

The Korean Middle East Respiratory Syndrome Coronavirus Outbreak and Our Responsibility to the Global Scientific Community

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The Korean outbreak of Middle East Respiratory Syndrome coronavirus (MERS-CoV) involved 186 cases including 38 fatalities [1]. The MERS-CoV was imported by a returning traveler from the Middle East on May 4th, 2015. He developed fever 7 days after returning and was diagnosed with MERS-CoV infection on May 20th, 2015. The infection had spread within the hospital, and subsequently to other hospitals because of patient movements, resulting in nosocomial spread at 16 hospitals [1]. The epidemic lasted for 2 months, with the government declaring a “virtual” end to the epidemic on July 6th, 2015. In order to control the outbreak, 16,993 individuals were quarantined for 14 days, with the economic loss estimated at 9311 billion Korean Won [2].

Superspreading is the most important epidemiological characteristic of the MERS-CoV outbreak in Korea. The largest clusters of cases (>10) occurred at Samsung Medical Center (90 cases) [3], Pyeongtaek St Mary’s hospital (37 cases), Daecheong Hospital (14 cases) [4], and Konyang University Hospital (11 cases), collectively accounting for 82% of the total cases. The outbreaks at Daecheong Hospital and Konyang University Hospital (Hospital A and B, respectively) were initi-

ated by the same index case (designated as patient #16 by the government).

In this issue of the Journal [5], Park et al. reported the clinical and epidemiological findings of the MERS-CoV outbreak at Hospitals A and B. They showed that the median time from symptom onset to the development of pneumonia was 6 days for patients at Hospital A, and 3 days at Hospital B. They also found that the case fatality ratio was 30.8% (4/13) at Hospital A, and 70% (7/10) at Hospital B. Based on these findings, they suggested that the index patient might have shed higher titers of MERS-CoV in respiratory secretions during his admission at Hospital B than at Hospital A. His chest computerized tomography scans obtained on May 28 (at Hospital B) showed more extensive infiltrates than that obtained on May 22 (at Hospital A).

It is plausible that a higher infective dose of MERS-CoV can lead to a shorter incubation period and more severe pneumonia. A recent study showed that a shorter incubation period was associated with a higher risk of death [6]. The authors reported viral shedding kinetics of MERS-CoV in a separate journal [7], showing that the peak titers of MERS-CoV in respi-

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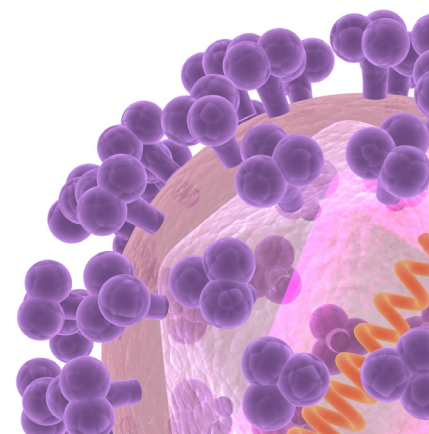
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ratory samples were similar among the moderate, severe and fatal groups. These results suggest that severe pneumonia is possibly a result of host immune response to MERS-CoV, rather than the virus infection per se, as in severe acute respiratory syndrome [8]. Indeed, a recent autopsy study showed that the pathologic basis for MERS-CoV pneumonia was pulmonary edema, type 2 pneumocytes hyperplasia, diffuse alveolar damage with hyaline membrane formation, and interstitial pneumonia with lymphocytic infiltration and syncytium formation [9]. Therefore, a patient with severe pneumonia does not necessarily shed a higher titer of MERS-CoV in the respiratory secretion, and is not necessarily more infectious .

It is of note that MERS-CoV was transmitted to the patients in 4 different rooms at Hospital A, whereas it was transmitted to only one other patient, excluding the roommates of the index patient, at Hospital B. The index patient was staying at Hospital A from May 22nd. to May 28th and at Hospital B from May 28th to May 30th. He did not receive any aerosol generating procedures during the admission at Hospital A, whereas he received nebulizer therapy and underwent bronchoscopy at Hospital B. If MERS-CoV had been transmitted via the airborne route, a more widespread area of infection is likely to have occurred at Hospital B. Then, why did MERS-CoV spread more widely at Hospital A than Hospital B? Had the patient interacted with the patients in other rooms, and transmitted the virus by droplet contact? Had a nurse with possible MERS-CoV contamination on her hands, contaminated the surroundings in other rooms, leading to other patients being infected via fomite contact?

One year has passed since the Korean MERS-CoV outbreak; however, several associated questions are still not answered. We need detailed epidemiological, clinical, and virological studies to better understand the Korean MERS-CoV outbreak. Moreover, in order to aid prevention and control of MERS-CoV outbreak in future, the results of the related studies should be shared promptly with the international community. It is our duty as a member of the global scientific community, and it is long overdue.

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