in South Korea during the care of patients with known status of MERS infection[8] whereas there was no seroconversion case among the 443 HCP with adequate personal protective equipment during the 2015 MERS outbreak in South Korea.[9]

In summary, there was no evidence of MERS-CoV infection among the HCP who participated in the care of 30 patients in NMC although a substantial proportion of HCP reported that they experienced MERS-like symptoms during the patient care period. Our results suggest that risk of MERS acquisition among HCP is low under stringent infection control measures.

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Middle East Respiratory Syndrome Coronavirus Transmission in Dialysis Unit and Infection Control Interventions in Korea

In May 2015, a Korean was diagnosed with Middle East respiratory syndrome (MERS) coronavirus (CoV) infection after travel to the Arabian Peninsula. Within 1 month, there was the largest outbreak outside the Middle East with 186 laboratory-confirmed MERS-CoV infections resulting in 36 fatalities.[1] There were relatively few cases of MERS-CoV infection in patients requiring chronic hemodialysis. Here we report the precaution measures, hemodialysis methods, and outcomes of the contacted patients in our dialysis unit (DU).

At the time of the MERS outbreak in 2015, precaution measures were applied in our hospital. All visitors had their body temperatures monitored and were encouraged to perform hand hygiene before entering the hospital. If a person reported respiratory symptoms, such as cough, sputum, or dyspnea, a surgical mask was applied. Surgical masks were applied to all patients in the DU regardless of respiratory symptoms.

During the outbreak, 1 hemodialysis patient in our hospital was confirmed to have MERS-CoV infection. The beds in the DU are spaced approximately 1.2 meters apart without screens. During the hemodialysis sessions, 1 nurse usually cares for 6 patients, making both the patients and the healthcare providers (HCPs) vulnerable to the transmission of infectious diseases.

The patients and HCPs in the DU were isolated. Contact was classified according to the closeness and the timing of the contact. Grade 1 contact means that the person stayed within 2 meters of the index patient. Grade 2 contact means that the person stayed in the DU while the index patient was undergoing hemodialysis. Grade 3 contact means that the person stayed in the DU at different times but possibly contacted the index patient indirectly.

All hemodialysis patients were hospitalized in isolation rooms. For individual isolation hemodialysis (IIH), 25 hemodialyzers were installed in the inpatient wards. In the DU, 7–8 patients underwent cohort hemodialysis (CH) at 1 session. HCPs caring for those patients utilized contact and droplet precautions with level D personal protection equipment in accordance with World Health Organization recommendations,[2] including waterproof disposable gowns, gloves, face shields or goggles, and N95 masks. After each hemodialysis sessions, DU and IIH rooms were disinfected.

Sputum or throat swab specimens were obtained for real-time reverse-transcriptase polymerase chain reaction (RT-PCR) testing. RT-PCR tests were performed for surveillance at the beginning and end of the isolation, and when the patient had symptoms possibly related to MERS. At 2 and 4 weeks after exposure, blood samples were collected for serologic testing for MERS-CoV.

A total of 104 patients and 18 HCPs were exposed to MERS-CoV in the DU. There were 92 patients undergoing regular hemodialysis and 12 peritoneal dialysis patients visiting the DU. Fifty patients underwent IIH and 42 patients underwent CH. During the CH sessions, the distances between the beds were extended to 2.5 meters. The patient characteristics are summarized in Table 1.

During the isolation, 23 patients (22.1%) developed symptoms possibly related to MERS. Two patients died of aspiration pneumonia during the isolation. RT-PCR test results of 23 patients with symptoms were all negative.

The results of RT-PCR surveillance were all negative. Serologic testing was performed in 84 patients who consented to the test and the results were negative in all patients.

Because hemodialysis patients must continue hemodialysis in the DU, complete isolation is more difficult and the risk of exposure to infectious diseases is increased. As a result, when one patient is diagnosed with an infection such as MERS, there is a high risk of transmission through possible continuous exposure within the DU. To our knowledge, ours is the first case of isolating hemodialysis patients with direct or indirect contact with MERS-CoV.

In our hospital, there were no additional MERS-CoV infections among 104 dialysis-dependent patients. We believe this was because the precaution measures and isolations were effective. During the MERS outbreak, we practiced intensified precaution measures for dialysis patients, given their increased susceptibility to infection.[3,4] In a report from Saudi Arabia in 2013, there were 9 additional MERS-CoV infections in the DU from 1 confirmed patient without precaution measures.[5]

TABLE 1. Characteristics of 104 Patients in Study of MERS-CoV in Dialysis Unit

Variable	Value
Age, mean ± SD, y	60.5 ± 13.7
Male sex	55 (52.9)
Type of dialysis	
HD	92 (88.5)
PD	12 (11.5)
Grade of exposure	
Grade 1	14 (13.5)
Grade 2	14 (13.5)
Grade 3	76 (73.1)
Admission	75 (72.1)
Patients with symptoms	23 (22.1)
Diarrhea	9/23 (39.1)
Fever	8/23 (34.8)
Cough	6/23 (26.1)
Sputum	6/23 (26.1)
Chills	1/23 (4.3)
Myalgia	1/23 (4.3)
Dyspnea	1/23 (4.3)
Sore throat	1/23 (4.3)
MERS PCR	
Negative at baseline	92/92 (100.0)
Negative after 2 weeks of isolation	90/90 (100.0)

NOTE. Data are no. (%) of patients unless otherwise specified. CoV, coronavirus; HD, hemodialysis; MERS, Middle East respiratory syndrome; PCR, polymerase chain reaction; PD, peritoneal dialysis.

There are some reports on the management of SARS in hemodialysis patients.[6–8] But there are no data on the effect of precaution measures for hemodialysis patients who have contacted a SARS case. One study showed that surgical masks would be helpful for preventing transmission of SARS in patients in the DU.[9] Though the World Health Organization recommended the N95 mask in the precaution measures for MERS,[2] it can cause physiological stress. One Taiwanese study showed that wearing the N95 mask for 4 hours during hemodialysis significantly reduced P_aO_2 and increased adverse respiratory outcomes in hemodialysis patients.[9]

With a large number of patients exposed to an infection in the DU, isolation and IIH are practically impossible owing to limited space as well as device and HCP availability. We isolated and classified all patients. IIH was performed for patients with grade 1 exposure or those with symptoms possibly related to MERS. CH was performed for patients with grade 2 or 3 exposure and no symptoms possibly related to MERS. Because fewer patients stayed in the DU, we could maintain more space between the patients during CH, reducing the possibility of transmission.

IIH and CH were performed to prevent further transmission of MERS. Because there was no further infection, we could not determine whether this measure was effective or not.

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During a MERS outbreak, surgical masks, appropriate hand hygiene, and body temperature monitoring would be useful as precaution measures for hemodialysis patients. In the case of confirmed MERS in the DU, IIH and CH would be the means of maximum isolation minimizing possible secondary transmission with limited facilities and manpower.

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Standardizing Direct Observation for Assessing Compliance to a Daily Chlorhexidine Bathing Protocol Among Hospitalized Patients

An efficacious intervention for preventing health care-associated infections is daily bathing with chlorhexidine gluconate (CHG).[1] Consequently, many hospitals in the United States have implemented CHG bathing in their intensive care units (ICUs) and non-ICU units.[2] With the increasing implementation of CHG bathing in healthcare facilities, it is important to monitor compliance to ensure that CHG baths are appropriately conducted and to identify potential opportunities for improving the process.

Most studies on compliance with CHG bathing procedures have used bathing product purchasing data[3] or inventory assessments as proxy measures of compliance.[4] Direct observations of CHG bathing may be a preferred method for assessing compliance and for understanding the overall process. Direct observation is an effective method for collecting real-time, naturalistic behavioral information about a specific process,[5] and this method is commonplace in infection prevention.

Herein, we describe our experience training observers to conduct CHG bathing observations, and we present findings from pilot observations.

METHODS

Training of New Observers

An experienced observer trained 2 new observers using a CHG bathing training manual (with components for both ICU and non-ICU CHG bathing) created by a multidisciplinary team. The training manual is available on our website (http://cqpi.wisc.edu/1758.htm). New observers (trainees) were given 3 days to read the training manual; then they met with the experienced observer, who reviewed each item on the data