

Letter to the Editor

## What can we learn from MERS outbreak in South Korea?



Since 20th May 2015, the world has been paying significant attention to the emerging outbreak of Middle East Respiratory Syndrome (MERS), rather than in the Middle East but in South Korea. According to the report of the Ministry of Health and Welfare's Central MERS Response Team, as of 11 Jun 2015, the number of South Koreans diagnosed with the Middle East Respiratory Syndrome (MERS) increased to 122 since the first case was reported, including 9 deaths [1]. More than 2800 persons have been quarantined and hundreds of schools have been closed. The number of MERS cases in South Korea has been the second all around the world, only less than that of Saudi Arabia. As reported, one case occurred in a Korean man who traveled to China and had been confirmed to have close contact with two relatives with MERS-CoV infection, and this patient became the first reported case in China.

### 1. The earliest MERS patients

The index case was a 60-year-old man who presented with acute pneumonia and subsequent renal failure with a fatal outcome in Saudi Arabia in June, 2012 [1]. A novel coronavirus was isolated from the sputum of the patient in Erasmus Medical Center (EMC) in Rotterdam, Holland, therefore, initially it was called the EMC coronavirus. According to a retrospective survey, the earliest MERS cases from Jordan were found at April 2012, which were the first cases of cluster. Both the 2 cases were found in medical staffs and they both died later. Since the sources of all the MERS patients were associated with the Middle East, the WHO in May 2013 named it as Middle East Respiratory Syndrome [2,3].

### 2. The clusters

During the past three years, the clusters of MERS have been reported for many times (more than ten), with only a few clusters were found with hundreds of cases. The known data showed that nosocomial infections accounts for most of the cluster cases, mainly occurred in medical staffs, and secondary in the family members of the MERS patients or other people who had close contacts with the MERS-CoV infected patients. However, there is still not very clear about how the medical staff became infected, what the Personal Protective Equipment (PPE) they used and how the standard precautions in these

hospitals were implemented. The following is the cluster outbreaks in hospital.

A cluster occurred from October to November 2012 in four men of a family in Riyadh, Saudi Arabia, two of whom died. None of the 24 other family members who lived with the infected patients or 124 healthcare workers who had contact with them became infected [4,5]. In April 2013, another cluster of 23 confirmed cases of MERS-CoV was detected in Al-Hasa in the Eastern Province of Saudi Arabia. Almost all cases were directly linked to person-to-person exposure. Most of them are in the hemodialysis (9 cases) or intensive care (4 cases) units of a same hospital. Two cases are healthcare workers. Three family members of over 200 household contacts (all of whom had visited the hospital) were proven infected [1,5]. More than 500 cases was reported in Saudi Arabia and the United Arab Emirates in March and April 2014, the majority represented hospital-based outbreaks in the Saudi Arabian cities of Jeddah (255 cases), Riyadh, Tabuk, and Madinah and in Al Ain City, Abu Dhabi, United Arab Emirates, and included cases in healthcare workers, patients admitted for other medical problems, visitors, and ambulance staff. 75% of those cases had known sources of exposure. However, there has been no clear evidence of sustained community transmission of MERS-CoV. Of the family members, 7 of 554 were infected (1.3%) [4–6].

### 3. The importance of hospital infection control

From the current reported cases in the South Korean, the epidemic is primary caused by hospital infection. After 9 days of onset, the first case was diagnosed and isolated, which suggested the importance of early detection and hospital infection control. The reported cases in South Korea were distributed at least 9 hospitals, but the involved hospitals are as many as 26 or even more. Because of the numerous contacts, there will be more new cases reported in the future.

The exact source and mode of transmission of MERS-CoV to human beings is unknown. Initial investigations suggested that MERS-CoV originate in bats, however, MERS-CoV has never been isolated from bats.

Recent studies suggested that dromedary camels may be the intermediate host of MERS-CoV, and human can be infected through contact with infected dromedary, for example, exposure to secretion, excreta (urine and stool), undercooked dairy

or meat products. The virus appeared to be able to spread from human to human through respiratory droplets, and it can also spread through close contact with secretions or excretions of the patients infected by MERS-CoV.

The early symptoms of MERS include fever, chills, fatigue, headache, muscle pain, etc., followed by cough, chest pain, dyspnea [5,6]. About 30% of the cases may suffer from vomiting, abdominal pain, diarrhea and other symptoms. The severe cases can develop severe pneumonia within 1 week, which may lead to acute respiratory distress syndrome (ARDS), acute renal failure, and even multiple organ failure (MODF). It is worth noting that a considerable portion of the patients develop diarrhea firstly in the early onset.

The chest radiography abnormalities could be from 90% to 100% in MERS Patients. But the image findings on chest radiography can range from minimal to extensive abnormalities, it presented with viral pneumonitis and acute respiratory distress syndrome, with bilateral hilar infiltration, unilateral or bilateral patchy densities or infiltrates, segmented or lobar opacities, ground-glass opacities [7–10]. The clinical manifestations of MERS are diverse and complex, short of specificity, so it is difficult to make early diagnosis. The medical staff should pay attention to the epidemiological history and should strengthen the hospital infection control measures and perform standard precautions.

## References

- [1] 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* 2012;367:1814.
- [2] World Health Organization. Global alert and response. Novel coronavirus summary and literature update — as of 17 May 2013. <http://www.who.int/>

[csr/disease/coronavirus\\_infections/update\\_20130517/en/index.html](http://www.who.int/csr/disease/coronavirus_infections/update_20130517/en/index.html) [accessed 17.05.13].

- [3] World Health Organization. Global alert and response. Novel coronavirus infection — update. [http://www.who.int/csr/don/2013\\_02\\_16/en/index.html](http://www.who.int/csr/don/2013_02_16/en/index.html) [accessed 17.02.13].
- [4] Memish ZA, Zumla AI, Al-Hakeem RF, Al-Rabeeh AA, Stephens GM. Family cluster of Middle East respiratory syndrome coronavirus infections. *N Engl J Med* 2013;368:2487.
- [5] Assiri A, McGeer A, Perl TM, Price CS, Al Rabeeh AA, Cummings DA, et al. Hospital outbreak of Middle East respiratory syndrome coronavirus. *N Engl J Med* 2013;369:407.
- [6] Zumla A, Hui DS, Perlman S. Middle East respiratory syndrome, Published Online June 3, 2015 [http://dx.doi.org/10.1016/S0140-6736\(15\)60454-8](http://dx.doi.org/10.1016/S0140-6736(15)60454-8).
- [7] Assiri A, Al-Tawfiq JA, Al-Rabeeh AA, Al-Rabiah FA, Al-Hajjar S, Al-Barrak A, 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* 2013;13:752–61.
- [8] Ajlan AM, Ahyad RA, Jamjoom LG, Alharthy A, Madani TA. Middle East respiratory syndrome coronavirus (MERS-CoV) infection: chest CT findings. *AJR Am J Roentgenol* 2014;203:782.
- [9] Arabi YM, Arifi AA, Balkhy HH, Najm H, Aldawood AS, Ghabashi A, et al. Clinical course and outcomes of critically ill patients with Middle East respiratory syndrome coronavirus infection. *Ann Intern Med* 2014;160:389–97.
- [10] Das KM, Lee EY, Enani MA, AlJawder SE, Singh R, Bashir S, et al. CT correlation with outcomes in 15 patients with acute Middle East respiratory syndrome coronavirus. *AJR Am J Roentgenol* 2015;204:736.

Rongmeng Jiang  
Beijing Ditan Hospital, Beijing, China  
E-mail address: 13911900791@163.com.

1 June 2015

Available online 25 June 2015