

ENA Topic Brief

Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

Key Information

Middle East respiratory syndrome (MERS) is caused by a coronavirus (MERS-CoV) that affects the respiratory system.

MERS-CoV is a newly identified virus that is different from the SARS coronavirus.⁴

Reported cases have been connected to countries in and around the Arabian Peninsula.

MERS-CoV is transmitted by contact with the respiratory secretions of an infected individual that are aerosolized by coughing or sneezing.^{14,15}

Many of those infected with MERS were associated with healthcare settings.

MERS presents with a wide spectrum of clinical symptoms.¹⁸

Currently, there is no specific treatment for MERS-CoV infections.¹⁸

There are no known vaccines or chemoprophylaxes for MERS-CoV infection.

CDC MERS guidance includes standard contact and airborne precautions.¹⁹

Purpose

Emergency departments (EDs) are the most frequent points of entry into hospitals. As a result, ED healthcare providers have frequent exposure to a plethora of communicable infectious diseases. Early identification, appropriate isolation, timely diagnosis, and proper infection control measures are essential components in infectious disease containment and management. Since EDs serve as a gateway, healthcare providers, particularly ED nurses, are in an advantageous position to play a pivotal role in promptly identifying and managing infectious disease outbreaks and epidemics. With the current increase of the Middle East respiratory syndrome coronavirus strain (MERS-CoV), it is essential that healthcare providers maintain awareness of the need to promptly identify patients who should be evaluated for this virus. This requires them to be educated in general modes of MERS-CoV transmission, clinical presentation, and treatment guidelines, and to apply this knowledge using sound clinical judgment. The purpose of this topic brief is to examine MERS-CoV, discuss its transmission, review clinical manifestations, evaluate current treatment guidelines, and assess prevention and containment measures.

Overview

MERS-CoV was first reported and identified in Saudi Arabia in September 2012.¹ However, subsequent investigations pushed its known origin back to a case in Jordan in April of 2012.² Middle East respiratory syndrome (MERS) is caused by a type of virus from the group known as coronaviruses. These are enveloped viruses that primarily infect the upper respiratory tract and are also responsible for the common cold.³ In more severe cases, coronaviruses can cause severe respiratory illnesses with flu-like symptoms, including severe acute respiratory syndrome (SARS), that can be fatal. Epidemiologic studies have proven that MERS-CoV belongs to the same family of coronavirus, but is of a previously unknown type that is distinct from the SARS virus.⁴

As with any newly emerging viral disease, the greatest concern is the potential for the virus to spread. MERS has attracted global concern because it is caused by a newly identified strain of coronavirus, it can affect anyone, and there have been

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different clusters of infection in various countries.

Transmission

MERS-CoV is a zoonotic virus that is transmitted from animals to humans. The origins of MERS-CoV are not completely understood, but analysis of different virus genomes suggests that MERS-CoV originated in bats and was somehow transmitted to dromedary camels at some point in time.⁵ However, there is no conclusive proof of this as yet. The route of transmission from non-human to human is not fully understood, but researchers hypothesize that camels are a likely reservoir host for MERS-CoV and most likely the animal source of infection in humans.⁵ Strains of MERS-CoV have been detected in camels in several countries, including Egypt, Qatar, Oman, and Saudi Arabia.⁶ In some areas of the Arabian Peninsula, the consumption of unpasteurized milk is common and, in some cultural practices of the region, camel milk and urine are consumed for their believed medicinal effects.⁷ Researchers have proved that MERS-CoV in milk can survive for prolonged periods.^{8,9} Contact with a MERS-CoV-infected animal, such as a dromedary, or its bodily fluids may be responsible for zoonotic transmission to humans, but investigations continue to better understand this question.¹⁰⁻¹³

Transmission of MERS-CoV from human-to-human occurs similarly to other coronaviruses. It is believed it is transmitted by contact with the respiratory secretions of an infected individual that are aerosolized by coughing or sneezing.^{14,15} Many of those infected with MERS-CoV were associated with healthcare settings such as hospitals, but the virus does not appear to pass easily from person-to-person unless there is direct close contact with the infected, such as occurs with those living with or caring for the infected.¹⁴⁻¹⁷ Research on the transmission of MERS-CoV in the community is ongoing.¹⁴⁻¹⁷

Since April 2012, infections with MERS-CoV have been lab-confirmed in several countries including Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, United Arab Emirates (UAE), and Yemen.¹ Countries with travel-associated MERS cases include Algeria, Austria, China, Egypt, France, Germany, Greece, Italy, Malaysia, Netherlands, Philippines, Republic of Korea, Thailand, Tunisia, Turkey, United Kingdom (UK), and United States of America (USA).¹ Limited transmission in the affected countries of Europe and North Africa has occurred as a result of close contact with infected individuals who had travelled to the Arabian Peninsula.¹⁶ All the European, North African, Southeast Asian, and North American cases reported either recently visiting the Arabian Peninsula or having close contact with an infected individual who had recently traveled from that region.¹⁶

The most recent outbreak of MERS occurred in South Korea and is the largest outside the Arabian Peninsula. The largest ever MERS outbreak^{1,2} was in the spring of 2014, in Jeddah, Saudi Arabia, resulting in 255 cases.¹⁶ As of October, 2015, the World Health Organization (WHO) reports a worldwide total of 1,589 confirmed cases and 567 deaths.¹⁷

Clinical Manifestations

MERS presents with a varied clinical spectrum of symptoms, ranging from a nonspecific asymptomatic infection to an acute upper respiratory illness that rapidly progresses to pneumonitis, respiratory failure, septic shock, multi-organ failure, and death.¹⁸ The average incubation period is approximately five days, with a range of 2–14 days.¹⁸ In MERS patients, the average time from illness onset to hospitalization is around four days; in more critically ill patients, the average time from onset to intensive care unit (ICU) admission is about five days. In fatal cases, the median time from illness onset to death is approximately 12 days.¹⁸ Among the confirmed and reported cases to date, the fatality rate is approximately 35%.¹⁸

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Typically, patients present with more common signs and symptoms including fever, rigors, headache, non-productive cough, dyspnea, and myalgia.¹⁸ Other symptoms have included sore throat, coryza, nausea, vomiting, diarrhea, abdominal pain, dizziness, and sputum production.¹⁸ Some of the reported laboratory findings include leukopenia, lymphopenia, thrombocytopenia, and elevated lactate dehydrogenase levels.¹⁸ Patients who required ICU admission often presented with a history of fever and upper respiratory tract illness progressing to pneumonia within 1 week of illness onset.¹⁸ It is important to note that hospitalized MERS patients have had other comorbidities.¹⁸ While most cases have been reported in male adults with a median age of 50 years, this virus can affect children and adults of all ages.

Treatment

Currently, there is no specific treatment for MERS-CoV infections, nor are there any known vaccines or chemoprophylaxes.¹⁸ Treatment includes clinical management, supportive care, and implementation of appropriate recommended infection prevention and control measures. Emphasis on infection prevention and control is paramount. Preventing transmission of MERS-CoV requires the application of appropriate infection control protocols, environmental and engineering controls, safer work practices, and proper use of personal protective equipment (PPE). The current suggested guidance by the Centers for Disease Control and Prevention (CDC) includes standard, contact, and airborne precautions.¹⁹ Evaluation and management of MERS patients also requires collaboration with state and local health departments.

Prevention and Containment

Prevention and containment are important to stop MERS-CoV transmission. Prevention begins with familiarization with the disease through education. Fundamental to this are understanding modes of transmission, using evidenced-based guidance, recognizing clinical signs and symptoms, staying abreast of current treatments, and participating in hands-on training for proper donning and doffing of PPE. Minimizing the opportunity for exposure and reducing the risk of human-to-human transmission necessitate that specific policies and procedures for respiratory pathogens like MERS-CoV be implemented and practiced. Basic infection control practices like hand hygiene and strict compliance with CDC's PPE guidance are essential to minimize exposures. Other factors can also influence exposure risk, such as patient placement, aerosol-generating procedures, safe handling and disinfection of contaminated objects, duration of infection control practices, movement of the patient within a facility, visitors, engineering controls, training and education of staff, environmental infection control, and level of preparedness, to name a few.¹⁹ Early identification, immediate isolation, and rapidly informing the necessary persons are crucial for disease prevention.²⁰ While preventative measures may minimize risks of exposure, the lack of current treatment plans, the high rate of morbidity and mortality, and incompletely defined modes of MERS-CoV transmission have made containment arduous.¹⁹

Conclusion

MERS is a viral respiratory illness that is new to humans. Since April 2012, 26 countries have reported cases of MERS, with all known cases connected to countries in or around the Arabian Peninsula.² Through retrospective investigations, health officials are learning more about the disease virus and the disease implications. As health officials continue to closely monitor the MERS situation, global collaborative partnerships are forming to better understand the risks, the source,

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transmission, and prevention and treatment for the disease. Public health authorities recognize the potential for MERS-CoV to spread and anticipate more cases globally, even in the U.S. Consequently, emergency nurses require education, preparation, and training to recognize and manage this and other emerging infectious diseases.

Definitions of Terms

Coronavirus: Common, enveloped viruses first detected in 1960s that typically cause mild to moderate upper respiratory tract illnesses.²¹ There are 4 main sub-groupings (alpha, beta, gamma, and delta). These viruses can infect animals and humans and some can cause severe acute respiratory syndrome (SARS).

Dromedary camel: Also known as an Arabian camel, these animals are even-toed ungulates with a single hump.²² They occupy arid regions, particularly the Sahara Desert in Africa, but are commonly found in the Arabian, Indian, and Middle Eastern deserts. They are used to carry cargo and provide milk and cheese as a staple food of desert nomad tribes.⁷ In certain areas, these animals are consumed for meat.

Middle East Respiratory Syndrome (MERS): Is a viral respiratory illness caused by the MERS-coronavirus, MERS-CoV.

MERS-CoV: Refers to the virus, not the illness.

Zoonotic: A disease that normally exists in animals but can be transmitted from animals to humans.

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Developed: October, 2015

Approved by the ENA Board of Directors: December, 2015

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