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Contact tracing of passengers exposed to an extensively drug-resistant tuberculosis case during an air flight from Beirut to Paris, October 2006

J Chemardin (Jacques.CHEMARDIN@sante.gouv.fr)¹, M-C Paty¹, S Renard-Dubois¹, N Veziris², D Antoine³

1. Direction générale de la santé, Ministère de la santé, de la jeunesse et des sports, Paris, France
2. Centre national de référence des mycobactéries et de la résistance des Mycobactéries aux anti-tuberculeux, Paris, France
3. Institut de veille sanitaire, Saint Maurice, France

Contact tracing of air travellers exposed to cases of multi-drug-resistant (MDR) and extensively drug-resistant (XDR) tuberculosis (TB) has become an increasingly important issue. The case of MDR (initially diagnosed as XDR) TB in an American citizen who travelled to and across Europe in May 2007 attracted a lot of media attention and raised a number of questions regarding control measures [1]. As travel and trade involving countries where MDR and XDR TB is endemic increase, such situations are likely to become more frequent. Therefore, contact investigation in travel situations involving MDR or XDR TB cases should be addressed more specifically, especially in a context where second line anti-TB drugs are not available in all countries. This paper describes the process of contact tracing of passengers exposed to an XDR TB case during an air flight from Beirut, Lebanon, to Paris, France, in October 2006. This investigation involving an index case with XDR TB in an aircraft was the first to be notified to the World Health Organization (WHO).

Case description

On 18 October 2006, the French Ministry of Health (MoH) was informed of a fatal case of pulmonary TB in a passenger who, on 5 October, had travelled on a five-hour flight from Beirut to Paris. He died 10 days after the journey, despite surgery, from a severe haemoptysis. The patient was travelling with his wife and two children.

The patient's history revealed that he had been treated for TB twice, in 2000 and 2004, for three months on each occasion, while resident in Chechnya (Russian Federation). This raised the clinical suspicion of MDR TB (resistance to at least isoniazid and rifampicin). Drug susceptibility testing confirmed that the *Mycobacterium tuberculosis* strain was resistant to isoniazid, rifampicin, streptomycin, kanamycin, amikacin, capreomycin, fluoroquinolones, ethambutol, and thiacetazone. These results met the WHO case definition criteria of XDR TB [2]. In addition, the case was considered to be highly infectious due to severe cough, cavernous lesions, and smear-positive sputum (10 to 99 acid fast bacilli per high-power field).

Subsequently, pulmonary TB was diagnosed by chest X-ray in the wife of the index case and in one of his children with mediastinal lymphadenopathy, but without bacteriological identification in either case. Latent TB infection was diagnosed in his other child (positive tuberculin skin test).

Since 15 December 2006, the case's wife and one child have been treated with ethionamide, para-aminosalicylic acid (PAS), linezolid, cycloserine and pyrazinamide, and the other child with ethionamide, PAS and pyrazinamide for latent TB infection. No side effects have been notified and the cultures have so far remained negative.

Contact tracing

Advised by an expert group (respiratory physicians, bacteriologists and epidemiologists), the French MoH decided to apply the contact investigation strategy. Although the WHO recommends tracing close contacts only when the duration of the flight exceeds eight hours [2], and this flight was five hours, the investigation was nevertheless carried out, on the grounds that the index case was infected by an XDR strain and that he was highly infectious at the time of travel. Close contacts during the flight were defined according to WHO guidelines [3].

According to the flight details provided by the airline company, 11 passengers were identified as close contacts. All contacts (passengers and cabin crew) were adults. Due to the resistance pattern of the case (XDR), treatment was not considered relevant for latent TB infection in adult contacts of the index case. Screening and medical follow-up was recommended to be mainly based on chest X-ray (0, 6, and 12 months) to all close contacts and information on TB infection was provided.

The final destination was the United States (US) for four contacts, Panama for three, Morocco for two and France for two of these contacts. Contact details have been obtained through the travel agencies only for nine passengers. The French MoH also informed the relevant national health authorities of the countries of residence of these passengers (in the US, Canada, Panama, France and Lebanon) as well as the WHO office for the passengers in Morocco.

At the time of publication of this article, seven of the 11 contact passengers have been informed. For three of them (in the US, Canada and France), results of the initial screening are available, while for one (in France) the results of the follow-up after six months are known. No active TB was diagnosed in any of these passengers. Members of the cabin crew were contacted by the airline occupational health service, but no further information is yet available.

Discussion

This event has raised several questions about the strategy of contact investigation in travel situations. There is no evidence that XDR strains are more contagious than sensitive strains. However, the French experts agreed with the MoH that the prevention of transmission of such a strain through international air travel was paramount. The contact tracing investigations were decided on with the aim of avoiding important delays in the appropriate clinical management of potential secondary cases. Indeed, Kenyon et al. [4] have described several TB transmissions from a passenger with similar clinical characteristics but in a longer flight, and concluded that both the infectiousness and the flight duration had to be considered.

Regarding the organisation of contact tracing, our case shows that information required to locate and contact the passengers is not always available. Indeed, for some of the passengers it was only possible to ascertain the country in which the plane ticket had been bought. As nine of the passengers' final destination was not France, a press release was not considered suitable. Additionally, such information several weeks after the flight might have caused unnecessary panic, as discussed by Lasher et al. [5]; this kind of measure should be restricted to cases involving diseases with short incubation periods and/or when the contact-tracing approach is not feasible within appropriate time limits and/or when all the exposed passengers cannot be reached using the available data.

As in other contact tracing investigations involving TB cases in airplanes, this event highlights the need to improve international coordination. This would enable the relevant stakeholders to make a joint risk assessment in situations not included in the guidelines but nevertheless considered serious due to the potential risk of transmission of severe TB, and to agree on relevant control measures. When deciding on control measures, in addition to the risk assessment it is important to consider the potential effectiveness of the contact tracing, taking into account several factors. These might include: the time since notification, the number of countries involved and the epidemiological situation in the countries. In order to assess the efficiency of such measures, the results of contact tracing should be analysed in terms of the number of passengers reached, the delays between the flight and screening of contacts, the number of screenings performed and their results. Follow-up assessment of such events is needed to revise existing guidelines, if necessary, or to address the relevance of conducting contact tracing in situations for which no specific guidelines are available.

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