

# Researchers develop tool to assist areas of infectious disease outbreaks

April 10 2013

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Researchers have developed a simple new tool to help governments worldwide decide whether to screen airplane passengers leaving or arriving from areas of infectious disease outbreaks.

The tool was developed by examining all international airplane traffic in the initial stages of the 2009 H1N1 pandemic.

Researchers led by Dr. Kamran Khan of St. Michael's Hospital in Toronto found that that a focused and coordinated approach to [screening](#) airplane passengers would generate the greatest public health benefits. Furthermore, they found that screening travelers as they leave an area where an infectious disease outbreak is under way is far more efficient than screening passengers when they land at their final destination.

It is also much less disruptive to international travel and the global economy, they wrote in the May issue of the *Bulletin of the World Health Organization*.

After the 2003 SARS outbreak, 194 countries agreed to the International Health Regulations, a global treaty designed to prevent, protect against and control the spread of infectious disease without putting unnecessary restrictions on international travel and trade. Until now, it's been unclear how governments should balance those competing demands.

Dr. Khan, an infectious disease physician and founder of BioDiaspora, uses global air traffic patterns to predict the international spread of

infectious disease. This web-based technology has been used by numerous international agencies, including the U.S. [Centers for Disease Control and Prevention](#), the European Centre for [Disease Prevention](#) and Control and the [World Health Organization](#) to evaluate [emerging infectious disease](#) threats, including those during global [mass gatherings](#) such as the Olympics or the annual Hajj pilgrimage in Saudi Arabia.

Dr. Khan used his experience analyzing air traffic patterns to review the flights of the nearly 600,000 people who flew out of Mexico in May 2009, the start of the H1N1 pandemic. He found that exit screening would have caused the least disruption to international air traffic.

In fact, all air travelers at risk of H1N1 infection could have been assessed as they left one of Mexico's 36 international airports. Exit screening at just six airports in Mexico coupled with entry screening at two airports in Asia (Shanghai and Tokyo) would have allowed for screening of about 90 per cent of the at-risk travelers worldwide.

Assessing those same passengers when they landed at their destinations on direct flights out of Mexico would have been much more complicated and expensive because it would have required screening at 82 international airports in 26 countries.

"One never waits for a fire to spread before putting it out," said Dr. Khan. "It only makes sense to intervene as early as possible right at the source. The same principle applies to infectious [disease outbreaks](#). To prevent or slow the spread of infectious disease, the most efficient strategy is to control an outbreak at its source, and if this cannot be achieved, to consider screening travelers as they depart the affected area for destinations around the globe."

The researchers came up with a simple tool any city could use to make a timely, reliable decision about traveler screening during a future

outbreak, regardless of where or when the outbreak might occur. Decisions from the tool are based on just three factors: (i) whether effective exit screening at the source of the outbreak is taking place, (ii) whether a city receives direct flights from the source of the outbreak, and (iii) the incubation period of the disease.

"If countries adopt this tool, it would help distinguish settings where traveler screening is reasonable from those where screening is clearly not warranted," Dr. Khan said. "Taking a highly targeted approach to screening would efficiently produce public health returns while minimizing disruption to international travel, and consequently the world's economy."

Dr. Khan noted that screening people as they leave the site of an outbreak does place an additional burden on that country, especially if it's a resource-poor country, and that it would be in other countries' interest to provide resources to assist.

"While entry screening may offer the perception of being more closely aligned with the self-interests of a country, the reality is that it's far more resource intensive and inefficient than exit screening in the source country," Dr. Khan said. "Since entry-screening consumes valuable health and human resources that could be used more effectively elsewhere, it can actually be counterproductive from both a public health and an economic perspective."

The reason entry screening is inefficient is that many travelers leaving the source of an outbreak may mingle with other travelers who have no connection to the outbreak. In the case of the H1N1 pandemic, screening all international travelers as they arrived in airports around the world would have been exceedingly inefficient: 116 travelers would have had to be screened for every traveler who may have been exposed to H1N1, or 67.3 million travelers at 1,111 international airports.

Dr. Khan said that 90 per cent of international trips by air last less than 12 hours, meaning it's unlikely that travelers incubating an infection will board a plane with no symptoms and develop the illness during the trip. The average incubation period for H1N1, for example, is about two days, but 78 and 91 per cent of at-risk travelers who flew out of Mexico in May 2009 finished their air travel within six and 12 hours respectively. Even the longest direct flights – 17 hours to Tokyo and 20 hours to Shanghai—would have taken less than one day.

Each year, more than 700 airlines transport more than 2.5 billion travelers between 4,000 airports. The chief of aviation medicine of the International Civil Aviation Organization said Dr. Khan's paper "will be very helpful as we continue to determine how to utilize resources to best protect the health of travelers and populations, while minimizing travel disruptions."

"Countries receiving travelers need to be confident that exit screening has been undertaken efficiently and it's a great help if communication channels have been established in advance of a public health event. ICAO, the WHO and others have been working together since 2006 to provide just this type of multi-sector/multi-stakeholder network through the Collaborative Arrangement for the Prevention and Management of [Public Health](#) Events in Civil Aviation," said Dr. Tony Evans.

The paper does not recommend how passengers should be screened. Some airports, such as those in Hong Kong and Tokyo, routinely use thermal scanners to look for fever among all arriving travelers. In others, traveler questionnaires and direct visualization of travelers for signs of illness are used.

Provided by St. Michael's Hospital

Citation: Researchers develop tool to assist areas of infectious disease outbreaks (2013, April 10)  
retrieved 10 April 2024 from  
<https://medicalxpress.com/news/2013-04-tool-areas-infectious-disease-outbreaks.html>

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