on and set alarm</td>
<td></td>
</tr>
<tr>
<td>OHSCU (7US)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rooms 7442 and 7448 are positive pressure rooms with negative anterooms, and will be used to house only OHSCU patients requiring airborne isolation.

The Nebraska Medical Center Owns a Total of 8 Portable HEPA Units

8 HEPA units stored in Clarkson Tower, room B840 (contact Reo Carnahan for additional info 2-3347)

- All eight HEPA Units are certified once each year by Balcon.
- 47 Fixed Negative Rooms – 25 inpatient, 4 ED (+1 Decon), 10 clinic, 1 Endoscopy, 4 Preop/PACU, and 2 special OHSCU rooms
- 12 Portable Negative Rooms – all inpatient (HEPA unit must be set up by FM)
Monitor Alarms
If the room air monitor alarms, follow this procedure:
1. Make sure the room door and all other room openings are closed tightly
2. Make sure the HEPA filter unit is plugged in (if portable) and/or turned on.
3. If the alarm still sounds, call Facilities Management at 2-3347.
4. While awaiting response from Facilities Management, keep the door closed and continue to utilize N–95 respirators while caring for the patient.
APPENDIX 4 -- Ventilation Chart for Isolation Areas
Minutes Required for Removal of TB Particles

<table>
<thead>
<tr>
<th>Air Changes in the Area</th>
<th>90 %</th>
<th>99 %</th>
<th>99.9 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>138</td>
<td>276</td>
<td>414</td>
</tr>
<tr>
<td>2</td>
<td>69</td>
<td>138</td>
<td>207</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
<td>92</td>
<td>138</td>
</tr>
<tr>
<td>4</td>
<td>35</td>
<td>69</td>
<td>104</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>55</td>
<td>83</td>
</tr>
<tr>
<td>6</td>
<td>23</td>
<td>46</td>
<td>69</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>39</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>9</td>
<td>15</td>
<td>31</td>
<td>46</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
<td>28</td>
<td>41</td>
</tr>
<tr>
<td>11</td>
<td>13</td>
<td>25</td>
<td>38</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>18</td>
<td>28</td>
</tr>
<tr>
<td>16</td>
<td>9</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>18</td>
<td>8</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>19</td>
<td>7</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>6</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>30</td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>35</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Source MMWR 1994; 43 No. RR-13;67-68.
RESPIRATOR USERS HEALTH QUESTIONNAIRE

Name ___________________________ Date _____________ Age _______________________

Sex  □ Male  □ Female  Height _____ ft. _____ in.  Weight ______________ lbs.

Job Title________________________________________  Home Phone________________________

Latex Allergy  Yes __________ No ______________

If you answered Yes to the above question you may be fit for the disposable respirator only.

Check the type of respirator you will use (you can check more than one category):

- □ Full Face Respirator
- □ Supplied Air
- □ Self Contained Breathing Apparatus (SCBA)
- □ Half Mask Respirator
- □ Disposable Respirator (filter-mask, non-cartridge type only)

Other type(s) *(Please list all types)*  □  □

Have you ever worn a respirator?  Yes  □  No  □  If “Yes”, please list what type(s)________________________

Please answer the following questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you currently smoke tobacco, or have you smoked tobacco in the last month?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you ever had any of the following conditions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Seizures <em>(fits)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Allergic reactions that interfere with your breathing?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Claustrophobia?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Trouble smelling odors?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Have you every had any of the following pulmonary or lung problems?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Asbestosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Chronic bronchitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Emphysema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Pneumonia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Tuberculosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Silicosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Pneumothorax <em>(collapsed lung)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Lung cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Broken ribs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. Any chest injuries and/or surgeries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l. Any other lung problem that you’ve been told about.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Do you currently have any of the following symptoms of pulmonary or lung illness?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Shortness of breath</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Shortness of breath when walking fast on level ground or walking up a slight hill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Shortness of breath when walking with other people at an ordinary pace on level ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Have to stop for breath when walking at your own pace on level ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Shortness of breath when washing or dressing yourself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Shortness of breath that interferes with your job</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please answer the following questions.

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>g. Coughing that produces phlegm <em>(thick sputum)</em></td>
<td></td>
</tr>
<tr>
<td>h. Coughing that wakes you early in the morning</td>
<td></td>
</tr>
<tr>
<td>i. Coughing that occurs mostly when you are lying down</td>
<td></td>
</tr>
<tr>
<td>j. Coughing up blood in the last month</td>
<td></td>
</tr>
<tr>
<td>k. Wheezing</td>
<td></td>
</tr>
<tr>
<td>l. Chest pain when you breathe deeply</td>
<td></td>
</tr>
<tr>
<td>m. Any other symptoms that you think may be related to lung problems</td>
<td></td>
</tr>
</tbody>
</table>

5. Have you ever had any of the following cardiovascular or heart problems?
   a. Heart attack
   b. Stroke
   c. Angina
   d. Heart failure
   e. Swelling in your legs or feet *(not caused by walking)*
   f. Heart arrhythmia *(heart beating irregularly)*
   g. High blood pressure
   h. Any other heart problems that you've been told about

6. Have you ever had any of the following cardiovascular or heart symptoms?
   a. Frequent pain or tightness in your chest
   b. Pain or tightness in your chest during physical activity
   c. Pain or tightness in your chest that interferes with your job
   d. In the past two years, have you noticed your heart skipping or missing a beat?
   e. Heartburn or indigestion that is not related to eating
   f. Any other symptoms that you think may be related to heart or circulation problems

7. Do you take medication for any of the following problems? If “YES”, please list.
   a. Breathing or lung problems
   b. Heart trouble
   c. Blood pressure
   d. Seizures *(fits)*

8. If you've used a respirator, have you ever had any of the following problems? *(If you've never used a respirator, please check “NO”).*
   a. Eye irritation
   b. Skin allergies or rashes
   c. Anxiety
   d. General weakness or fatigue
   e. Any other problem that interferes with your use of a respirator

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?

10. Have you ever lost vision in either eye *(temporarily or permanently)*?

11. Do you currently have any of the following vision problems?
   a. Wear contact lenses
   b. Wear glasses
   c. Color blind
   d. Any other eye or vision problem

12. Have you ever had an injury to your ears, including a broken ear drum?

13. Do you currently have any of the following hearing problems?
   a. Difficulty hearing
   b. Wear a hearing aid
   c. Any other hearing or ear problem

14. Have you ever had a back injury?

15. Do you currently have any of the following musculoskeletal problems?
   a. Weakness in any of your arms, hands, legs or feet
   b. Back pain
   c. Difficulty fully moving your arms and legs
   d. Pain or stiffness when you lean forward or backward at the waist
   e. Difficulty fully moving your head up and/or down
   f. Difficulty fully moving your head side to side
Please answer the following questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>g. Difficulty bending at your knees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Difficulty squatting to the ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Climbing a flight of stairs or a ladder carrying more than 25 lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Any other muscle or skeletal problem that interferes with using a respirator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on OSHA guidelines, the following regulations must be followed for those who wear a respirator:

“The test shall not be conducted if there is any hair growth between the skin and the face-piece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface.”

Employees who wear a respirator must follow these same guidelines, regarding facial hair, whenever donning a respirator in the work environment.

[ ] I have read and understand the above stated information regarding the donning of a respirator.

Employee’s Signature: ___________________________ Date: ________________

Reviewer’s Name: ___________________________ Date: ________________

(print) (signature)
STUDENT SCREENING FLOW CHART

For students who have no history of a positive PPD including those who have received the BCG.

Is there a history of positive PPD?

- Yes
  - 2 Step PPD
    - Positive
      - IGRA
        - Positive
          - Yearly f/u IGRA (might suggest a PPD again first)
        - Negative
          - Yearly f/u one step PPD
    - Negative
      - Yearly f/u IGRA
        - If low risk and result <= 0.7 IU/ml, consider yearly f/u IGRA
        - If low risk and result 0.7IU/ml, perform CXR and consider INH therapy for latent TB, clinical f/u
        - If high risk, perform CXR and consider INH therapy for latent TB, clinical f/u
        - If abnormal CXR, evaluate for active tuberculosis

- No
Appendix 7

BOX 5. Factors affecting treatment decisions during the medical and diagnostic evaluation, by tuberculin skin test (TST) result

<table>
<thead>
<tr>
<th>TST result ≥5 mm is positive</th>
<th>TST result ≥10 mm is positive</th>
<th>TST result ≥15 mm is positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Persons infected with HIV†</td>
<td>• Recent immigrants (i.e., within the previous 5 years) from countries with a high incidence of TB disease</td>
<td>• Persons with no known risk factors for TB disease</td>
</tr>
<tr>
<td>• Recent contacts of a person with tuberculosis (TB) disease</td>
<td>• Persons who inject illicit drugs</td>
<td>• HCWs who are otherwise at low risk for TB disease and who received baseline testing at the beginning of employment as part of a TB screening program**</td>
</tr>
</tbody>
</table>
| • Persons with fibrotic changes on chest radiograph consistent with previous TB disease | • Residents and employees (including health-care workers [HCWs])** of the following congregate settings  
  — hospitals and other health-care facilities  
  — long-term-care facilities (e.g., hospices and skilled nursing facilities)  
  — residential facilities for patients with AIDS†† or other immunocompromising conditions  
  — correctional facilities  
  — homeless shelters | |
| • Organ transplant recipients and other immunosuppressed persons (e.g., persons receiving ≥15 mg/day of prednisone for ≥1 month)§ | • Mycobacteriology laboratory personnel | |
| • TB suspects§ | • Persons with any of the following clinical conditions or immunocompromising conditions that place them at high risk for TB disease  
  — diabetes mellitus  
  — silicosis  
  — chronic renal failure  
  — certain hematologic disorders (e.g., leukemias and lymphomas)  
  — other specific malignancies (e.g., carcinoma of the head, neck, or lung)  
  — unexplained weight loss of ≥10% of ideal body weight  
  — gastrectomy  
  — jejunooileal bypass | |
| • Persons living in areas with high incidence of TB disease | • Children aged <4 years | |
| • Infants, children, and adolescents exposed to adults at high risk for developing TB disease | • Locally identified groups at high risk | |

* TST result ≥15 mm is positive in anyone. These persons should receive a symptom screen and do not need to be tested again. They should be evaluated for TB disease, and if disease is excluded, they should be offered treatment for latent TB infection (LTBI) if they have no contraindication to treatment.
† Human immunodeficiency virus.
§ The risk for TB disease in persons treated with corticosteroids increases with higher doses and longer duration of corticosteroid use.
‡ Persons with suspected TB disease can be treated based on the medical and diagnostic evaluation, regardless of the TST result.
** For HCWs who are otherwise at low risk for LTBI and progression to TB disease if infected and who received baseline testing at the beginning of employment as part of a TB infection-control screening program, a TST result of ≥15 mm (instead of ≥10 mm) is considered to be positive. Although a result of ≥10 mm on baseline or follow-up testing is considered a positive result for HCWs for the purposes of referral for medical and diagnostic evaluation, if the TST result is 10–14 mm on baseline or follow-up testing, the referring clinician might not recommend treatment of LTBI. SOURCE: Marsh BJ, SanVicente J, vonReyn F. Utility of dual skin tests to evaluate tuberculin skin test reactions of 10 to 14 mm in health-care workers. Infect Control Hosp Epidemiol 2001;22:821–4.
†† Acquired immunodeficiency syndrome.
Appendix 8  Suggested Decision Tree for HCW Skin Test Conversions

PPD test conversion in HCW

1. Evaluate HCW for active TB
2. Determine need for drug therapy
3. Obtain history of possible TB exposure

Probable exposure to TB outside the facility?

Yes

Probable source identified

Yes

Other PPD conversions detected?

No

1. Review PPD screening results of other HCWs in same area
2. Consider additional PPD testing

No further investigation necessary in facility

No

Recognized exposure to TB in Facility?

Yes

1. Identify and evaluate contacts of the suspected source patient
2. Evaluate possible reasons for exposure and transmission
3. Implement interventions
4. Repeat PPD and evaluation after 3 months

No

1. Review lab and other records to identify patients with TB
2. Match TB patients and HCWs who have converted, by time and location

No

No further investigation necessary in facility
1. Identify and evaluate contacts of the suspected source patient
2. Evaluate possible reasons for exposure and transmission
3. Implement interventions
4. Repeat PPD and evaluation after 3 months

PPD conversions or other evidence of transmission?

No

Terminate investigation

Yes

Other PPD conversions detected?

Yes

Evaluate patient detection process, infection control practices and engineering controls

Yes

Potential problems identified?

Yes

1. Implement corrective interventions
2. Repeat PPD and evaluation after 3 months

No

PPD conversions or other evidence of transmission

No

Yes

1. Reassess possible reasons for exposure & transmission
2. Reassess interventions
3. Repeat PPD and evaluation after 3 months

Yes

1. Implement high-risk protocol for area
2. Consider consultation

Source MMWR 1994; 43 No. RR-13; 67-68.
Appendix 9:
Guidelines for Patient/Visitor Non-Compliance of Infection Control Practices, IC 7

Nursing Staff provide education

Patient
Family/Visitor

Non-compliant

Nursing Staff/Attending Staff/Healthcare Epidemiology/Patient Relations reinforce education

Non-compliant

Compliant

No further intervention

Non-compliant

Hospital Epidemiologist and unit Medical Director reinforce education

Non-compliant

Healthcare Epidemiology in consult with Patient Relations and Hospital Administration will identify the final action plan
## APPENDIX 10 -- Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>All</td>
<td>Airborne Infection Isolation</td>
</tr>
<tr>
<td>AFB</td>
<td>Acid Fast Bacilli</td>
</tr>
<tr>
<td>BCG</td>
<td>Bacillus Calmette-Guérin</td>
</tr>
<tr>
<td>BSL</td>
<td>Biosafety Level</td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>DOC</td>
<td>Durham Outpatient Center</td>
</tr>
<tr>
<td>HCW</td>
<td>Healthcare Worker</td>
</tr>
<tr>
<td>HEPA</td>
<td>High Efficiency Particulate Air</td>
</tr>
<tr>
<td>IGRA</td>
<td>Interferon Gamma-Release Assay</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>Multiple Drug Resistant Tuberculosis</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PPD</td>
<td>Purified Protein Derivative</td>
</tr>
<tr>
<td>PPE</td>
<td>Personnel Protective Equipment</td>
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<tr>
<td>TST</td>
<td>Tuberculin Skin Test</td>
</tr>
<tr>
<td>PPD/TST</td>
<td>Purified Protein Derivative/Tuberculin Skin Test</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TNMC</td>
<td>The Nebraska Medical Center</td>
</tr>
<tr>
<td>UNMC</td>
<td>University of Nebraska Medical Center</td>
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<tr>
<td>UV</td>
<td>Ultra Violet</td>
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Appendix 11

Management of Outpatient in DOC with Suspected/Documented TB - UNMCP

1) Adult Patient with suspected/documentated TB is to be seen in the outpatient setting by UNMC-P. In most cases these will be patients of ID or pulmonary clinic. Appointment may be initiated by MD or referring MD.

2) Internal Medicine Clinic staff will call x9-4208 to determine availability and schedule Airborne Isolation (AI) room located in DOC Pediatric Clinic, 1st floor room #1-1626A.

3) If an induced sputum specimen is required the Internal Medicine Clinic staff will call the Pulmonary Function Lab (PFL) at x9-4430 to inform them of the appointment date and time. The hours of the PFL are M-F 8:00AM-4:30PM. The latest time that a sputum induction can be started is 3:30PM. PFL Manager will have sufficient staff scheduled on the appointment day.

4) Patient is scheduled and told to come into DOC 1st floor. Upon arrival the patient is to call the Internal Medicine Clinic at ext 9-4015. Staff should question the patient about their exact location so that they can be easily found. If possible, the patient should call the Internal Medicine Clinic at 402-559-4015 just as they reach the parking structure.

5) Patient is met by staff at specified location and given a surgical mask to wear. Staff must be wearing an N95 mask.

6) Masked patient will be escorted by staff to the Pediatric Clinic via the back hallway and immediately placed in the AI room.

7) AI sign placed on door. Door to remain closed.

8) Supply of each size of N95 respirator must be readily available.

9) All staff entering AI room should have been N95 fit tested and are to use the appropriate size N95 respirator.

10) Patient exam, and all other services, i.e. phlebotomy, chest x-ray, procurement of sputum specimens will be performed, if possible in AI room. Contact 402-559-1002 or pager 402-888-4609 for chest x-ray. If sputum induction is needed contact the PFL at x9-4430.

11) Pt check out process may include: (A), filling prescription in outpatient pharmacy, (B) communication with pharmacist for demographic information and counseling, (C) scheduling of additional sputum induction procedures with the PFL, (D) and scheduling another appointment. Pt is to remain in AI room during the performance of these activities.
A) If prescriptions are needed: MD phones the prescription to the Outpatient pharmacy x9-5215, clinic staff pick up medication at outpatient pharmacy, where they will be required to sign for the medications.

B) If pharmacist needs to obtain demographic information or counsel the patient: call is made to outpatient pharmacy from AI room and patient and pharmacist communicate via telephone.

C) To schedule additional sputum induction procedures the pediatric clinic staff and the PFL staff will coordinate dates for availability of the AI room.

D) If another appointment needs to be scheduled: pediatric clinic and internal medicine clinic staff will coordinate available dates for future appointment.

12) At completion of visit masked pt leaves AI room via back hallway escorted by masked staff to the 1st floor exit.

13) Door to AI room remains closed, AI sign remains visible and room is not used for 1 hour to allow for exchange of air.