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Three air travel-related contact investigations associated with infectious tuberculosis, 2007—2008☆

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Summary *Background:* The potential for transmission of *Mycobacterium tuberculosis* during air travel has garnered considerable attention in the media and among public health authorities due to high-profile cases of international travelers with infectious tuberculosis (TB).
Methods: During 2007 and 2008, state and local health officials were asked to locate and conduct diagnostic follow-up for airline passengers considered contacts of three travelers, two with multidrug-resistant (MDR) TB and one considered highly contagious, who undertook air travel while infectious with TB disease.
Results: Public health departments in 21 states located and evaluated 79 (60%) of the 131 passenger contacts identified; 52 (40%) were lost to follow-up. Eight (10%) contacts had a history of TB disease or latent TB infection and were not retested. Sixteen (23%) of 71

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contacts tested had positive TB test results suggesting latent TB infection, 15 of whom were from countries reporting estimated TB disease rates of greater than 200 cases/100,000 persons.
Conclusions: Passenger contacts' positive test results may represent prior TB infection acquired in their countries of residence or may be a result of new TB infection resulting from exposure during air travel.
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Introduction

The potential for transmission of *Mycobacterium tuberculosis* during air travel has garnered considerable attention in the media and among public health authorities due to high-profile cases of international travelers with infectious tuberculosis (TB), particularly multidrug-resistant TB (MDR TB).[1,2] Because the greatest risk of developing TB disease is within 2 years following infection,[3] the goal of investigating TB contacts, including those associated with air travel, is to prevent TB disease by identifying new TB infection and initiating prompt treatment. However, risk factors associated with transmission of *M. tuberculosis* to other passengers during air travel have not been extensively studied. Investigating passenger contacts of an individual airline traveler with contagious TB disease can involve many levels of government, entails notifications to domestic and foreign public health authorities, and is affected by the availability and quality of passenger contact information.[4] In keeping with international and domestic guidelines[5–8] and a 2003 Executive Order of the President on quarantinable communicable diseases,[9] the U.S. Centers for Disease Control and Prevention (CDC) Division of Global Migration and Quarantine (DGMQ) aims to prevent the transmission and spread of infectious tuberculosis by identifying passenger contacts of travelers with infectious TB disease on aircraft and by providing passenger locator information to state and local health departments for follow-up, based upon U.S. guidelines for TB detection.[7] DGMQ protocols include but are not restricted to recommendations contained in the World Health Organization's guidance *Tuberculosis and air travel: guidelines for prevention and control* (Table 1).[5,6]

This report describes three persons who traveled by air while infectious with TB disease and the outcomes of subsequent passenger contact investigations, initiated by DGMQ in 2007 and 2008 in collaboration with state and local health departments. The objectives of this investigation were to evaluate evidence of and risk factors for transmission of *M. tuberculosis* during air travel, characterize the DGMQ experience in obtaining detailed outcomes data associated with TB contact investigations, and further assess the effectiveness of travel-related contact investigations.

Materials and methods

Tuberculosis case reporting to CDC

CDC DGMQ receives reports of cases of infectious TB disease among international and national travelers through notification by telephone, facsimile, or electronic mail by local, state, and international public health authorities. DGMQ initiates contact investigations for a flight if the TB case was infectious and diagnosed within 3 months of the flight, the flight duration was longer than 8 h, passenger contacts and crew could be identified, and notification occurred within 6 months of the flight (Table 1). A period of 6 months, rather than the 3 months recommended in the WHO guidelines, is used since it is no more difficult for DGMQ to assess infectiousness of the patient with TB disease, obtain quality passenger contact information, and to clinically differentiate between recent and remote infections whether a flight occurred 3 or 6 months prior to notification (Table 1, row 4). Implementation of the 2008 WHO guidelines in June 2008 and the pursuant November 2008 DGMQ policy occurred subsequent to these three passenger contact investigations; therefore, the 2006 WHO guidelines and 2006 CDC policy were followed during the implementation of these contact investigations. (Table 1, column 4).[6]

Case follow-up and contact investigations are conducted by state and local health authorities. DGMQ obtains passenger contact information from the airlines, and, because airline manifest data are limited, also routinely requests locating information from U.S. Customs and Border Protection to supplement the manifest data. These data are imported into a secure electronic database that sorts and assigns passenger information to U.S. states and territories based on address or telephone area code. Once assigned, the data are securely transmitted through an electronic notification system to state health departments. State and local health departments evaluate air travelers potentially exposed to *M. tuberculosis* according to U.S. consensus guidelines for TB contact investigations.[7,10] Because this investigation comprised a public health response based on regulatory authority, it was exempted from Human Subjects Review.[7,8]

Case definitions

For the period January 2006 through November 2008, a person who traveled on an airline was defined as having infectious TB disease for the purpose of contact investigations based on the following criteria: (1) sputum smear-positive for acid-fast bacilli (AFB) and culture-positive (if available) for *M. tuberculosis*; (2) sputum smear-negative, culture-positive, and case symptomatic with cough during the flight and not receiving adequate treatment for more than 2 weeks (or receiving adequate treatment, but with no evidence of smear or culture conversion); or (3) culture-positive and isolate identified as MDR TB or