

MERS-CoV: Where Are We Now?

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Prior to 2002, coronaviruses were known mainly for causing mild human upper respiratory tract infections (URTIs) and enteric and respiratory infections in many animals. However, their full pathogenic potential was only realised when an outbreak of severe pneumonia with a high fatality rate occurred in southern China, and they were identified to be a coronavirus—severe acute respiratory syndrome (SARS).

By dint of international cooperation, enhanced international and local infection control, the outbreak and the virus were contained but not without a significant loss of life and lessons learnt.

Outbreaks caused by coronaviruses were then quiescent, until summer 2012, when an Egyptian virologist¹ identified a novel coronavirus from a 49-year-old man with severe pneumonia from Jeddah, Saudi Arabia. What was unique was that the doctor had posted his findings on the World Health Organization's (WHO) ProMED-mail, a rapid and effective way of disseminating information on emerging infections and outbreaks. This sixth human coronavirus became known as the Middle East respiratory syndrome coronavirus (MERS-CoV), sequenced by the Erasmus Medical Centre and found to be a beta coronavirus with sequence homology to bat coronaviruses.

Global spread was quick by dint of air travel and medical tourism; in September 2012, the same type of coronavirus, with a near identical sequence, was isolated from a patient with severe respiratory illness who had been transferred from the Middle East to London, United Kingdom. Retrospectively, an outbreak of severe pneumonia in healthcare workers in a hospital at Zarqa, Jordan, in April 2012, was shown to be likely caused by the MERS-CoV.²

With MERS-CoV, the response of the Saudi local authorities was rapid and collaborative—they invited a WHO team, consisting of expertise from abroad and Singapore, to work with them.

Epidemiologically, MERS-CoV has been found in the Middle East, with cases originating from Jordan, Saudi

Arabia, Qatar, Lebanon, Yemen, and the United Arab Emirates.

As of 18 November 2014, there have been a total of 806 laboratory confirmed cases of MERS-CoV infection including 343 deaths, 449 recovered and 14 currently active cases in Saudi Arabia, with up to 900 possible cases currently reported worldwide. The case fatality rate is 42.5% (ProMED-mail), higher than SARs.

Most patients present with a severe acute respiratory condition that requires hospitalisation. It is also possible for subclinical MERS to occur; research has shown that up to 20% of cases show no signs of active infection but have MERS-CoV antibodies in their blood. Like SARS, it is postulated that there has been zoonotic spread, with an animal reservoir being likely. Recent studies have pointed to camel contact (milk, excretions, meat) being a risk factor, with transmission in 1 case via camel saliva/nasal excretions, but human cases have occurred with no such epidemiological links. The same virus was found in camels and their Saudi farmer who died of MERS in November 2013.³ A recent study showed that dromedary camels infected with MERS-CoV developed mild upper respiratory tract symptoms, but shed large quantities of virus from the upper respiratory tract.⁴ There does appear to be links with bat coronavirus, as similar viruses have been found in European and Ghana bats, but they have not as yet been confirmed as a reservoir.

Although person-to-person transmission was thought to be low,⁵ the number of healthcare workers becoming infected, subsequent to nursing infected patients, has been notable, as have cases within household contacts. A recent study of 26 index patients with MERS-CoV infection and their 280 household contacts, showed a rate of secondary transmission of 5%.⁶ Hence, it is paramount that when a case is suspect, respiratory and contact precautions are adhered to.

The current advice from the Singapore Ministry of Health, working with the Islamic Religious Council of Singapore (MUIS) to Haj and Umrah pilgrims and travellers from

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Singapore, is to avoid contact with camels and camel products, and to seek medical advice if they become unwell with fever or URTI, within 2 weeks of returning from the region. All emergency departments here have clear risk assessment and management policies for suspected MERS-CoV cases developed from the SARS days and influenza outbreak of 2009; to date, all cases screened have been negative by dint of rapid polymerase chain reaction (PCR)-based testing.

These cases have put an added pressure on isolation facilities which were expanded after SARs in preparation for future pandemics. But we must continue to be on high alert with this emerging virus; the death of a returning pilgrim in April 2014 in Malaysia, was very close to home. The concern also is that MERS-CoV has the potential to mutate into a strain that does transmit more effectively from person-to-person, so complacency is not an option.

Unlike SARS, the outbreak is ongoing, with cases continuing to be identified in the Middle East and in returning travellers throughout the world. We are all still at risk from MERS-CoV and must remain vigilant. Singapore is a major port and global transport hub, with tourism both medical and otherwise, that bring in a steady influx of visitors from the Middle East.

Post-SARS, the 2009 *H1N1* flu pandemic, and now MERS-CoV, local and international ongoing surveillance and network systems have been set up as well as universal information technology access to rapid alert systems, allowing infection professionals in the field autonomy to alert the international community to emerging pathogens or new disease trends. The expansion of the Internet worldwide has been a huge step forward in combating disease and in emergency planning.

The key thing is to know that there is a problem, understand the potential threat, and to make immediate action plans based on current knowledge of the likely spread of the disease. Mathematical models and socioeconomic models are important in predicting how diseases may spread but nothing is as important as early communication and cooperation.

As Sun Tzu said, “If you know your enemies and know yourself, you will not be imperiled in a hundred battles... if you do not know your enemies nor yourself, you will be imperiled in every single battle.” With the MERS-CoV pandemic, we are alert and prepared, but we must continue to maintain vigilance, as Singapore and the world have done since the outbreak of SARS 12 years ago.

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Addendum

Since this review was written, South Korea is experiencing an outbreak of MERS-CoV, wherein a returning traveller from the Middle East was not initially recognised as being potentially infectious, and this resulted in onward transmission in the healthcare setting and beyond, to local countries. This outbreak emphasises the need to remain vigilant, especially as cases are still occurring in the Middle East, with the potential rapid onward spread.