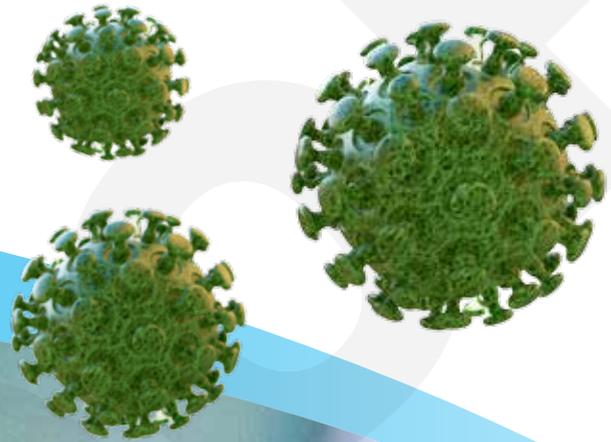


## **Middle East Respiratory Syndrome (MERS)** Essential information



# Middle East Respiratory Syndrome (MERS)

## Origins

Coronaviruses (CoV) are a broad family of viruses named after the crown-like spikes on their surface. They typically cause mild to moderate upper respiratory tract disease in humans and some coronaviruses can infect animals. Mild illness caused by coronavirus includes the common cold. A severe illness caused by coronavirus is Severe Acute Respiratory Syndrome (SARS CoV).

In 2012 a novel coronavirus was identified in patients in Saudi Arabia in the Middle East. This coronavirus causes a new illness, called Middle East Respiratory Syndrome (MERS), which is a respiratory illness with an approximately 30% mortality rate.

## Geographic Risk of Exposure

Confirmed cases of MERS have occurred in the following countries in the Middle East:

- Saudi Arabia
- Yemen
- Oman
- Qatar
- United Arab Emirates
- Kuwait
- Jordan
- Lebanon

People visiting these countries or in close contact with a person who recently visited these countries have transmitted the virus to people in several other countries as well. In 2015, an outbreak of MERS in the Republic of Korea was traced to a man who traveled in several Middle Eastern countries and is believed to have been infected during his travels.

## Source/Natural Reservoir

All reported cases have been linked to countries in the Arabian Peninsula. People who have become ill either lived in the Arabian Peninsula or had recently traveled to the Arabian Peninsula, while a few had close contact with someone who had recently traveled to the Arabian Peninsula.

There has been much investigation into the host that carries the virus, but thus far, the natural reservoir remains unproven. MERS CoV has been found in camels, and testing of other animal species has failed to identify other animals that may also carry MERS CoV, so camels appear to be a likely source of infections for humans, but it is possible that

other reservoirs also exist that so far have been unidentified. Camels carrying MERS CoV may not show symptoms of illness, but may still secrete MERS CoV in their nasal and eye discharge, feces, and potentially in their milk and urine.

People visiting farms, barns, markets, or other places with animals in the Arabian peninsula should perform regular hand hygiene before and after touching animals, especially camels, and avoid any contact with sick animals.

People working closely with camels, such as farm workers, slaughterhouse workers, or veterinarians may be at higher risk for MERS CoV infection than other people. When these people bring work clothes home for laundering, care should be taken to avoid exposing family members to soiled clothing, shoes, or other items that may have come in contact with camel excretions. It is always preferable to have this work clothing laundered at the work site and for workers to shower before returning home.



## Diagnosis

Performing a diagnosis on a person infected with MERS CoV can be difficult because the early symptoms (fever, cough, shortness of breath) can be non-specific to MERS CoV. Once infected, symptoms appear in 2 – 14 days.

The symptoms likely to present early in the illness are often seen in patients with more commonly occurring diseases, such as the common cold, and other coronaviruses that generate similar symptoms. Diagnosis and treatment should only be performed by a trained physician who can rule out other potential diseases.

If there is a reason to suspect MERS, the physician will order that the patient should be isolated and public health authorities should be informed. Samples will be taken from the patient and sent in for laboratory testing to confirm the diagnosis.

MERS affects the respiratory tract (lungs and breathing tubes).

### Initial Symptoms of MERS

- Fever
- Cough
- Shortness of breath

### Some patients may also experience

- Chills
- Body aches
- Sore throat
- Headache
- Runny nose
- Diarrhea
- Nausea/vomiting
- Pneumonia
- Kidney failure

While the mortality rate is approximately 30%, most people that die from MERS have other underlying medical conditions (comorbidities). Some of the infected people have mild symptoms, similar to what a person with a cold might present, or no symptoms at all. People with minor symptoms or no symptoms at all are expected to recover.

Because patients with MERS may also have other conditions or illnesses at the same time, the patient may need to be treated for other conditions or illnesses in addition to MERS. This discussion is limited to considerations related to MERS for purposes of clarity.

While limited information on patient risk is available today, the initial data suggests that certain comorbidities (diabetes,

cancer, chronic lung, heart, and kidney disease, or a weakened immune system) may make the person more likely to become infected with MERS and to have a more severe case once infected.

## Method of Transmission

The method in which the virus appears and is transmitted is not firmly established. Repeat contact with camels appears to be necessary to transfer MERS CoV from camels to people, but this has not resulted in sustained transmission, indicating the transmission mechanism is not efficient. Future work will attempt to discover the specific route of infection, which is key to interrupting transmission of the virus.

MERS CoV is not believed to be transmitted by water or food, although consumption of raw milk, raw meat, or raw organs of an infected animal, such as an infected camel, may be a potential source of infection for people. Similarly, raw camel urine should not be consumed. Camel meat, milk and urine can be safely consumed as long as they are cooked, pasteurized, or otherwise heat treated.

Within a Healthcare setting, it is important for Healthcare workers (HCW) to observe proper precautions including barriers, such as masks, gowns, and gloves. If airborne precautions are being observed, HCW should wear an NIOSH N95 type respirator whenever in the same room with a patient suspected of having MERS and patients should be placed in an airborne isolation (negative pressure) room.

The most likely route of transmission between people is believed to be through the air by coughing and sneezing, where droplets of respiratory secretions contaminated with MERS CoV are inhaled directly into the respiratory tract of an uninfected person.

Additionally, contact transmission can occur through close personal contact, where secretions from an infected person are transmitted to another person or their clothing, such as by sneezing onto another person. The uninfected person then contaminates their hands by touching the droplets of secretion on their body and then touching their eyes, nose, or mouth with unwashed hands, which allows the virus to cross the second person's mucous membranes.

Transmission can also occur indirectly, where an uninfected person's hands come in contact with a contaminated surface or object and subsequently transfers the virus across their mucous membrane by touching their eyes, nose or mouth with unwashed hands. Surfaces, equipment, and instruments are thus a potential source of indirect infection if they have been contaminated with MERS CoV and are not disinfected or sterilized appropriately after contamination.

## Contagiousness

Infected people have spread MERS CoV in Healthcare settings, such as hospitals, but there is no evidence of sustained spreading of MERS through community settings. Most of the person to person transmission is believed to occur through close contact, such as caring for or living with a person that has MERS. The virus does not appear to be easily transmitted between people without close contact. Once a person with MERS recovers, they are no longer believed to be contagious.

## Prevention and People with MERS (confirmed or under evaluation)

Not all people who are being evaluated or have been confirmed as having MERS will require hospitalization. While highly contagious, MERS may not cause an illness that requires in-patient treatment at a hospital. Healthcare providers working with public health authorities may determine that a patient should stay in their home while they recover. In this case, the patient should:

- Stay home. Do not travel outside the house except to receive medical care.
- Remain separate from other family members. Stay in a different room and minimize contact.
- Call ahead to Healthcare providers. When traveling to receive care, the Healthcare provider will implement steps to reduce the risk of transmission to others.
- Wear a facemask. When in a room with others or when visiting a Healthcare provider, a mask can reduce the risk for others. If the patient cannot wear a mask, all others in the same room should wear masks.
- Hand hygiene. The patient's hands should be washed frequently with soap and water. Alcohol hand rubs can be used if hands are not visibly dirty or soap and water is not available. The patient should be coached to avoid touching their eyes, nose or mouth with unwashed hands.
- Respiratory hygiene. When coughing or sneezing, either the mouth should be covered with a tissue, or the person should use their sleeve/elbow. Used tissues should be thrown in the trash and hand hygiene should be performed after coughing or sneezing.
- Avoid sharing household items. Drinking glasses, dishware, towels, bedding, and clothing should not be shared. After use by the patient, these items should be washed thoroughly before reuse.
- Monitor symptoms. Seek prompt medical attention if symptoms worsen.

People providing home care for patients with MERS or suspected of having MERS should follow additional steps including:

- Have proper care explained to them by the Healthcare provider. This includes treatment and medications.
- Have only people in the house who are essential to providing care. Other household members should leave the house during the illness or if this is not possible, stay in other rooms and use a separate bathroom.
- Shared spaces in the home should have good airflow.
- Wash hands frequently using soap and water. Alcohol hand rubs can be used if hands are not visibly dirty or soap and water is not available. Avoid touching eyes, nose or mouth with unwashed hands.
- Wear appropriate personal protective equipment (PPE). Wear a disposable facemask, gown, and gloves when touching the patient's blood, body fluids, or secretions. After use, throw away PPE in a lined trash container and do not reuse. Wash hands with soap and water after removing PPE and after emptying trash.
- Avoid sharing household items with the patient. Drinking glasses, dishware, towels, bedding, and clothing should not be shared. After use by the patient, these items should be washed thoroughly before reuse.
- Clean high touch surfaces (door knobs, light switches, phones, keyboards, tables, etc) every day. Use governmental approved (registered) disinfectants or governmental approved bleach solutions.
- Wash laundry promptly and thoroughly. Wash soiled bedding promptly. Wear disposable gloves while handling soiled laundry and wash hands after removing gloves. Use the warmest laundering temperatures recommending for the fabrics.
- Monitor the patient's symptoms. Call the Healthcare provider if the symptoms worsen.
- Caregivers and family members who do not follow these recommendations are considered "close contacts" and will be instructed by the Healthcare provider or public health authority:
  - To monitor their temperature twice daily from first exposure and for 14 days from last exposure to the patient for fever or symptoms of respiratory illness. Symptoms of concern include: fever, coughing, shortness of breath, chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose.
  - If a close contact develops any of these symptoms, they should call the Healthcare provider and tell them about a possible exposure to MERS.
  - If a close contact does not have these symptoms, they can continue their daily activities unless instructed no to by the public health authority.

# Prevention

There are currently no vaccines for MERS CoV. There are also no antiviral treatments. Supportive care is used to reduce the severity of symptoms. People caring for a patient with MERS CoV risk exposure when providing care and should follow precautions as outlined below.

The CDC recommends standard, contact, and airborne precautions for hospitalized patients. The WHO recommends standard, contact, and droplet precautions with eye protection and airborne precautions for aerosol generating procedures. Note that WHO does not recommend airborne precautions and instead advises droplet precautions.

For a suspected case of MERS, facilities should be prepared to implement standard and contact precautions including:

- **Hand hygiene** as per the WHO five moments and before/after PPE use.
- Appropriate **Personal Protective Equipment**, including gloves, fluid resistant gowns, masks, and eye protection. Workers must receive training on and demonstrate an understanding of when to use PPE, what PPE is required, how to properly don (put on), use, and doff (take off) PPE, and how to properly dispose of or disinfect and maintain PPE. Reusable PPE must be properly cleaned, decontaminated, and maintained after and between uses.
- **Minimize chances for exposure.** Patients being evaluated for possible MERS infections and the people accompanying them should be screened for symptoms of a respiratory infection and take appropriate preventive actions to reduce the risk of transmission. Healthcare providers will often establish a triage procedure to detect patients that may be at risk of having a MERS infection and isolate them quickly while they are being diagnosed.
- **Environmental Infection Control** as appropriate. Use of a country governmental approved disinfectant effective against human coronaviruses for environmental surface disinfection. Standards procedures for food utensils and dishware.
- Treat all **blood and body fluids** as potentially infectious and decontaminate.
- **Respiratory hygiene/cough etiquette** to prevent the spread of contaminated respiratory secretions.
- **Patient Placement/Isolation** of suspected MERS patients from contact with unprotected persons.
- **Fabric Handling** ensuring soiled fabric is handled in a way to prevent transmission. Standard Healthcare laundering procedures for contaminated fabric are capable of making the fabric hygienic.
- **Aerosol generating procedures** some procedures performed on MERS patients may be more likely to generate higher concentrations of infectious respiratory aerosols. These procedures potentially put Healthcare workers and others at increased risk of MERS exposure and additional precautions are recommended.

- **Manage visitor access** to control access to MERS patients and others within a Healthcare facility. Access to a MERS patient's room should be restricted unless required for their care. Visitors who have been in contact with a MERS patient are a possible source of MERS for other patients, visitors and staff and should be trained in the facility's procedures to reduce risks of transmission.
- **Healthcare worker self-monitoring.** Workers who provide care or have had close contact with MERS patients should self-monitor for signs of illness by monitoring their temperature twice daily from first exposure and for 14 days from last exposure to the patient for fever or symptoms of respiratory illness. Symptoms of concern include: fever, coughing, shortness of breath, chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose. Healthcare facilities should have policies in place to address how to handle Healthcare workers becoming ill while providing care.

Facilities should also be prepared to implement airborne isolation precautions including the following below. There are not currently clear guidelines for when to discontinue airborne isolation precautions.

- **Masking Patients:** Known or suspected MERS patients traveling in a Healthcare facility outside an airborne isolation (negative pressure) room (AIIR) should wear a mask to minimize the risk to others.
- **Patient Placement:** Known or suspected MERS patients should be placed in an airborne isolation room.
- **Airborne PPE:** HCW should wear NIOSH N-95 (or equivalent) respirators whenever in an AIIR. HCW should also wear gloves, gown, goggles/face shield. If observing droplet precautions instead of airborne precautions, Healthcare workers should wear mask and eye protection (goggles or face shield) instead of a respirator.

Different types of PPE are used to prevent multiple routes of transmission. For respiratory pathogens, such as MERS, the recommended donning sequence for PPE is:

- Perform hand hygiene, put on gown, put on respirator, put on goggles or face shield, and put on gloves.
- The recommended doffing sequence for PPE is:
- Remove gloves, then goggles or face shield, then gown, then respirator, then perform hand hygiene.

Guidelines and technical information are available from the CDC and WHO websites to aid in better understanding of the disease and its prevention. These references were used in the preparation of this document.

<http://www.cdc.gov/coronavirus/mers/>

[http://www.who.int/csr/disease/coronavirus\\_infections/en/](http://www.who.int/csr/disease/coronavirus_infections/en/)



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