Middle East respiratory syndrome coronavirus (MERS-CoV): A cluster analysis with implications for global management of suspected cases

Ziad A. Memish, Jaffar A. Al-Tawfiq, Rafat F. Alhakeem, Abdullah Assiri, Khalid D. Alharby, Maher S. Almahallawi, Mohammed Alkhallawi

Ministry of Health, Riyadh, Saudi Arabia
College of Medicine, Alfaisal University, Riyadh, Saudi Arabia
Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia
Indiana University School of Medicine, Indianapolis, IN, USA
Regional Health Directorate, Ministry of Health, Madinah, Saudi Arabia

Key words: Middle East; Clusters; MERS-CoV; RT-PCR; Coronavirus

Summary Since the initial description of the Middle East respiratory syndrome (MERS) in September 2012, a total of 1038 cases of MERS-CoV including 460 deaths have been reported from Saudi Arabia. From August 24, 2013 to September 3, 2013, a total of 397 patients and contacts were tested for MERS-CoV. Of those tested, there were 18 (4.5%) MERS-CoV cases reported in Al-Madinah al-Munawwarah with one large cluster. In this report, we describe the outcome, epidemiology and clinical characteristics of this cluster of which 4 cases involved healthcare workers. Fourteen cases appeared to be linked to one cluster involving healthcare workers (HCWs), family and patient contacts. Of the 18 cases, five (including 2 HCWs) were community acquired, two were household contacts, and 11 were healthcare associated (including 4 HCWs). All except 4 cases were symptomatic and the case fatality rate was 39% (7 of 18). The outbreak resulted in human to human transmission of an estimated 6 cases. Contact screening showed positive test in 1 of 56 (1.8%) household contacts, and 3 of 250 (1.2%) HCWs.

© 2015 Elsevier Ltd. All rights reserved.
1. Introduction

Since Middle East respiratory syndrome (MERS) was described in September 2012, a total of 1038 cases of MERS-CoV including 460 deaths have been reported from Saudi Arabia [1]. The current case fatality rate is lower than the initial rate of 65% [2]. MERS-CoV is known to cause three patterns of transmissions [2–8]: sporadic cases, community-transmission [9] and healthcare associated transmissions such as the case in the Zarqa, Jordan [10,11], Al-Hasa, Saudi Arabia [12] and Jeddah, Saudi Arabia [13,14]. The exact source of the infection for most patients remains unknown. In this report, we describe the outcome, epidemiology and clinical characteristics of this cluster of MERS-CoV in Al-Madinah al-Munawwarah of which 4 cases involved healthcare workers.

2. Methods

All samples were tested in Jeddah regional lab. We included all MERS-CoV cases reported from Al-Madinah al-Munawwarah between August 24, 2013 and September 3, 2013. A confirmed case of MERS CoV is defined as an isolation of MERS CoV from a nasopharyngeal or a respiratory sample by real time reverse transcriptase PCR, as described previously [12,15]. Clinical information included demographic data, clinical symptoms and signs, co-morbidities, and contact with animals.

3. Results

3.1. MERS-CoV cases and clusters

During the study period, a total of 397 patients and contacts were tested for MERS-CoV. There were 18 (4.5%) MERS-CoV positive cases reported in Al-Madinah al-Munawwarah with one large cluster. Of those cases, 15 (83%) were male and 3 (17%) were females. Twelve of the cases were Saudis (67%) and 6 were non-Saudis 33%. There were two possible clusters and two cases were sporadic in nature. The largest cluster included 15 cases and was thought to be initiated by a 55 year-old male resident. He was in the same hospital ward of a 74 year-old Saudi male who was thought to acquire the infection in the healthcare setting. Transmission then occurred in an additional 12 cases as illustrated in Fig. 1. Another case was from Qatar, the son of a patient sharing a room with the second case although the father tested negative for MERS-CoV. The second cluster was from the city of Hanakia located 100 km from Madina, and involved a 56 year-old male healthcare worker (HCW), who then infected another 39 year-old HCW. There was one sporadic case, a 50 year-old HCW, who had no contacts with other cases. The majority of the cases (61.1%) were healthcare associated infections and primary cases constituted 27.8% and intra-familial transmission was only 11.1%.

Figure 1  Summary of Cluster of MERS-CoV cases.

Please cite this article in press as: Memish ZA, et al., Middle East respiratory syndrome coronavirus (MERS-CoV): A cluster analysis with implications for global management of suspected cases, Travel Medicine and Infectious Disease (2015), http://dx.doi.org/10.1016/j.tmaid.2015.06.012
Primary cases, and in our series only one patient had camel contact, especially with camels is uncommon among expansion of the infection in the healthcare setting [5]. An interesting observation in this report is the link of one of the MERS cases from Qatar to this healthcare associated cluster. Travel associated MERS cases were reported from: Turkey, Austria, United Kingdom, Germany, France, Greece, the Netherlands, Tunisia, Algeria, Malaysia, Philippines, China, and the United States of America [17]. The current report illustrates the pattern of transmission of MERS-CoV with case fatality rates [16]. Screening of contacts yielded less than 2% positivity among HCWs and family contacts. In a large screening of contacts, MERS-CoV was detected in 1.12% of HCWs contacts and in 3.6% of family contacts [15]. However, the majority of the cases were acquired within healthcare facilities similar to the Al-Hasa and Jeddah outbreak [12–14]. The outbreak highlights the importance of infection control and early recognition and isolation of suspected cases [5]. The Kingdom of Saudi Arabia also hosts one of the largest mass gathering in the world hosting millions of pilgrims during the annual Hajj where pilgrims visit the holy cities of Makkah and Al-Madinah [7]. The occurrence of MERS-CoV transmission during the annual Hajj and subsequent development of a global epidemic is of a great concern. Respiratory samples were obtained from all MERS suspected cases during 2013 Hajj season and all samples tested negative for MERS-CoV [20]. A cohort of 129 French Hajj pilgrims were systematically sampled in 2013 with screened for MERS-CoV using nasal swabs prior to returning to France [21]. Although, the majority (90.7) had respiratory symptoms, none was tested positive for MERS-CoV [21]. In 2012 and 2013 Hajj season, a total of 5 million pilgrims from 22 countries in 2013 showed no positive MERS-CoV were detected during or after the Hajj [22]. Screening of 5235 adult pilgrims from 22 countries in 2013 showed no positive MERS cases using nasopharyngeal swabs [23]. Although only rare cases have been associated with the Umrah pilgrimage so far, there is a need for continuing surveillance among travelers, pilgrims and HCW attending pilgrims [24].

Conflict of interest
None.

Acknowledgments
We are grateful to the staff of the Ministry of Health in Al-Madinah area and the staff of the regional laboratory, Kingdom of Saudi Arabia.

Figure 2 A map of the Kingdom of Saudi Arabia showing main clusters: Riyadh (The Capital); Hofof (Al-Hasa 2013 outbreak); Jeddah (2014 outbreak); and the holy Cities Makkah and Al-Madinah (the described outbreak in this report).
References


