Tuberculosis on the Flight Deck

A. J. PARMET, M.D., M.P.H.

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Tuberculosis in commercial aircraft has been a concern since a 1995 incident of possible transmission from an active case of tuberculosis to passengers in the cabin of a 747. Subsequently, commercial air carriers have been vigilant in cooperating with public health authorities in tracking all known exposures to tuberculosis. In 1998, a pilot of a commercial airliner was diagnosed with active tuberculosis. Company records demonstrated that in the previous 6 mo, the pilot had flown with 48 other pilots. Every exposed pilot was contacted and evaluated by skin testing (IPPD) or chest x-ray if previously positive. There were no skin test conversions and no changes on x-rays. This study demonstrates that transmission of tuberculosis in the aircraft cabin environment, even under close and continuous exposure to an active case, is a rare event.
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TUBERCULOSIS IN COMMERCIAL aircraft has been a concern since the Centers for Disease Control (CDC) report of 1995 (2,4) described possible transmission from an active case of tuberculosis to passengers in the cabin of a 747. In that incident, several other passengers developed positive skin tests following the exposure to another passenger. Since that time, there has not been any other demonstrated transmission of tuberculosis within the flight cabin although there have been skin test conversions (7). Despite the scientific facts presented, popular literature, often filled with misinformation, has attempted to raise concerns among the flying public (1).

Air quality studies have repeatedly demonstrated that the aircraft cabin is a clean, dry environment (5,6) whose most significant finding is a low relative humidity never going above 20%. Aircraft contaminants have consistently been found to be very low in bacteria and fungi. Further, the air flow dynamics from air entering the cabin near the ceiling and exiting through the floor at a very high turnover of approximately 15–20 air exchanges per hour clearly exceed those standards required for public buildings as well as other forms of transportation, such as buses, trains, and subways (6). A commercial aircraft is also divided into different compartments which do not permit exchange of air between them. Fresh air in the aircraft cabin is provided by "bleed" air derived from the jet engine intakes. This air is the source of the dry, pure air provided to the cabin. Most modern aircraft recycle about 50% of the cabin air after it exits through the floors first forcing the recycled air through a HEPA filter, which removes 99.7% of all biological contaminants. Such performance is in excess of hospital operating room qualities.

Commercial aircraft companies are obliged to investigate and cooperate with public health authorities in the event that a potentially infectious disease has been carried aboard the aircraft. According to World Health Organization (WHO) and CDC guidelines for tuberculosis exposure, this would occur in long distance flights where an exposure time of over 8 h has occurred (7). In the author's position, this policy was adapted for flights of 5 h or longer for passengers as well as all potentially exposed cabin crew regardless of the flight leg length. Due to the highly limited circulation of air within the aircraft cabin, any passenger sitting within two rows of the suspected source or subject were notified of potential exposure and requested to be evaluated.

In 1998, the author was notified that a pilot had tested positive for active tuberculosis. It was extremely easy to identify all other pilots who had flown with this individual within the previous 6 mo. Due to the nature of the aircraft involved, DC9 series, there was no air recycling with this equipment. Therefore, the only individuals with prolonged exposure to the infected pilot were other pilots. Company records demonstrated that within the preceding 6 mo 48 other pilots had flown with the infected individual.

Of the 48 pilots notified, 38 tested negative by IPPD. Nine pilots had been previously demonstrated to have positive IPPDs, all demonstrated while on prior military service and prophylaxed with isoniazid. This was significantly higher than the expected background of rate of 4–6% among Americans as a whole (2) and 3% among college students (3). All of these were evaluated by chest x-ray and demonstrated to be free of active disease. One individual refused to be tested and elected to retire. He was interviewed by the author and reported that the testing process was an unwarranted invasion of his privacy. He was asymptomatic and continued to refuse to be evaluated.

In summary, despite a significant contact time with an actively infectious individual, there were no demonstrated instances of tuberculosis transmission in the

From Trans World Airlines, 11500 Ambassador Drive, Kansas City, MO.

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Address reprint requests to: A. J. Parmet, M.D., M.P.H., who is Medical Director, Trans World Airlines, 11500 Ambassador Drive, Kansas City, MO 64153.

aircraft. The range of exposure time with this individual was from 8–60 h in the cockpit. Lack of any evidence of transmission of tuberculosis despite prolonged and intimate contact and detailed follow-up in a closed environment indicates that the risk of transmission of tuberculosis in the aircraft cabin is extremely low and that WHO and CDC guidelines are appropriate. Nevertheless, individuals who are actively infectious should not fly or expose others in any public environment.

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