How great is the risk of Middle East respiratory syndrome coronavirus to the global population?

Expert Rev. Anti Infect. Ther. 11(10), 979–981 (2013)

Ziad A Memish

Author for correspondence: WHO Collaborating Center for Mass Gathering Medicine Ministry of Health, Al-Faisal University, Riyadh 11176, Kingdom of Saudi Arabia
Tel.: +966 11 2124052
Fax: +966 11 2125052
zmemish@yahoo.com

Alimuddin Zumla

Division of Infection and Immunity, University College London, London, and University College London Hospitals NHS Foundation Trust, London, UK

Jaffar A Al-Tawfiq

Specialty Internal Medicine, Saudi Aramco Medical Services Organization, Dhahran, Kingdom of Saudi Arabia

"The potential for respiratory tract infections during mass gatherings is related to the presence of a large number of people from different parts of the world in congested and crowded areas..."

Since the initial discovery of the Middle East respiratory syndrome coronavirus (MERS-CoV), there has been global concern about its threat to global health security and its pandemic potential. The virus was initially recovered from a patient from the Kingdom of Saudi Arabia (KSA) in September 2012 [1,2]. The virus was originally designated human coronavirus-Erasmus Medical Center [2] and was later called MERS-CoV [3]. As of 30 August 2013, there were a total of 104 cases with 49 (47%) death [101]. The majority of these cases occurred in KSA, where 82 cases with 41 (50%) deaths [101]. In Saudi Arabia, there were two periods of disease activity [4]. The initial period was from June 2012 to 1 April 2013, and during that period, nine cases were reported mainly in the central and western part of the country. These cases occurred sporadically and included two family clusters. This reporting period was also significant for the lack of any transmission in health care setting. The second reporting period in Saudi Arabia was from 1 April 2013 to 14 July 2013 [4]. This period showed a cluster of 23 cases and these cases were linked to an outbreak in a health care facility in the eastern part of the country (Al-Hasa) [5]. In addition to Saudi Arabia [2,4–7], additional cases were reported from other countries such as Qatar [1], Jordan [8,102], the UK [9,10], Germany [11], France [12], Tunisia [103], UAE [13] and Italy [104]. MERS-CoV infection so far has three pattern of transmission. The first pattern is the occurrence of sporadic cases in different Middle East countries. The second pattern is nosocomial transmission within health care facilities to health care workers and other patients [4] and the third pattern is the occurrence of transmission as a family cluster [5,6,8,10,14,15].

The severity of reported cases of MERS-CoV ranges from mild disease to fulminant respiratory infection [4,5]. Less severe disease was described within family contacts and hospital clusters [5,6,15]. The clinical spectrum of MERS-CoV infections also includes asymptomatic and subclinical cases [16]. Asymptomatic and/or subclinical MERS-CoV cases are important since these cases may contribute to the transmission of MERS-CoV to close contacts within the community or the hospital setting cases [16]. In addition, the presence of these mild cases would inversely affect the reported high case fatality rates.

The potential for respiratory tract infections during mass gatherings is related to the presence of a large number of people from different parts of the world in congested and crowded areas especially during the annual Muslim pilgrimage (the Hajj) [17,18]. Thus, the occurrence of the first cases, MERS-CoV, a few months before the 2012 Hajj season was a concern for international communities [19]. At that time, there was no human-to-human transmission, and there

EXPERT REVIEWS

 10.1586/14787210.2013.836965 ISSN 1478-7210

were no travel restrictions to areas where cases were reported [19]. The KSA has a unique policy to manage health risks associated with the annual pilgrimage through the preparation and annual revision of the recommendations and health requirements for the annual Umrah and Hajj.

As MERS-CoV emerged in 2012 prior to Hajj, an update to the Hajj requirements was published in Eurosurveillance [20]. The recommendations included explicit measures to reduce the risk of transmission of viral respiratory infections including MERS-CoV infection. These recommendations include the practice of proper hand hygiene, protective behaviors and cough etiquette [20]. The 2012 Hajj season which took place from 10 to 31 October 2012, was uneventful without any MERS-CoV cases being reported. During that season, four million pilgrims from 187 countries performed the annual Hajj. None should 300 pilgrims with respiratory symptoms was tested positive for MERS-CoV infections [21]. In addition, the testing of 154 French pilgrims returning from the 2012 annual Hajj showed that 83.4% had respiratory symptoms [22]. None of the pilgrims were positive for MERS-CoV by real-time PCR [22]. This year, 2013, the annual Hajj is taking place in October 1–20, and thus with the increased number of cases of MERS-CoV, there was a concern of the potential risk of the transmission of MERS-CoV. The KSA released the 2013 Hajj requirement [105]. The Saudi Ministry of Health recommends that people aged over 65 years and those with chronic diseases (e.g., heart disease, kidney disease, respiratory disease and diabetes) and pilgrims with immune deficiency (congenital and acquired), malignant and terminal illnesses, pregnant women and children aged under 12 years planning to come for Hajj and Umrah this year, to postpone the performance of the Hajj and Umrah [105]. The Saudi Ministry of Health also recommends that all pilgrims should comply with common public health recommendations to prevent the spread of respiratory infectious disease, such as hand hygiene, use of disposable tissues when coughing or sneezing, avoid direct contact with the persons who is coughing, sneezing or vomiting [105].

The second meeting of the WHO Emergency Committee convened by the Director-General under the International Health Regulations (2005) [106] was held on Wednesday, 17 July 2013. The unanimous decision of the Committee was that, with the information now available, and using a risk-assessment approach, the conditions for a Public Health Emergency of International Concern have not at presently been met [107]. Two mass gatherings events attracting over 15 million pilgrims have occurred in Saudi Arabia over the past 12 months, the annual Hajj in October 2012 [19] and the recently completed July 2013 Ramadaan Umrah season. No MERS-CoV cases have been reported from these events.

These observations support the findings in a recent modeling paper published in *Lancet* that examined the risk of MERS-CoV on mass gathering [23,24]. Breban and colleagues estimated MERS-CoV R0 to be 0.69 compared to the R0 for pre-pandemic severe acute respiratory syndrome-coronavirus of 0.80 [23] concluding that MERS-CoV in its current status quo is unlikely to cause a pandemic [23]. Watchful surveillance and vigilance will continue despite the minimal risk of global spread.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

References

1 CDC. Severe respiratory illness associated with a novel coronavirus – Saudi Arabia and Qatar, 2012. *MMWR* 61, 820 (2012).

2 Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus AD, Fouchier RA. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *N. Engl. J. Med.* 367(19), 1814–1820 (2012).

3 de Groot RJ, Baker SC, Baric RS *et al.* Middle East respiratory syndrome coronavirus (MERS-CoV); announcement of the Coronavirus Study Group. *J. Virol.* 87(14), 7790–7792 (2013).

4 Assiri A, Al-Tawfiq JA, Al-Rabeeah AA *et al.* Epidemiological, demographic, and clinical characteristics of 47 cases of Middle East respiratory syndrome coronavirus disease from Saudi Arabia: a descriptive study. *Lancet Infect. Dis.* 13(9), 752–761 (2013).

5 Assiri A, McGeer A, Perl TM *et al.*; KSA MERS-CoV Investigation Team. Hospital outbreak of Middle East respiratory syndrome coronavirus. *N. Engl. J. Med.* 369(5), 407–416 (2013).

6 Memish ZA, Zumla AI, Al-Hakeem RF, Al-Rabeeah AA, Stephens GM. Family cluster of Middle East respiratory syndrome coronavirus infections. *N. Engl. J. Med.* 368(26), 2487–2494 (2013).

7 Al-Ahdal MN, Al-Qahtani AA, Rubino S. Coronavirus respiratory illness in Saudi Arabia. *J. Infect. Dev. Ctries.* 6(10), 692–694 (2012).

8 Hijawi B, Abdallat M, Sayaydeh A *et al.* Novel coronavirus infections in Jordan, April 2012: epidemiological findings from a retrospective investigation. *East Mediterr. Health J.* 19(Suppl. 1), S12–S18 (2013).

9 Evidence of person-to-person transmission within a family cluster of novel coronavirus infections, United Kingdom, February 2013. *Euro Surveill.* 18(11), 20427 (2013).

10 Bermingham A, Chand MA, Brown CS *et al.* Severe respiratory illness caused by a novel coronavirus, in a patient transferred to the United Kingdom from the Middle East, September 2012. *Euro Surveill.* 17(40), 20290 (2012).

11 Buchholz U, Muller MA, Nitsche A *et al.* Contact investigation of a case of human novel coronavirus infection treated in a German hospital, October-November 2012. *Euro Surveill.* 18(8), pii: 20406 (2013).

12 Mailles A, Blanckaert K, Chaud P *et al.* First cases of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infections in France, investigations and implications for the prevention of human-to-human transmission, France, May 2013. *Euro Surveill.* 18(24), pii: 20502 (2013).

13 Drosten C, Seilmaier M, Corman VM *et al.* Clinical features and virological analysis of a case of Middle East respiratory syndrome coronavirus infection. *Lancet Infect. Dis.* 13(9), 745–751 (2013).

14 AlBarrak AM, Stephens GM, Hewson R, Memish ZA. Recovery from severe novel coronavirus infection. *Saudi Med. J.* 33, 1265–1269 (2012).

15 Health Protection Agency (HPA) UK Novel Coronavirus Investigation team. Evidence of person-to-person transmission within a family cluster of novel coronavirus infections, United Kingdom, February 2013. *Euro Surveill.* 18, 20427 (2013).

16 Memish ZA, Zumla AI, Assiri A. Middle East respiratory syndrome coronavirus infections in health care workers. *N. Engl. J. Med.* 369(9), 884–886 (2013).

17 Tawfiq JA, Memish ZA. Mass gatherings and infectious diseases: prevention, detection, and control. *Infect. Dis. Clin. North Am.* 26, 725–737 (2012).

18 Ahmed QA, Arabi YM, Memish ZA. Health risks at the Hajj. *Lancet* 367, 1008–1015 (2006).

19 Al-Tawfiq JA, Smallwood CA, Arbuthnott KG, Malik MS, Barbeschi M, Memish ZA. Emerging respiratory and novel coronavirus 2012 infections and mass gatherings. *East Mediterr. Health J.* 19(Suppl. 1), S48–S54 (2013).

20 Al-Tawfiq JA, Memish ZA. The Hajj: updated health hazards and current recommendations for 2012. *Euro Surveill.* 17(41), 20295 (2012).

21 Novel coronavirus – Eastern Mediterranean (03): Saudi comment, 12 February 2013. *ProMed*, 2013, archive number 20130212.1540011

22 Gautret P, Charrel R, Belhouchat K *et al.* Lack of nasal carriage of novel corona virus (HCoV-EMC) in French Hajj pilgrims returning from the Hajj 2012, despite a high rate of respiratory symptoms. *Clin. Microbiol. Infect.* 19(7), E315–E317 (2013).

23 Breban R, Riou J, Fontanet A. Interhuman transmissibility of Middle East respiratory syndrome coronavirus: estimation of pandemic risk. *Lancet* 382(9893), 694–699 (2013).

24 Bauch CT, Oraby T. Assessing the pandemic potential of MERS-CoV. *Lancet* doi:10.1016/S0140-6736(13)61504-4 (2013) (Epub ahead of print).

Websites

101 CDC. Middle East Respiratory Syndrome (MERS). www.cdc.gov/coronavirus/MERS/index.html

102 Severe respiratory disease of unknown origin – Jordan – outbreak in ICU. Communicable Disease Threats Report, week 18, 29 April–May 2013. (2013). www.ecdc.europa.eu/en/publications/Publications/CDTR%20online%20version%204%20May%202012.pdf

103 Novel coronavirus infection – update as of 22 May 2013. World Health Organization, Geneva. www.who.int/csr/don/2013_05_22_ncov/en/ (Accessed 12 August 2013).

104 ProMed. www.promedmail.org/promedprint.php?id=1750425 (Accessed 12 August 2013)

105 World Health Organization. Weekly epidemiological record. www.who.int/wer/2013/wer8832.pdf

106 World Health Organization. International Health Regulations (2005). www.who.int/ihr/9789241596664/en/ (Accessed 14 August 2013)

107 WHO Statement on the Second Meeting of the IHR Emergency Committee concerning MERS-CoV. www.who.int/mediacentre/news/statements/2013/mers_cov_20130717/en/ (Accessed 14 August 2013)