

Middle East respiratory syndrome coronavirus (MERS-CoV) summary and literature update—as of 20 January 2014

Since April 2012, 178 laboratory-confirmed of human infection with Middle East respiratory syndrome coronavirus (MERS-CoV) have been reported to WHO, including 76 deaths (Figure 1). The median age of all lab-confirmed cases (n=178) is 52 years; this varies by the presumed type of exposure. For primary cases, those who have no history of exposure to other human cases, median age is 58 years; for secondary cases, those who appear to have been infected by other humans, median age is 44 years. Overall, 62% are male; distribution by sex also varies by presumed exposure (76% male among primary cases; 53% among secondary cases). To date, affected countries in the Middle East include Jordan, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE)and; in Europe countries affected include: France, Germany, Italy and the United Kingdom (UK) and; and in North Africa: Tunisia. All cases have a link to the Middle East. For those cases reported outside the Middle East, the link is either through recent travel to the region or exposure to a patient who acquired infection in the region. Since the last update of 22 November 2013, 21 laboratory-confirmed cases, including seven deaths, were reported to WHO. The geographic distribution of these 21 cases is 14 cases, including four deaths, from Saudi Arabia; six cases, including two deaths, from UAE; and one fatal case from Oman (Figure 2).

Among the six new cases reported from UAE, three were from one family in Abu Dhabi, including a 32-year-old pregnant woman who died on 2 December 2013. Before her death, the woman gave birth to a healthy baby, who had no evidence of MERS-CoV infection. One of the recent cases from UAE was a 33-year-old health care worker who provided direct care for a 68-year-old patient with laboratory-confirmed MERS-CoV infection. The health care worker subsequently developed severe disease requiring mechanical ventilation and haemodialysis, and died.

Among the new cases reported from Saudi Arabia, seven are classified as sporadic (no contact with a probable or confirmed MERS-CoV patient) and seven as secondary cases (infection presumed to be acquired by transmission from another human case). Of the seven secondary cases, six are health care workers who were reported to be asymptomatic.

To date, more than half of all laboratory-confirmed secondary cases have been associated with health care settings. These include health care workers treating MERS-CoV patients, other patients receiving treatment for conditions unrelated to MERS-CoV, and people visiting MERS-CoV patients. The specific types of exposure resulting in transmission in the health care setting are currently unknown. The majority of 32 health care worker laboratory-confirmed MERS-CoV cases reported mild or no symptoms and were discovered through contact testing around known cases; however, at least seven experienced severe disease and four have died.

On 5 November 2013, health authorities in Spain notified WHO of a probable MERS-CoV case. The patient, a 61-year-old female, developed symptoms while travelling in Saudi Arabia shortly after performing Hajj. Contact tracing identified a second probable case, a 50-year-old female, presenting with pneumonia, who had travelled with the first patient and had shared a room with her while in Saudi Arabia. Both women had acute febrile respiratory illness with clinical and radiological

evidence of pneumonia. Both recovered and were discharged from hospital. None of 113 close contacts of the two women who travelled with them or were identified in Saudi Arabia or Spain tested positive for MERS-CoV. A laboratory in Spain reported a positive MERS-CoV polymerase chain reaction (PCR) testing the UpE target in a nasopharyngeal (NP) swab from the first patient in early November, although the values for threshold cycles (C_t) were high. In late November, repeat testing of the first patient again found a positive PCR for UpE in NP samples and additionally in sputum, and bronchoalveolar lavage (BAL) samples, with high C_t values. NP lavage samples from the second patient yielded positive MERS-CoV PCR results for the UpE target. All other confirmatory PCR targets (ORF1a and ORF1b) were negative for both patients, including attempted genomic sequencing. All specimens were sent to an outside reference laboratory for confirmatory testing. In the second laboratory, all RT-PCR tests for three MERS-CoV targets (UpE, N and ORF1B) were negative, as were serologic assays of the blood samples drawn two to three weeks after the onset of illness, for both patients.

No other confirmed or probable cases were detected in any pilgrims performing Hajj in the weeks following the pilgrimage.

WHO MERS-CoV activities and upcoming guidance

A two-day consultation with affected countries was held in the WHO office for the Eastern Mediterranean Region in Cairo 15 to 16 December 2013 to review priorities for public health research for MERS-CoV. The participants agreed that a multinational case-control study was urgently needed to determine the exposures that result in human infection

(<http://www.emro.who.int/surveillance-forecasting-response/surveillance-news/consultative-meeting-to-determine-key-research-studies-on-mers-cov.html>).

WHO and ISARIC jointly held a MERS-CoV Outbreak Readiness Workshop on the clinical management and potential use of convalescent plasma 10 to 12 December 2013 in Geneva

(http://www.who.int/csr/disease/coronavirus_infections/MERS_outbreak_readiness_workshop.pdf)

WHO and partners have continued to support countries in preparedness and response. In Qatar, investigations of the cluster of cases identified within a farming complex were supported by WHO, the Food and Agriculture Organization (FAO), and the World Organization for Animal Health (OIE). Follow up support for the development of a sero-epidemiological study protocol, and investigation of routes of transmission has been provided by partners in the Global Outbreak Alert and Response Network (GOARN), including the US Centers for Disease Control and Prevention (CDC), Public Health England (PHE), and National Institute for Public health and the Environment (RIVM), Netherlands. In December, the GOARN Steering Committee reviewed the international technical support provided to Qatar, and earlier in 2013 to Tunisia to investigate a familial cluster of MERS-CoV cases.

Selected MERS-CoV Literature

- The initial investigation around two laboratory-confirmed human cases in Qatar has been published. PCR testing and partial genomic sequencing confirmed the presence of MERS-CoV in three camels in a herd of 14 animals with which both human cases had had contact. However,

the investigation was not able to determine the direction of transmission, whether human-to-animal or animal-to-human. A full investigation, including the testing of other animal species and environmental samples, is ongoing.

Haagmans BL, Al Dhahiry SH, Reusken CB, et al. Middle East respiratory syndrome coronavirus in dromedary camels: an outbreak investigation. Lancet Infect Dis. 2013 Dec 16. pii: S1473-3099(13)70690-X. Available here: www.thelancet.com/journals/laninf/article/PIIS1473-3099%2813%2970690-X/fulltext.

- Investigators from Jordan and the Netherlands published results of serologic investigations in dromedary camels, goats, sheep and cows from the area where the 2012 human cases in Jordan were identified. Neutralizing antibodies against MERS-CoV were found in all camel sera (n=11); all samples from other livestock species were negative.

Reusken C, Ababneh M, Raj V, Meyer B, et al. Middle East Respiratory Syndrome coronavirus (MERS-CoV) serology in major livestock species in an affected region in Jordan, June to September 2013. Euro Surveill. 2013 Dec 12;18(50). pii: 20662. Available at: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20662>.

- Investigators from UAE and Europe tested sera collected in 2003 and 2013 for antibodies against MERS-CoV in dromedary camels in the UAE. They found that all samples from 2003 (n=151) and 59.8% (389/651) of specimens from 2013 had MERS-CoV neutralizing antibodies.

Meyer B, Muller MA, Corman VM, et al. Antibodies against MERS coronavirus in dromedary camels, United Arab Emirates, 2003 and 2013. Emerg Infect Dis 2014 Apr;20(4) (Early online release). Available at: http://wwwnc.cdc.gov/eid/article/20/4/13-1746_article.htm.

- Investigators from Saudi Arabia and Germany reported results of a serologic study of children hospitalized between 2010 and 2011 and adult males who donated blood in Eastern Province, Saudi Arabia, in December 2012. None of the samples had MERS-CoV neutralizing antibodies using a lentiviral vector system bearing the viral spike protein of MERS-CoV.

Gierer S, Hofmann-Winkler H, Albuoli WH, et al. Lack of MERS Coronavirus Neutralizing Antibodies in Humans, Eastern Province, Saudi Arabia. Emerg Infect Dis. 2013 Dec;19(12):2034-6. doi: 10.3201/eid1912.130701. Available at: http://wwwnc.cdc.gov/eid/article/19/12/13-0701_article.htm.

Summary assessment

Infections acquired in health care facilities currently account for more than half of secondary cases. Health care workers and other patients in contact with cases both appear to be at risk. Thus far, transmission in health care facilities does not appear to persist over long periods of time or extend into the community. Most secondary cases who acquired infection in this setting have been mild or asymptomatic; however, several have had severe disease and have died, including workers who provided care for infected patients. Health care providers should be reminded of the need for universal precautions and for infection control measures to be implemented even before the cause of a patient's illness has been determined. Patients for whom clinical suspicion of MERS-CoV is high should be managed as potentially infected, even if an initial test on a nasopharyngeal swab is negative. Repeat testing should be done when the clinical and epidemiological picture suggests

MERS-CoV when initial testing is negative, preferably on specimens from the lower respiratory tract. Infection control guidelines for both home care settings and health care facilities can be found on the WHO MERS-CoV website.

Despite the initial report of probable MERS-CoV cases in Spain, follow-up laboratory testing was unable to confirm MERS-CoV infection in these two patients using specific RT-PCR assays. The women, who had been on an extended visit to Saudi Arabia, raised initial concerns about possible infection related to the pilgrimage of Hajj, which occurred 13 to 18 October 2013. However, other than these two unconfirmed cases, there were no other reports of Hajj-related MERS-CoV patients, despite extensive testing in nearly every country from which Hajj pilgrims originated. At this point, it is clear that neither significant transmission nor exportation of MERS-CoV occurred in association with the Hajj.

The confirmation of MERS-CoV virus in camels in Qatar supports an earlier report of MERS-CoV in a camel in Saudi Arabia and serologic evidence of MERS-CoV in camels from Canary Islands, Egypt, Jordan, Oman and UAE. The earliest findings of antibodies in camels from 2003 in UAE suggest that a similar virus has been circulating in animals for at least a decade. However, most primary human cases do not have a history of direct exposure to animals. More work is needed to determine the route of transmission to humans and the types of exposures that result in infection.

Guidance and tools for carrying out investigations into human cases of MERS-CoV are available on the WHO website:

- [WHO guidelines for investigation of cases of human infection with Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\) pdf, 359kb](#)
- [Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\) Initial Interview Questionnaire of Cases pdf, 114kb](#)
- [Case-control study to assess potential risk factors related to human illness caused by Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\) pdf, 257kb](#)
- [Seroepidemiological Investigation of Contacts of Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\) Patients](#)

Until more information is gathered, it is prudent for individuals at high risk of severe disease, including those with diabetes, chronic lung disease, pre-existing renal failure, or who are immunocompromised, take appropriate precautions when visiting farm environments in the affected area. These include good hand hygiene, avoiding sick animals, and avoiding food that may be contaminated with animal secretions unless they are properly washed, peeled, or cooked.

Countries outside the affected region should maintain a high level of vigilance, especially those with large numbers of travellers or guest workers returning from the Middle East. Surveillance should be implemented in these countries according to WHO guidelines, along with infection control procedures in health care facilities. WHO requests that Member States report all confirmed and

probable cases, along with information about their exposures, testing, and clinical course to inform the most effective international preparedness and response.

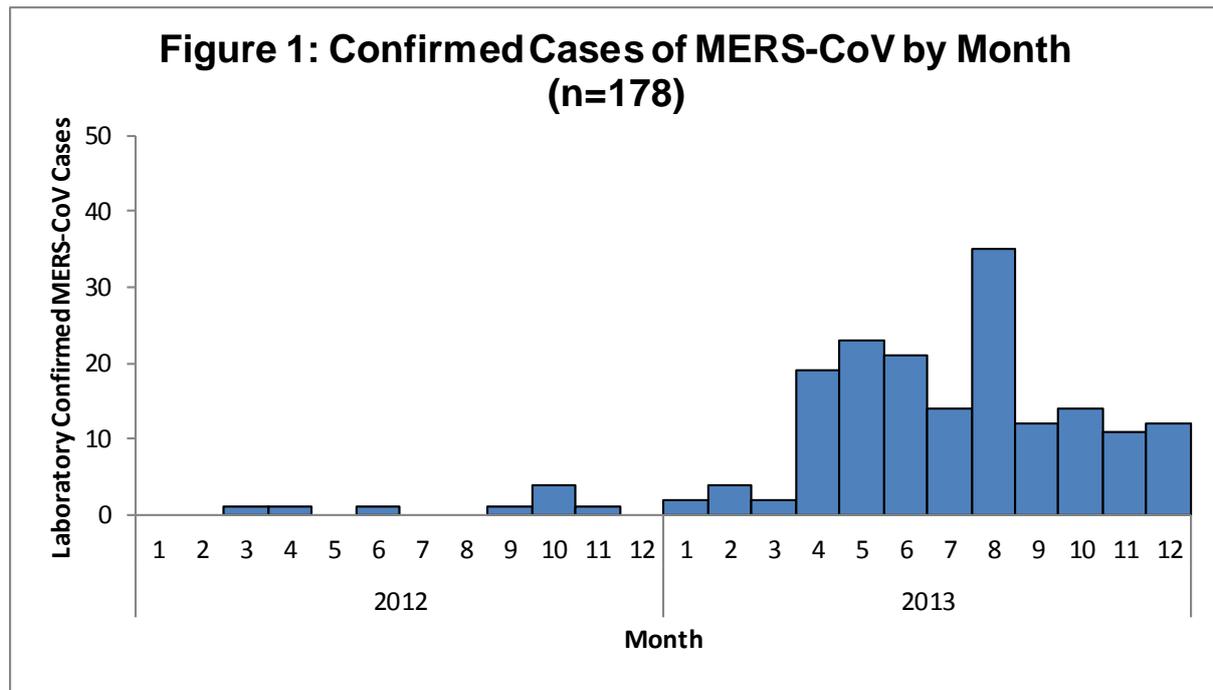


Figure 2: Map of laboratory-confirmed cases of MERS-CoV.

