Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Isolation in real life: lessons from MERS-CoV in Thailand

Sir,

In the era of globalization, the healthcare facility has become an important factor in infectious disease epidemics.[1,2] Because of the importance of continual vigilance in controlling infectious diseases, the preparation for early identification, isolation, and treatment of Middle East respiratory syndrome coronavirus (MERS-CoV) began immediately after the first case was reported in Saudi Arabia in 2012.[2,3] This preparation was especially important for Bumrungrad International Hospital (BIH) because it serves patients from many countries including a significant number from the Middle East.

On June 15th, 2015, an Omani male from the Middle East presented to the emergency department at BIH with dyspnoea. He had been recently hospitalized in his home country for a respiratory infection. Because of this symptom, his recent hospitalization in his home country and his history of recent travel from the Middle East, the patient had a surgical mask placed over his nose and mouth 7 min after registration and screening. On examination his vital signs showed temperature 37°C, pulse 93/min, blood pressure 154/86 mmHg, respiratory rate 24/min, and oxygen saturation 94% on room air. Physical examination revealed tachypnoea and rales in the right lung field. A chest radiograph showed opacification of the right upper and right lower lung fields. Because MERS-CoV was suspected, an infectious disease specialist was immediately consulted and the patient was admitted into a negative pressure room in the intensive care unit with full isolation precautions. Following Ministry of Public Health (MOPH) guidelines for patients who are not intubated, only nasopharyngeal swabs were initially performed for real-time polymerase chain reaction. This first sample yielded a weakly positive result for MERS-CoV at a referral laboratory. This led to a second set of nasal swabs being collected; these were sent to three referral laboratories, one of which was the National Institute of Health, MOPH laboratory. These samples were reported to be negative. However, to be certain of a negative result, a third sample, this time of sputum, was collected and sent to a fourth laboratory certified by the World Health Organization. This sample was reported positive for *UpE*, *ORF1a*, and *RdRp* genes. The patient was then transferred to Bamrasnaradura Infectious Diseases Institute where he received supportive care and recovered.

Because the patient was initially suspected to have MERS-CoV, he had a surgical mask placed within 7 min of registration in the emergency department. He was isolated in the emergency department and then admitted to a negative pressure room in the intensive care unit. Simultaneously, the MOPH was contacted and an investigation was begun by the government epidemiologist. The MOPH team came to the hospital and evaluated the individuals who had been in contact with the patient. A total of 101 individuals, including hospital staff and relatives of the patient, were evaluated for isolation. The hospital infection control team and the MOPH epidemiologist collaboratively determined the risk for contracting the infection for each individual. Twenty individuals (20%) were considered to be at high risk of contracting the infection; 25 (24%) at low risk; and 56 (56%) at extremely low risk. Twenty-one individuals (21%) were isolated in the hospital, two (2%) in another hospital, 13 (13%) were placed under quarantine in a house outside the hospital, and 65 (64%) self-monitored at home. The hospitalized patients were placed in a single hospital ward with the individuals at high risk physically separated from the lower risk individuals in a different area of the ward separated by empty rooms. The high risk individuals were placed in rooms with more rapid air turnover.

After the report of negative results from three laboratories on the second set of nasal swabs, isolation of all the individuals was terminated. Five hours later, the third sample was reported to be positive. At that time all the original contacts, three relatives, and 23 hospital staff who had come into contact with the patient during the 5 h interval before isolation was reinstated were again isolated. The duration of the isolation was based on the determination of the risk group by the MOPH epidemiologist and the hospital infection control team. None of the patients, relatives, or staff became infected.

Early identification that the patient was at high risk of having MERS-CoV occurred because the hospital had recently established a screening procedure for MERS-CoV; indeed only two days prior to the presentation of the patient a simulation exercise had been undertaken of a patient presenting with MERS-CoV to the emergency department. Further, the emergency department physician was knowledgeable about MERS-CoV and the translator noted the unique accent and speaking style of the patient, identifying him to be from the endemic area in the Middle East.

Although the result of the third sample was not yet known, the isolation was terminated after consultation between the MOPH team and the hospital infection control team. This

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decision was made based on the negative results from the second set of samples and the opinion that the third sample was unlikely to yield a positive result and was only obtained to make absolutely sure that the result was negative. The decision was also based on the significant negative impact of the isolation on the hospital staff when the chance of the patient having MERS-CoV was assessed to be very small. The finding of a false-negative result is not rare in medicine and could have negatively affected the outcome; however, it ultimately did not affect the outcome because of the rapid response to the positive result reported for the third sample.

Partnership between the MOPH and hospital infection control teams was critical in the successful management of the process. This partnership optimized the deployment of staff, allowing hospital services to proceed uninterrupted with minimal impact on the other patients.

Social cohesion played an important role in making the isolation process effective.[4] Without adequate information being transmitted to isolated individuals they might have undermined our isolation practices.[2] Discussion with the quarantined individuals helped to proactively identify their needs. Solutions provided by the hospital management team for the isolated individuals included providing child care for family members and mitigating the financial impact of being unable to work. Daily risk re-classification was accomplished based on routine clinical assessment, new laboratory findings and updated interviews with the isolated individuals. Based on social cohesion concepts, the physical spacing resulted in proximity of the hospital staff at the same risk level.

Although the control of infectious disease epidemics has been generally perceived negatively by the public, our experience with MERS-CoV provided invaluable social benefits to the hospital and the country. The financial cost of the isolation was minimized to both the staff and the hospital. The social impact on the staff of the hospital was also minimized by frequent communication with the affected staff and with the hospital staff as a whole. The manner with which the hospital effectively collaborated with the MOPH in preventing significant exposure of the staff and public to MERS-CoV was recognized by both the public and the press, and serves as an excellent model in responding to this potentially dangerous infectious disease.

In summary, our healthcare facility successfully prevented an infectious disease epidemic in a country in an era of globalization and medical tourism. Early and effective communications with the public health authorities resulted in a collaborative process that maximized the health of the community, minimized the impact on the individuals involved in the isolation procedure, and minimized the operational and financial impact on the hospital.

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