

Travel and the globalization of emerging infections

Poh Lian Lim*

Travellers' Health & Vaccination Clinic, Institute of Infectious Diseases & Epidemiology, Tan Tock Seng Hospital, Singapore 308433, Singapore; Lee Kong Chian School of Medicine, Singapore 39798, Singapore

*Corresponding author: Tel: +65 635 77919; Fax: +65 625 24056; E-mail: poh_lian_lim@ttsh.com.sg

Received 3 March 2014; accepted 7 March 2014

Keywords: Coronavirus, Emerging infections, Influenza, Travel medicine

Although more than 10 years have elapsed since the appearance of severe acute respiratory syndrome (SARS), this 'first pandemic of the 21st century' has left a lasting legacy because of its spread by travelers.¹ The International Health Regulations (IHR) were re-formulated in 2005, and along with changes in mobile computing technology and social media, has led to greater transparency and faster information sharing of health events important to travel medicine and travelers.²

Emerging infections continue to be a concern for travelers with numerous events highlighted in the media and public health literature during 2013 and 2014. In 2013, there was heightened international concern over travel-associated cases of Middle East respiratory syndrome (MERS) coronavirus infections in the United Kingdom, France, Italy and countries in the Middle East.^{3,4} Avian influenza A (H5N1) continues to simmer in Southeast Asia with sporadic cases reported, including a recent travel-associated fatal infection of a person in Canada who had returned from Beijing, China.⁵ However, the situation to watch in 2014 is the rise of avian influenza A (H7N9) in China, with over 200 cases of H7N9 reported during the current 2013–2014 Northern Hemispheric winter.⁶ There has also been an alarming rise and spread of vector-borne infections including the large dengue outbreak in Southeast Asia in 2013, the spread of chikungunya to the Caribbean and travel-acquired Zika infections in Thailand and French Polynesia.^{7–9}

Travelers play an important role in the spread of emerging and re-emerging infections. International travel has become more affordable as compared to 10 to 20 years ago. Global travel volume is estimated at over a billion individuals crossing an international border annually and is projected to increase. Although emerging infections remain relatively rare occurrences, these low-probability but high-impact events are another factor that travel-medicine practitioners need to be aware of, as the cumulative global risk increases.

Several categories of travelers are potentially at higher risk of certain infections. Travelers visiting friends and relatives (VFR) and long-term travelers have higher exposures to vector-borne infections such as malaria, and are less likely to take health

precautions before and during their residence abroad. These categories of travelers may be important groups that need to be reached with pre-travel advice.^{10,11} Immigrants and migrant workers who return from lower-income countries to visit friends and relatives may also introduce vector-borne infections such as chikungunya into new geographic locations that did not have prior endemic infection.¹² As a clinician, how do we prepare travelers for these unpredictable events? We do know that most emerging infections have zoonotic origins and many have viral pathogens as etiologic agents. The primary routes of transmission include contact with animals, mosquito bites and respiratory exposure to infected persons. This can form the basis for advice to travelers who want to take the appropriate precautions, and provide targeted screening criteria for ill travelers returning from outbreak-affected areas. For example, travelers to China should be advised to avoid contact with poultry to minimize their risk of acquiring avian influenza, and those going to the Middle East should understand that current medical knowledge indicates that camels and bats are potential animal reservoirs or intermediaries for MERS-CoV infection.^{13,14}

Travel is also associated with clusters of re-emerging, vaccine-preventable infections, ranging from measles to pertussis.¹⁵ Migrant populations often contain large groups of individuals who may be susceptible to infections due to a variety of reasons including socioeconomic and cultural barriers to care. Concerns about vaccines' adverse effects also lead individuals to opt out of immunizations, but travel may expose these persons to infectious risks.

This presents another challenge to travel medicine clinicians who already provide advice for common health risks such as travelers' diarrhea, and clinicians must remain current on guidelines for more esoteric vaccines such as Japanese encephalitis, yellow fever or rabies. Various national or international websites such as the Centre for Disease Control and Prevention (CDC), European Centres for Disease Control (ECDC), National Travel Health Network and Centre (NaTHNAC) and WHO are of great benefit and provide resources to guide practice. Travel medicine

conferences bring clinicians together with industry and academic partners to share updates on travel medicine and discuss issues of relevance. HealthMap trawls internet sources in different languages and provides near real-time ability to geo-locate disease occurrences and outbreaks.¹⁶ Ultimately, however, it is not information systems but the networks of people and astute clinicians who make sense of data, identify emerging trends and minimize the effects of emerging infections.

Competing interests: None.

References

- 1 Heymann DL, Mackenzie JS, Peiris M. SARS legacy: outbreak reporting is expected and respected. *Lancet* 2013;381:779–81.
- 2 Hardiman M, Wilder-Smith A. The revised international health regulations and their relevance to travel medicine. *J Travel Med* 2007;14:141–4.
- 3 CDC. Updated information on the epidemiology of Middle East respiratory syndrome coronavirus (MERS-CoV) infection and guidance for the public, clinicians, and public health authorities, 2012–2013. *MMWR Morb Mortal Wkly Rep* 2013;62:793–6.
- 4 Lim PL, Rowe EK, Lee TH. Middle East Respiratory Syndrome coronavirus (MERS CoV): Update 2013. *Curr Infect Dis Rep* 2013;15:295–8.
- 5 CDC. H5N1 avian flu: First imported case in Canada. Atlanta: Centers for Disease Control and Prevention; 2014. <http://wwwnc.cdc.gov/travel/notices/watch/h5n1-avian-flu-imported-case-canada> [accessed 3 March 2014].
- 6 WHO. Confirmed human cases of avian influenza A(H7N9) reported to WHO. Geneva: World Health Organization; 2014. http://www.who.int/influenza/human_animal_interface/influenza_h7n9/13_ReportWebH7N9Number_20140221.pdf?ua=1 [accessed 3 March 2014].
- 7 CDC. Chikungunya in the Caribbean. Atlanta: Centers for Disease Control and Prevention; 2014. <http://wwwnc.cdc.gov/travel/notices/watch/chikungunya-saint-martin> [accessed on 3 March 2014].
- 8 Tappe D, Rissland J, Gabriel M et al. First case of laboratory-confirmed Zika virus infection imported into Europe, November 2013. *Euro Surveill* 2014;19:pii=20685.
- 9 ECDC. Zika virus infection outbreak, French Polynesia: 14 February 2014. Stockholm: European Centres for Disease Control; 2014. <http://www.ecdc.europa.eu/en/publications/Publications/Zika-virus-French-Polynesia-rapid-risk-assessment.pdf> [accessed 3 March 2014].
- 10 Chen LH, Wilson ME, Davis X et al. Illness in long-term travelers visiting GeoSentinel clinics. *Emerg Infect Dis* 2009;15:1773–82.
- 11 Leder K, Tong S, Weld L et al. Illness in travelers visiting friends and relatives: a review of the GeoSentinel Surveillance Network. *Clin Infect Dis* 2006;43:1185–93.
- 12 Lim PL, Oh HM, Ooi EE. Chikungunya in Singapore: imported cases among travelers visiting friends and relatives. *J Travel Med* 2009;16:289–91.
- 13 Ferguson NM, Van Kerkhove MD. Identification of MERS-CoV in dromedary camels. *Lancet Infect Dis* 2014;14:93–4.
- 14 Memish ZA, Mishra N, Olival KJ et al. Middle East respiratory syndrome coronavirus in bats, Saudi Arabia. *Emerg Infect Dis* 2013;19:1819–23.
- 15 Rapose A. Measles and pertussis outbreaks: an important role for travel clinics. *Am J Infect Control* 2013;41:1140.
- 16 Brownstein JS, Freifeld CC, Reis BY et al. Surveillance Sans Frontieres: Internet-based emerging infectious disease intelligence and the HealthMap project. *PLoS Med* 2008;5:e151.