

## Middle East respiratory syndrome (MERS) in Asia: lessons gleaned from the South Korean outbreak

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The first case of Middle East respiratory syndrome coronavirus (MERS-CoV) was reported in 2012.<sup>1</sup> Over the past 3 years, sporadic travel-associated importations occurred to countries in Europe, North Africa and Asia, and cases continued to smoulder in Saudi Arabia,<sup>2</sup> but the risk assessment by most experts was that MERS-CoV was a low risk for causing a pandemic.<sup>3,4</sup> With a reproductive number ( $R_0$ ) estimated at close to 1.0 by some experts, MERS-CoV was considered unlikely to propagate enough to cause a large outbreak.<sup>5</sup> However, before 2014, a similar argument could have been made for the likelihood of a large outbreak of Ebola—in over four decades, Ebola had never caused more than several hundred cases at worst. It appears that the disclaimer made for financial investments applies equally well to emerging infections—past experience is no guarantee of future performance.

On 4 May 2015, a 68-year-old Korean man returned from travel in the Middle East. He became symptomatic on 11 May and sought medical attention on 12 May. He was admitted and discharged, then re-admitted at a second hospital where the diagnosis of MERS-CoV infection was confirmed on 20 May.<sup>6</sup> In the week before diagnosis, this index case was not suspected to have MERS-CoV and, therefore, his caregivers did not use appropriate isolation precautions and personal protective equipment. As a result of this critical lapse, South Korea experienced a large outbreak and is now the country with the second largest number of MERS-CoV cases in the world, after Saudi Arabia. As of 23 July 2015, this outbreak stands at 186 cases, with 36 deaths and a case fatality rate of 19%;<sup>7</sup> South Korea appears to be on track to declare the outbreak over by August 2015 after completing two incubation periods without new cases. Over 16 000 individuals had to be quarantined for potential exposure and over 30 healthcare facilities had to undergo investigations for possible MERS-CoV transmission.

This outbreak caused considerable anxiety in Asia because one of the second generation cases travelled to China (Guangzhou

and Hong Kong), requiring strenuous contact tracing efforts of fellow airplane passengers and others exposed to the patient. As a result, countries around the region issued travel warnings, stepped up screening efforts and activated thermal scanners for incoming passengers from South Korea. This outbreak took a substantial toll on South Korea, economically and politically, in addition to the human impact.

The question still remains: why did this MERS-CoV outbreak occur in South Korea when the preceding 3 years had seen multiple other importations that did not result in an outbreak, even in less developed countries? A WHO team, led by Dr Keiji Fukuda, was dispatched to investigate this outbreak.<sup>8</sup> Initial concerns, about viral mutation resulting in a more transmissible pathogen were not borne out by viral sequencing data. The concept of ‘super-spreaders’ was again mooted. For severe acute respiratory syndrome (SARS) veterans watching this outbreak unfold, a sense of déjà vu prevailed. These events reinforced five key observations and learning points (Box 1).

### Box 1. Five key observations from the MERS-CoV outbreak in South Korea

- It only takes one: a single imported case can spark an outbreak.
- Travel matters: in our globalised world, diseases are just a plane flight away.
- Hospitals are a risk for amplifying outbreaks; therefore, manage that risk well.
- The myth of the ‘super-spreader’.
- To stop outbreaks, we need effective, rapid and coordinated approaches.

With over a billion individuals travelling annually, the risk of emerging infections crossing borders is a reality that needs to be managed with calibrated, sensible approaches. South Korea's experience illustrates the ongoing need for a high level of vigilance. To control emerging infections for which no preventive vaccines or proven specific therapies are available, classical outbreak control measures are still required—transmission can be terminated by isolating infectious cases and quarantining exposed individuals during the incubation period. Suspect cases must be cared for with appropriate precautions in order to protect hospital staff, visitors and other patients, all of whom would inadvertently become vectors for spread, if infected.

Super-spreaders are a myth, rather than a mystery. It is more appropriate to speak of super-spreading incidents, which occur because an individual is not suspected to have infection. The number of secondary cases increases proportionate to the duration that an individual remains out of isolation after symptoms develop. Medical procedures that aerosolise viral particles further increase the likelihood of super-spreading incidents.

Decisive action is required to stop outbreaks. The 2014–2015 Ebola outbreak in West Africa demonstrates what can happen if rapid, coordinated action is not taken early enough, and has resulted in calls for a global health emergency workforce. This role is currently filled by WHO and the Global Outbreak Alert and Response Network (GOARN), but they need more resources to strengthen outbreak response and build capacity.

This outbreak also underscores one other critical component to managing outbreaks—communications at the speed of trust. Unlike SARS in 2003, MERS is occurring in a different milieu. In 2015, social media must be reckoned with. Clear, consistent and accurate communications becomes ever more important to maintain credibility for governments and health authorities.<sup>9</sup> South Korea's early decision to withhold the names of MERS-affected hospitals caused more anxiety, loss of confidence and proved, ultimately, futile.

In the aftermath of South Korea's outbreak, preparedness efforts in Asia were ramped up in many countries in Asia. In Singapore, health advisories for travellers to and from Korea and border screening with thermal scanners were implemented, along with the usual circulars to all healthcare facilities and doctors to increase vigilance for travel-related importations. Tan Tock Seng Hospital and the Communicable Disease Centre are the designated facilities in Singapore for outbreak management, including Ebola, MERS-CoV and avian influenza. Over the past 3 years, our hospital has evaluated over 300 patients who either walked in themselves or were referred by a doctor for possible MERS-CoV infection. Our Emergency Department doctors balance the risk of missing a case with the challenges of admitting reluctant patients to isolation rooms (which are a finite resource). For front-line clinicians without the luxury of hindsight, knowledge of the case definitions (pneumonia plus travel exposure) is balanced by awareness that the spectrum of disease includes mild infection, clinical presentations may evolve and upper respiratory samples may not detect infection, especially early in the course of illness.<sup>10</sup>

What happened in South Korea could happen in any country in Asia—our task is to stop the outbreak before it happens. These

emerging infection outbreaks reinforce the need to stay vigilant and to invest in capacity building to detect and respond quickly to outbreaks with effective, decisive actions. Global health security requires this commitment from every country because outbreaks teach us that we are only as strong as our weakest link.

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