

Infection Control in Health-Care Settings

Introduction

All health-care settings need an infection-control program designed to ensure prompt

- detection,
- airborne precautions, and
- treatment

of persons who have suspected or confirmed tuberculosis (TB) disease (or prompt referral of persons who have suspected TB disease for settings where persons with TB disease are not expected to be encountered). In order to be effective, the primary emphasis of the TB infection-control program should be on achieving these three goals.

In all health-care settings, particularly those in which persons who are at high risk for exposure to *Mycobacterium tuberculosis* work or receive care, policies and procedures for TB control should be developed, reviewed periodically, and evaluated for effectiveness to determine the actions necessary to minimize the risk for transmission of *M. tuberculosis*.

Overview of TB Infection-Control Measures

The TB infection-control program should be based on a three-level hierarchy of control measures. The first and most important level of the hierarchy, administrative measures, affects the largest number of persons and is intended primarily to reduce the risk of uninfected persons exposed to persons who have TB disease. These measures include the following activities:

- Assigning responsibility for TB infection control in the 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 the timely availability of recommended laboratory processing, testing, and reporting of results to the ordering physician;
- Implementing effective work practices for the management of patients with suspected or confirmed TB disease;
- Ensuring proper cleaning and sterilization or disinfection of potentially contaminated equipment (e.g., bronchoscopes, endoscopes);
- Training and educating health-care workers (HCWs) regarding TB, with specific focus on prevention, transmission, and symptoms;
- Screening and evaluating HCWs who are at risk for TB disease or who might be exposed to *M. tuberculosis*;
- Applying epidemiologic-based prevention principles, including the use of setting-related infection-control data;
- Using appropriate signage advising respiratory hygiene and cough etiquette; and
- Coordinating efforts with the local or state health department.

The second level of the hierarchy is the use of environmental controls to prevent the spread and reduce the concentration of infectious droplet nuclei in ambient air. Primary environmental controls control the source of infection by using local exhaust ventilation (hoods, tents, or booths) and dilute and remove contaminated air by using general ventilation. Secondary environmental controls control the airflow to prevent contamination of air in areas adjacent to the source (airborne infection isolation [AII] rooms) and clean the air by using high efficiency particulate air (HEPA) filtration, or ultraviolet germicidal irradiation.

The first two control levels of the hierarchy minimize the number of areas in the health-care setting where exposure to *M. tuberculosis* may occur.

They reduce, but do not eliminate, the risk in those few areas where exposure to *M. tuberculosis* can still occur (e.g., All rooms housing TB patients and treatment rooms in which cough-inducing or aerosol-generating procedures are performed on TB patients). Therefore, the third level of the hierarchy is the use of respiratory protective equipment in situations that pose a high risk of exposure to *M. tuberculosis*.

Use of respiratory protection equipment can further reduce risk for exposure of HCWs to infectious droplet nuclei that have been expelled into the air from a patient with infectious TB disease. The following measures can be taken to reduce the risk for exposure:

- Implementing a respiratory protection program
- Training HCWs on respiratory protection
- Training patients on respiratory hygiene and cough etiquette procedures.

Determining the Infectiousness of TB Patients

In general, patients who have suspected or confirmed TB disease should be considered infectious if (a) they are coughing, undergoing cough-inducing procedures, or have positive sputum smear results for acid-fast bacilli (AFB); and (b) they are not receiving adequate antituberculosis therapy, have just started therapy, or have a poor clinical or bacteriologic response to therapy.

For patients placed under airborne precautions because of suspected infectious TB disease of the lungs, airway, or larynx, airborne precautions can be discontinued when infectious TB disease is considered unlikely and either

- Another diagnosis is made that explains the clinical syndrome, or
- The patient produces three consecutive negative sputum smears collected in 8- to 24-hour intervals (one should be an early morning specimen).

Patients for whom the suspicion of infectious TB disease remains after the collection of three negative sputum smear results should not be released from airborne precautions until they

- Receive standard multidrug antituberculosis treatment (minimum of 2 weeks) and
- Demonstrate clinical improvement.

For these patients, additional diagnostic approaches (e.g., sputum induction) and, after sufficient time on treatment, bronchoscopy may need to be considered.

Patients who have drug-susceptible TB of the lung, airway, or larynx, should remain under airborne precautions until they

- Produce three consecutive negative sputum smears collected in 8- to 24-hour intervals (one should be an early morning specimen), and
- Receive standard multidrug antituberculosis treatment (minimum of 2 weeks), and
- Demonstrate clinical improvement.

Note

The Centers for Disease Control and Prevention (CDC) is not a regulatory agency; CDC recommendations on infection control provide evidence-based guidance. For regulations in your area, refer to state and local regulations and contact your local Occupational Safety and Health Administration (OSHA) office. A directory of OSHA offices may be found at www.osha-slc.gov/html/RAMap.html.

References

CDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. MMWR 2005; 54(No. RR-17). www.cdc.gov/mmwr/pdf/rr/rr5417.pdf

Additional Resources

Websites:

CDC Division of Tuberculosis Elimination:
www.cdc.gov/tb

State TB control offices:
www.cdc.gov/tb/pubs/tboffices.htm.

National Institute for Occupational Safety and Health:
www.cdc.gov/niosh/topics/tb

Occupational Safety and Health Administration:
www.osha-slc.gov/SLTC/tuberculosis/index.html

Fact Sheet:

Respiratory Protection in Health-Care Settings:
www.cdc.gov/tb/pubs/tbfactsheets/RPHCS.htm