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Middle East Respiratory Syndrome Coronavirus: What Do We Know?

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ABSTRACT

Middle East respiratory syndrome coronavirus is a viral respiratory infection initially reported in the Saudi Arabian peninsula in 2012. This epidemic has crossed from Middle Eastern countries into many European and Asian countries. Recently, the United States and United Kingdom have also been impacted. Although there is very little information about its transmission, it is important for the advanced practice nurse to be updated on the current information provided by the Centers for Disease Control and World Health Organization. This report addresses the risks, symptoms, diagnosis, and implications related to Middle East respiratory syndrome coronavirus.

Keywords: MERS-CoV, Middle East respiratory syndrome, respiratory infection, viral, zoonotic transmission

Middle East respiratory syndrome coronavirus (MERS-CoV) is a viral respiratory infection initially reported in the Saudi Arabian peninsula in 2012. Today, it is considered an epidemic, crossing from the Middle Eastern countries of United Arab Emeritus, Qatar, and Kuwait into many European and Asian countries. The United States and United Kingdom have also been impacted by the MERS-CoV epidemic. Most recently, and as reported by the World Health Organization (WHO), there have been 699 recorded cases worldwide with varying prognoses, approximately 209 deaths, and the majority of cases occurring in men with a median age of 47 years.[1]

In their 2014 report, "Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus," the Centers for Disease Control and Prevention (CDC) expressed concern about the suspected high rate of mortality and morbidity among patients infected with MERS-CoV, as evidenced by limited human-to-human transmission, symptomology that mimics other respiratory infections, unknown mode of transmission, as well as lack of proper antiviral medications and vaccination. The virus comes from the coronavirus family that has "…crown-like projections on their surfaces and are among the viruses that cause the common cold,"[2 (p. 56)] and other respiratory type syndromes. It has been suggested that this virus is found primarily in bats and camels. Camels are indigenous to the Middle Eastern countries initially impacted. Although exact transmission remains unknown, it is suggested that zoonotic transmission between camels and humans through the respiratory route is a possible cause.[3]

Thus far, in the US there have been two reported cases of MERS-CoV, both occurring in May 2014. The first was reported in Indiana in a man from Saudi Arabia (SA) who both lives and works in the health-care field in SA. Another person, from Illinois, who was reported to be in contact with the SA visitor, tested positive for MERS-CoV. A second case, similar to the first, was confirmed in a male health-care worker from SA who traveled to Florida. Both patients were admitted, placed in isolation, and discharged after being treated and having been confirmed as no longer a viral threat to the community.[4]

WHO IS AT RISK?

Both CDC (2014) and WHO (2014) have both proposed that recent travelers from the Middle East or Arabian Peninsula are at high risk. They also suggested that those in close contact with someone who either traveled to that region or has somehow been exposed to the virus (ie, camel farm or slaughterhouse) are also at risk. Persons with severe

disease or chronic illness, or who are immunocompromised, are also at increased risk for exposure and infection. These persons should take precautions when traveling to the Middle East or Arabian Peninsula, or when coming in close contact with an infected individual traveling from that region.[1,5] Precautions should include frequent hand washing, avoiding touching mucous membranes, avoiding any close contact with persons who are ill, and following up on all immunizations about 4 to 6 weeks before travel.[6] WHO suggests that the increase in outbreak in a number of hospital-acquired cases may be related to a lack of proper infection control and prevention measures.[1] Health-care workers should always use standard precautions, specifically droplet precautions in cases of acute respiratory illness of unknown etiology. Presently, CDC and WHO do not advise any special screening or travel restrictions, but only encourage standard precaution and vigilance.

WHAT ARE THE SYMPTOMS AND CLINICAL MANIFESTATIONS OF MERV-COV?

Patients under investigation include those who present with acute respiratory distress syndrome with a fever greater than 100.4°F, and radiographic evidence of consolidation related to parenchymal disease.[7] Patients must also have recently traveled from in or around the Arabian Peninsula within 14 days, have come in close contact with a traveler to that area within the last 14 days, or are from a cluster of patients who demonstrate acute respiratory disease with unknown etiology. Patients are considered susceptible if they present with a fever of greater than 100.4°F and symptoms of respiratory illness with unknown etiology, or had been in a health-care facility within the past 14 days and may have come in close contact with an infected individual.[7] The average incubation period from time of exposure to presence of symptoms is 2 to 13 days, with an average of 5 days.[7]

Patients with MERV-CoV will initially present with pneumonia-like symptoms; however, extreme cases may not only present with acute respiratory distress, but also renal failure, pericarditis, and/or disseminated intravascular coagulation. It is necessary to identify the clinical manifestation of the disease for proper management, because, in rare cases, this disease may rapidly progress to septic shock or fatal multiorgan failure.[7] Common symptomology includes fever, chills/rigor, headaches, nonproductive cough, dyspnea, malagia, and coryza type. Associated gastrointestinal symptoms of diarrhea, nausea, and vomiting may also be present. Low-risk/uncomplicated patients who develop cold-like symptoms were found to recover fairly quickly. Immunocompromised patients, or patients with preexisting medical conditions, including diabetes, cancers, and chronic lung, heart, or kidney disease, were more at risk for more severe complications, hospitalization, and admissions to the intensive care unit.[8] Although transmission of the disease is time limited, there is currently no research suggesting ongoing spread into the community.[9]

HOW IS THE VIRUS DIAGNOSED?

Confirmation of the virus requires positive polymerase chain reaction on at least two specific genomic targets or a single positive target with sequencing on a second target.[10] Molecular tests are currently being developed to diagnose active infections. Most state labs in the US are approved to test for MERS-CoV by using a real-time reverse transcription polymerase chain reaction assay; however, there is currently no Food and Drug Administration cleared or approved test available in the US.[10] Two consecutive negative real-time reverse transcription polymerase chain reaction assays will confirm the patient as negative for the virus. Serology tests are also conducted in patients suspected to have had a previous infection. The presence of antibodies to MERS-CoV may indicate a previous infection and immunity. Radiographic assessments may rule out other respiratory infections and pneumonia.[10] Laboratory values will demonstrate leukopenia, lymphopenia, thrombocytopenia, and elevated lactic dehydrogenase levels, whereas radiographic images will show either unilateral or bilateral consolidation or patchy densities.[7]

WHO and CDC both advise that lower respiratory tract specimens of sputum, endotracheal aspirate, or bronchoalveolar lavage should be considered when diagnosing patients presenting with the aforementioned symptoms.[11,12] In patients who are strongly suspected but unable to produce a lower tract specimen or present with suggested symptoms, a nasopharyngeal or oropharyngeal swab should be