Hajj – beyond traveller's diarrhea

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Dear Editor,

We read the valuable article by Leangapichart et al [1] systematically reviewing antimicrobial resistance infections associated with pilgrims traveling to perform Hajj. Travelling and human displacement contribute significantly to the global transmission of infectious diseases. Approximately 1.1 billion people, constituting 15% of the world's population, travelled across international borders in 2014, and this number is predicted to increase to 1.8 billion by 2025 [2]. A significant proportion of this travel includes international travellers participating in planned and recurrent mass gatherings such as pilgrimages and sporting events. Despite substantial advances in food and water hygiene in many countries, mass gathering events still represent the perfect environments for the transmission of enteric infections. For instance, during the 2017 IAAF World Championships held in London in early August 2017, more than 30 athletes who were participating in the competition and support staff from Botswana, Germany, Canada, Ireland and Puerto Rico suffered from norovirus-associated gastroenteritis, as confirmed by Public Health England [3].

Unsurprisingly, the structure and distribution of the microbial population associated with contracting enteric illnesses during participation in mass gathering events varies according to a number of factors, including the structure of the participant population, their destination and the nature of the activities that they perform [4].

We conducted the first large-scale study to identify the etiologic agents associated with diarrheal infections in symptomatic Hajj pilgrims travelling from 40 countries [5]. Although viral agents were minor contributors to Hajj-associated diarrheal infections, they had quickly spread after emerging elsewhere. The emergent norovirus genotype GII.4, first identified in Sydney, Australia in March 2012, had already begun

circulating amongst Saudi pilgrims during the Hajj season that occurred in late October 2012 [5].

Our data demonstrate that Hajj-diarrheal disease in a pilgrim is usually associated with one, rather than multiple, bacterial agents, with *Salmonella* spp., *Shigella*/enteroinvasive *Escherichia coli* and enterotoxigenic *E. coli* being the most common pathogens detected. The distribution of pathogens seen was distinct to the usual pattern seen in traveller's diarrhoea that is mostly diagnosed in non-immune travellers from high-income countries. This is likely due to the variation in the participant population, with the vast majority of Hajj pilgrims being non-naïve, originating from intermediate- and high-risk regions for enteric pathogens. Of particular concern were the presence of extended-spectrum β-lactamases and carbapenemases, in particular the $bla_{\text{CTX-M-15}}$ and bla_{NDM} elements, in ~40% of *Salmonella* and *E. coli*-positive samples [5].

These rates of resistance are alarming, considering the risk that Hajj poses of acquiring carriage of resistance elements and the large number of global participants; currently 2 million pilgrims from 188 countries. Hajj can therefore be seen as a short journey across the globe that promotes the mixing of susceptible populations and infectious agents and, therefore, raises unique public health challenges, particularly the transmission of drug-resistant enteric infections.

References

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