

MERS-CoV: A Persistent Threat to International and U.S. Force Public Health

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As new biological threats emerge around the world, deployed personnel risk encountering these agents both on the battlefield and during peacetime. The current outbreak of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) continues to cause unrest and confusion and thus remains a threat to U.S. forces. MERS-CoV was first detected in late 2012, when a man died of pneumonia and kidney failure of unknown cause in Saudi Arabia. [1] Upon virus isolation and growth, it was determined that the causative agent was a novel coronavirus, initially named human coronavirus EMC (for Erasmus Medical Center, where the virus was identified and characterized). MERS-CoV is related to Severe Acute Respiratory Virus (SARS-CoV), which caused a pandemic after first emerging in 2003. However MERS-CoV is genetically distinct and has unique clinical manifestations. [2,3] Since 2012, the World Health Organization has confirmed 1,368 individual cases of MERS-CoV and 490 related deaths on four continents, and the international public health community has moved to respond to the global threat caused by MERS-CoV (Figure 1). [4]

MERS-CoV has an incubation of time of anywhere from 2-14 days, during which the infected individual is not thought to be contagious. MERS-CoV infection manifests as acute pneumonia, with early presenting symptoms nonspecific (flu like symptoms, sore throat, nonproductive cough). [2,5] Infected individuals typically deteriorate within days of the initial symptoms and develop respiratory failure with possible extrapulmonary manifestations such as renal impairment, enteric symptoms and bacterial and viral co-infection. [6] To date, a majority of the MERS-CoV infections have occurred in individuals with preexisting co-

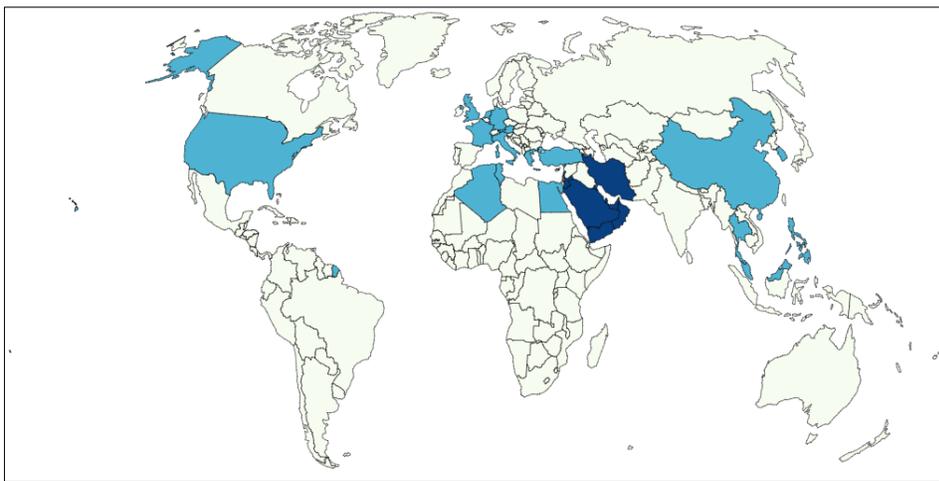


Figure 1. Global spread of MERS-CoV. Dark blue shaded countries indicate ongoing/ autochthonous transmission. Light blue shaded countries indicate imported cases from travels originating in the Middle East.

morbidities, with healthier patients generally able to combat the infection more successfully. MERS-CoV currently has a case-fatality rate of 35 percent.

Researchers have made progress towards identifying the source and means of transmission of the virus. Reports implicate dromedary camels as one potential reservoir for MERS-CoV. Viral sequences isolated from infected humans match samples taken from their camel herds. [7-9] It is unknown whether other reservoirs exist. MERS-CoV can also be transmitted from person to person, particularly in healthcare settings [10]. Clusters of several dozen cases have occurred in the Middle East and the Republic of Korea, although smaller clusters are more common. There have also been 17 travel-related cases exported to non-endemic countries, several of which have sparked small outbreaks in the country of import. Some patients have no epidemiological link to either camels or a known human case, which raises the possibility of asymptomatic or mild transmission; prevalence in the at-risk population is unknown.

Of recent concern is a cluster of cases in the Republic of Korea stemming from an importation of MERS-CoV by a traveler returning from the Middle East. [11] This outbreak occurred primarily within healthcare facilities and was facilitated by cultural traditions and healthcare practices. [12,13] Implementation of strict infection control practices controlled the situation. As of July 21, the Republic of Korea MERS-CoV outbreak has led to 186 cases and 36 deaths. [14] The United States retains a substantial presence on the Korean peninsula, and endemic and imported emerging diseases remain a threat to personnel stationed in Korea. To date, there have been no cases of MERS in service members.

MERS-CoV and other coronavirus countermeasures remain in the research and development phase despite the ongoing outbreak. Some antivirals with anti-MERS-CoV activity have been identified [15-17] as well as a few promising vaccine candidates. [18,19] However, there is no approved antiviral or vaccine against any coronavirus

[19,20], and no candidates yet in clinical trials that specifically target MERS-CoV. The lack of countermeasures against coronaviruses and their zoonotic niche means that these emerging viral diseases remain a global threat not only to international public health but also to America's troops based at home and abroad.

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