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Geographies of risk: Emerging infectious diseases and travel health data

Dear Editor,

Outbreaks of emerging infectious diseases are being detected with unprecedented frequency. In our increasingly inter-connected world, travel medicine is at the frontlines of the battles against these novel threats. Not only do travel medicine practitioners provide counsel in the context of the imperfect and evolving information that accompanies epidemics, but also, they are often the first port of call when travellers return to their home countries with medical concerns. Reflecting on the findings of Petridou and colleagues [1], describing imported ZIKV cases to the UK between 2016 and 2018, confirmed at the Rare and Imported Pathogens Laboratory, we look back to the 2015–2017 Zika virus (ZIKV) pandemic and reflect on some of the opportunities and limitations presented by data obtained from returning travellers in enhancing understanding of emerging infectious diseases.

Given travellers' well-defined temporal windows of potential exposure, improved recollections of risk behaviors, and access to well-resourced travel clinic laboratories, travel health data are uniquely positioned to provide insights into the pathogenesis of emergent infectious diseases. In the case of ZIKV, case studies of pregnant travellers provided early evidence that asymptomatic maternal ZIKV infections can also result in congenital malformations [2]. Data from a traveller returning to an ecological setting that does not support ZIKV vectors, elucidated sexual contact as a new route of transmission [3]. Serial testing in travellers enabled early descriptions of the kinetics of ZIKV RNA loads across biological samples and antibody responses to infection [4].

As the burden of emerging infectious diseases disproportionately falls on communities in lower resource settings, travel health data may provide valuable complementary information to local surveillance efforts. GeoSentinel, initiated in 1995 by the International Society of Travel Medicine, is a global network of 70 travel and tropical medicine centers in 31 countries initially created to track emerging infections at their point of entry, but now expanded to include monitoring of global disease trends among travellers and determining individual-level and destination-related risk factors [5]. For ZIKV, Geosentinel data were used to help track the spread of the expanding epidemic and for identifying transmission, which may have otherwise gone unnoticed. For example, after the ZIKV epidemic was reported to have subsided in Latin America, Geosentinel surveillance data together with air travel information and molecular data were used to document the occurrence of a late large-scale ZIKV outbreak in Cuba in 2017 [6].

There are, however, noteworthy limitations to using travellers as sentinels for emerging infectious diseases. First, we can assume neither homogenous mixing between travellers and locals nor equivalent risks of exposure to pathogens. Considering ZIKV, travellers' geographic footprint may be limited to tourist sites with enhanced vector control measures limiting the prevalence of *Aedes* spp. mosquitoes. Travellers may practice temporarily enhanced preventative behaviours, such as the daily use of insecticides, which may be inaccessible to resident populations. Second, travellers and locals may have differing age distributions and underlying risk factors that could modify the clinical severity or complications of the resulting disease. Third, travellers may display more health-seeking behaviour traits, be more likely to seek testing for minor symptoms, and have better access to testing laboratories. Fourth, travellers and locals may differ with respect to their immunological experiences in ways that could modify testing outcomes. For instance, prior exposure to dengue virus can lead to immunological cross-reactivity that can compromise the specificity of serological testing for ZIKV. For all these and other reasons, it is therefore important, where possible, for studies utilizing travel data to contextualize and validate their findings with on-the-ground epidemiological investigations led by resident country experts.

The sharing of data, knowledge, and expertise between travel medicine specialists and professionals working in areas with active transmission is mutually beneficial and of paramount importance for protecting the public's health in all countries. During outbreaks of emerging infectious diseases, local clinicians and epidemiologists play a critical role in describing the novel features, risk factors, and transmission patterns for emerging infectious diseases. When the epidemic of microcephaly was first identified in Northeast Brazil, local teams provided the first clinical descriptions of the novel Congenital Zika Syndrome and undertook epidemiological studies that provided robust evidence of ZIKV as the etiological agent. While travel health data has the opportunity to build on this foundation and provide novel insights about emerging infectious agents, the fastest progress will be made through meaningful bi-directional international partnerships built on respectful collaboration, commitments to capacity building, and cooperative efforts to bolster surveillance.

As evidenced by the ZIKV and COVID-19 pandemics, we are in a new era of emerging infections, rapid research, and potential international partnerships. Now more than ever, travel data and databases are becoming invaluable resources in the early stages of outbreak investigations and for on-going support of local surveillance efforts in affected areas. By working together across our shared geographies of risk, we will be best prepared to confront, contain, and mitigate the impact of emerging infectious disease pandemics.

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