Prevention of Spread of Communicable Disease by Air Travel

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Mathematical modeling suggests that travel restrictions are likely to have only a limited effect on minimizing the spread of disease. Nevertheless, medical screening of travelers remains an option to be considered in a risk-reduction strategy. Screening of departing and/or arriving travelers are possibilities, although the World Health Organization (WHO) favors the former as it is normally easier to geographically contain a disease prior to its transmission outside the outbreak area. Apart from airport screening, several other related issues require consideration, including: transmission of disease on board aircraft; transmission of disease in airport terminal buildings; and contact tracing. A major challenge is to ensure adequate resources are devoted to pandemic preparedness planning in the aviation sector, which may not be fully considered in a national preparedness plan. This is because the prevention of accidents occupies most of the attention of regulatory aviation authorities, and public health authorities do not always see aviation as a priority area. Chief medical officers of regulatory authorities may be in a position to facilitate collaboration between the many stakeholders involved in preparedness planning for aviation.

Keywords: preparedness planning, pandemic, contact tracing.

THE PAPER BY GABER et al. (3) presents an interesting and timely discussion concerning screening for communicable disease at international airports. Mathematical modeling for pandemic influenza suggests that travel restrictions are likely to have only a limited effect in minimizing the spread of communicable disease (1) unless restrictions are severe and undertaken promptly: measures to control spread within a local 'containment zone' are likely to be more effective (11). However, exit screening (i.e., of departing travelers) at airports remains one potential mitigating strategy, although the World Health Organization (WHO) believes the ideal action would be to close major air, land, and sea transit points in the containment zone. Closure of a major international airport would clearly be a highly sensitive issue, and might not be feasible.

Exit screening may be recommended by the WHO in an outbreak situation (10) because it is easier, at least in theory, to contain the disease at the source rather than to limit its dissemination once individuals have departed the country. When combined with advice to potential travelers, it may have a deterrent effect to symptomatic individuals planning to travel, although such an effect is difficult to quantify.

Gaber et al. recommend exit screening only for travelers on international flights, presumably to limit the number needing to be screened. However, domestic passengers may subsequently transfer to an international flight at another airport. Their proposed separation of passengers with paper and electronic tickets appears to complicate the screening process, without apparent benefit.

Even though exit screening is favored by the WHO, a number of governments believe that facilities need to be put in place for entry screening (i.e., of arriving travelers) (9), partly because public health authorities cannot control the efficacy of exit screening undertaken outside their own borders, and partly because symptoms may develop during travel, especially that of long duration. To improve the reliability of notification of the destination public health authority of a suspected on-board case, the International Civil Aviation Organization (ICAO) has introduced a new procedure that uses the air traffic control system, rather than the carrier's own communication channels. The new procedure becomes applicable in November 2009, but has already been introduced by some regulatory authorities (8).

There is a general acceptance that modern aircraft, using systems that pass recirculated air through high efficiency particulate air filters, do not spread pathogens throughout the cabin (7). However, there remains a relative lack of knowledge concerning the risk of an air traveler being directly infected by a fellow traveler having a communicable disease.

For tuberculosis, the WHO recommends that those seated in the same row, as well as two rows ahead and two behind (unless separated by a bulkhead) should be regarded as 'close contacts', but only for flights of 8 h or more (13). This would seem a reasonable approach for most types of suspected communicable disease, although many public health authorities would reduce the time period (of 8 h) for diseases more infectious than tuberculosis, such as influenza, that have pandemic potential.

Gaber et al. suggest the definition of close contact should be reconsidered, citing a paper by Olsen et al. (6) concerning the transmission of severe acute respiratory syndrome (SARS) on a flight from Hong Kong to Beijing,

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where cases were found outside the five rows recommended for follow-up as 'close contacts'. They prefer to use a distance limitation of '6 ft'. However, caution is necessary when using such data concerning apparent on-board transmission of disease. Olsen et al. wrote that they could not determine whether individuals had been infected before or after the flight (a factor recognized as important by Gaber et al. later in their paper).

Although the distance from an index case seated adjacent to a window may be greater across the full width of the aircraft than to a traveler seated three or more rows directly in front or behind, the risk of transmission of infection may be increased across the cabin because of the laminar (non-turbulent) ventilation flow in this direction. More research is needed to reach a firm conclusion on risk of infection based on distance from the index case.

Although better use of paper-based 'passenger locator cards' (12) or improved data collection by airlines are suggested by Gaber et al. to improve contact tracing, a more efficient system may be an electronic method whereby the potential traveler supplies relevant information direct to the public health authority at the destination. This is already in place by some States for visa issuance or security clearance. This approach requires both financial resources and political will for further development.

The ICAO CAPSCA project (Cooperative Arrangement for the Prevention of Spread of Communicable Disease through Air Travel) has been running for over 2 yr (2) and 11 international airports in Asia and Africa have been evaluated against the ICAO pandemic preparedness guidelines for States (5) and the International Health Regulations (14). Airport evaluations often demonstrate that the aviation sector is not fully considered in some States (countries). This may be because the public health authority does not see aviation as a priority, and may not be knowledgeable about its specific challenges. In addition, chief medical officers (CMOs) of regulatory authorities tend to concentrate on ensuring fitness of license holders, even though Article 14 of the Convention on International Civil Aviation (Chicago Convention) places responsibilities on States to prevent the international spread of communicable disease (4).

The development of an appropriate national pandemic preparedness plan for the aviation sector, including airport screening, requires the collaboration of both public health and regulatory aviation authorities, as well as other stakeholders, private and state-run. At present, there appears to be inadequate interest in the topic in many States to ensure the aviation sector is properly considered. The CMO of civil aviation authorities may be in a good position to facilitate and contribute to such planning, and to form an ongoing link between stakeholders. We, therefore, strongly encourage CMOs, and other doctors and health professionals working in aspects of aviation medicine other than those related to public health, to become more involved in aviation-related public health issues.

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