

An update on
– and how to
keep it out of your facility!



Expect the Unexpected.

By Russell Olmsted, MPH, CIC

Reports on disease caused by *Mycobacterium tuberculosis* have been in the headlines a lot lately.

The settings involved illustrate the unpredictability of TB disease. These reports range from a person, with prior history of living in Russia, who was diagnosed and later incarcerated in a correctional facility because his disease is caused by a strain of the emerging extensively drug-resistant TB (XDR-TB), a healthcare worker who developed TB disease and may have subsequently exposed others and most recently a U.S.-born citizen who was also diagnosed with XDR-TB with extensive air travel while possibly infectious (see callout box on page 108).¹

Changing epidemiology

In 2006, a total of 13,767 tuberculosis (TB) cases (4.6 per 100,000 population) were reported in the United States, representing a 3.2 percent decline from the 2005 rate. That is the good news. The more disconcerting issue is that the rate of decline of new cases of

active TB has been slowing since 2000. In addition, there is a notable trend demonstrating an increase in the proportion of new cases of TB disease among those who were born outside the U.S. (see Figure 1).²

The slowed decline also comes at a time when support for local, state and federal TB control programs that emphasize directly observed therapy of those with newly diagnosed disease is being compromised by financial constraints and competing priorities for public health. What this will bring in terms of incidence of new cases remains to be seen. The last time there was a convergence of lack of funding for TB control programs and a newly susceptible population, specifically those co-infected with human immunodeficiency virus (HIV), in the late 1980s/early 1990s, there was a dramatic upsurge in cases of TB seen in the U.S.

Control and prevent TB transmission

TB background

TB is the prototype airborne pathogen that is characterized by obligate inhalational exposure to *M. tuberculosis*. Once inhaled, *M. tuberculosis* travels to lung alveoli and establishes infection, which can be detected by a tuberculin skin test (TST) two weeks to 12 weeks later. This is classified as latent TB infection or LTBI. Thereafter, active disease can occur and can be transmitted from person to person. If disease is localized in the respiratory tract, it can present in a patient with fever, prolonged cough, weight loss, night sweats and hemoptysis. Five percent to 10 percent of persons with untreated LTBI sometime during the lifetime are at risk of progressing to disease. If someone is exposed and infected and has underlying HIV, the risk of progressing is much higher – 10 percent per year.

Control and prevention guidelines

Near the end of 2005, the U.S. Centers for Disease Control and Prevention (CDC) published updated guidelines for preventing transmission of TB in healthcare facilities.³ These are an invaluable tool for infection control professionals and their affiliated facilities. The Guidelines' emphasis is on a hierarchy of interventions needed to prevent transmission in healthcare facilities.

The hierarchy includes:

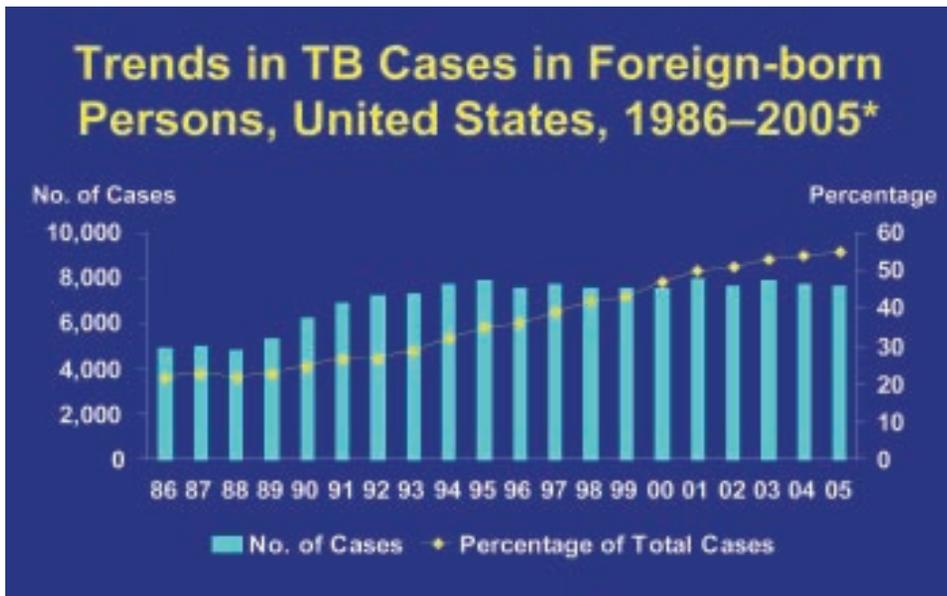
Administrative controls: Reduce risk of exposure via a facility-based risk assessment and early identification of possible cases of active TB disease.

TB on TV

TB is even showing up on the late-night radar!

On June 5, 2007, the "Late Show with David Letterman" aired a segment titled "Can a Guy with Drug-Resistant Tuberculosis Hail a Cab?" In this sketch, a man wearing a facemask walks down a New York street with the goal of hailing a cab, explaining to the driver that he has drug-resistant tuberculosis and procuring a ride to Queens. Ironically, the first cab driver he speaks to agrees to give him a ride – perhaps illustrating the general population's lack of knowledge surrounding this disease!

Figure 1



Environmental controls: Prevent spread and reduce concentration of droplet nuclei that carry *M. tuberculosis* via air currents using an airborne infection isolation room (AIIR) and other containment devices such as high-efficiency particulate air (HEPA) filters and/or methods to inactivate TB bacilli such as ultraviolet germicidal irradiation (UVGI).

Respiratory protection controls: Further reduce risk of exposure in special areas and circumstances by protecting healthcare personnel against inhalation.

Transmission of healthcare-associated TB is often linked to close contact with infectious TB patients during procedures that generate aerosols. These include:

- Surgical procedures on a patient with active TB disease
- Bronchoscopy
- Endotracheal intubation or suctioning
- Open abscess irrigation
- Autopsy
- Sputum induction
- Aerosol treatments

Care of a patient needing surgery who also has active TB disease

represents a unique challenge. The operating room must be kept at a positive pressure with respect to the corridor outside the OR.

Therefore, air is supplied at a greater rate than it is removed. By contrast, patients with active disease need to be kept in a negative-pressure room where the air leaving the room is either discharged directly outdoors or filtered through a HEPA filter before returning to other areas.

One investigation into secondary transmission of TB to perioperative personnel during this scenario found that four out of five personnel in the OR during a procedure on one patient converted from a negative to a positive TST.⁴

To address this, the 2005 CDC TB Guidelines offer some helpful guidance. To learn more about these prevention tips, please refer to page 92 in the Forms & Tools section of this magazine.

Summary

TB remains a challenging disease from all aspects of identification, treatment, control and prevention. It is also often unpredictable and these challenges are even greater when the frequency of TB at a

CDC investigates risk of transmitting TB during air travel

This case grabbed the headlines on almost every major network!

In late May, the CDC sent notice that it was aware of a case of extensively drug-resistant tuberculosis (XDR TB) in a U.S. citizen who traveled to and from Europe on several commercial flights between mid- and the end of May. The patient has been hospitalized in an AIIR and is currently under treatment. The number of fellow passengers and crew is estimated at more than 650, but post-exposure testing is primarily recommended for those who sat within several rows of the patient on the flights in question.⁵

This investigation is ongoing but it demonstrates the unpredictability of TB disease – this was not a person who was born or lived outside the U.S. For more details and updated information, visit <http://www.cdc.gov/tb/xdrtb/>.

particular healthcare facility is low. However, this situation can change on a dime and therefore it is critical that the infection control professionals remain ever vigilant for new cases as part of a surveillance program and also maintain open communication with the local TB control personnel in their area. The CDC Guidelines not only provide a great resource but also include a risk assessment tool that will help target infection prevention initiatives that best fit with the epidemiology of TB in the geographic area and type of patient populations served.



About the author
Russell N. Olmsted, MPH, CIC has more than 24 years of experience in the field of infection control/applied epidemiology. He is an epidemiologist with Infection Control Services at Saint Joseph Mercy Health System, headquartered in Ann Arbor, Mich., and President of Applied Epidemiology Solutions, Inc., a private consulting business that covers the field of infection prevention/control and healthcare epidemiology.

References

- 1 Perez-Pena R. Hospital Worker With TB May Have Exposed 500 Patients. *New York Times*, March 16, 2007.
- 2 Centers for Disease Control. Trends in Tuberculosis Incidence — United States, 2006. *Morbidity and Mortality Weekly Report*. 2007;56(11):245-50.
- 3 Centers for Disease Control. Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005. Available at: http://www.cdc.gov/tb/pubs/mmwr/Maj_guide/List_date.htm. Accessed June 10, 2007.
- 4 Hutton MD, et al. Nosocomial transmission of tuberculosis associated with a draining abscess. *The Journal of Infectious Diseases*. 1990 Feb;161(2):286-95.
- 5 Centers for Disease Control. CDC Investigation of Traveler with Extensively Drug-Resistant Tuberculosis (XDR TB): Questions and Answers. Available at: <http://www.cdc.gov/tb/xdrtb/travellerfact-sheet1.htm>. Accessed June 11, 2007.
- 6 Associated Press. Drug-resistant TB strain raises ethical dilemma. Man locked up indefinitely, sparking civil liberties debate. April 2, 2007.