

## **Middle East Respiratory Syndrome Coronavirus (MERS-CoV)**

### **REPORTING INFORMATION**

- **Class A: Report immediately via telephone** the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - *Immediately via telephone.*
  - The local health department should enter the case into the Ohio Disease Reporting System (ODRS) within 24 hours after the telephone report.
  - The Centers for Disease Control and Prevention (CDC) [MERS Patient under Investigation \(PUI\) Form](#) is available for use to assist in local disease investigation. Information collected from the form should be entered into ODRS and sent to ODH.

### **AGENT**

MERS-CoV is a novel species of *Coronaviridae* virus in lineage C of the genus beta-coronavirus.

### **Case Definition**

#### **Patient under Investigation (PUI)**

A person who has both clinical features and an epidemiologic risk factor should be considered a patient under investigation (PUI) based on one of the following scenarios:

- Fever AND pneumonia or acute respiratory distress syndrome (based on clinical or radiological evidence) AND EITHER:
  - History of travel from countries in or near the Arabian Peninsula within 14 days before symptom onset, OR
  - Close contact with a symptomatic traveler who developed fever and acute respiratory illness (not necessarily pneumonia) within 14 days after traveling from countries in or near the Arabian Peninsula OR
  - A member of a cluster of patients with severe acute respiratory illness (e.g., fever and pneumonia requiring hospitalization) of unknown etiology in which MERS-CoV is being evaluated, in consultation with state and local health departments.

OR

- Fever AND symptoms of respiratory illness (not necessarily pneumonia; e.g. cough, shortness of breath) AND being in a healthcare facility (as a patient, worker, or visitor) within 14 days before symptom onset in a country or territory in or near the Arabian Peninsula in which recent healthcare-associated cases of MERS have been identified.

OR

- Fever OR symptoms of respiratory illness (not necessarily pneumonia; e.g. cough, shortness of breath) AND close contact with a confirmed MERS case while the case was ill.

The above criteria serve as guidance for testing; however, patients should be evaluated and discussed with public health departments on a case-by-case basis if their clinical presentation or exposure history is equivocal (e.g., uncertain history of health care exposure).

## Case Classification

**Confirmed:** A confirmed case is a person with laboratory confirmation of MERS-CoV infection. Confirmatory laboratory testing requires a positive PCR on at least two specific genomic targets or a single positive target with sequencing on a second.

**Probable:** A probable case is a PUI with absent or inconclusive laboratory results for MERS-CoV infection who is a close contact of a laboratory-confirmed MERS-CoV case.

Close contact is defined as a) being within approximately 6 feet (2 meters), or within the room or care area, of a confirmed MERS case for a prolonged period of time (such as caring for, living with, visiting, or sharing a healthcare waiting area or room with a confirmed MERS case) while not wearing recommended personal protective equipment (PPE) such as gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection.

## Laboratory Criteria for Diagnosis

If infection with MERS-CoV is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, please contact ODH.

CDC recommends that clinicians collect three specimen types (lower respiratory, upper respiratory, and serum) for MERS testing.

ODH Laboratory (ODHL) has the ability to test clinical respiratory and blood specimens using real-time reverse transcription-PCR assay. "NEGATIVE" test results will be reported within 24 hours. When a "PRESUMPTIVE POSITIVE" or "EQUIVOCAL" test result is obtained at ODHL, confirmation by CDC is required, however this should not delay the local investigation and response, including the contact investigation.

### See also:

- CDC [MERS-CoV Laboratory Specimen Criteria](#)
- CDC [MERS-CoV Guidelines for Biosafety](#)

## SIGNS AND SYMPTOMS

A wide clinical spectrum of MERS-CoV infection has been reported ranging from asymptomatic infection to acute upper respiratory illness, and rapidly progressive pneumonitis, respiratory failure, septic shock and multi-organ failure resulting in death. In some cases, diarrhea preceded respiratory symptoms. In general, the first noted symptom may be fever (>100.4°F [ $>38.0^{\circ}\text{C}$ ]). Other early symptoms have included headache, chills, myalgia, nausea/vomiting and diarrhea.

## DIAGNOSIS

Patients who meet the criteria for a PUI should also be evaluated for common causes of community-acquired pneumonia (e.g. influenza A and B viruses, respiratory syncytial virus, *Streptococcus pneumoniae*, and *Legionella pneumophila*). This evaluation should be based on clinical presentation and epidemiologic and surveillance information.

In the presence of person-to-person transmission of MERS-CoV anywhere in the world, healthcare providers should evaluate patients in the U.S. for MERS-CoV infection if they meet the PUI criteria.

If a patient meets the PUI criteria healthcare providers will need to:

1. Institute standard, contact and airborne precautions
2. Notify the local health department
3. Consider MERS-CoV testing

## **Epidemiology**

Health officials first reported the disease in Saudi Arabia in September 2012. Through retrospective investigations, health officials later identified that the first known cases of MERS occurred in Jordan in April 2012. So far, all cases of MERS have been linked through travel to, or residence in, countries in and near the Arabian Peninsula. The largest known outbreak of MERS outside the Arabian Peninsula occurred in the Republic of Korea in 2015. The outbreak was associated with a traveler returning from the Arabian Peninsula. MERS represents a low risk to the general public in the United States. Despite intensive case finding efforts and testing, only two individuals have been diagnosed with MERS in the U.S. (in May 2014) both returned to the U.S. after travel to Saudi Arabia.

### **Source**

MERS-CoV has been found in some camels, and some MERS patients have reported contact with camels. More information is needed to determine the role camels and other animals may play in transmission of MERS-CoV. Many people with MERS have had close contact with a person sick with MERS.

### **Mode of Transmission**

MERS-CoV, like other coronaviruses, is thought to spread from an infected person's respiratory secretions, such as through coughing. However, the precise ways the virus spreads are not currently well understood.

Person-to-person spread of MERS-CoV, usually after close contact, such as caring for or living with an infected person, has been well documented. Infected people have spread MERS-CoV to others in healthcare settings, such as hospitals. Researchers studying MERS have not seen any ongoing spreading of MERS-CoV in the community.

### **Period of Communicability**

Patients can shed the virus after resolution of symptoms, but the duration of infectivity is unknown. Patients are not contagious during the incubation period. Asymptomatic cases might not be contagious.

### **Incubation Period**

As a result of investigations, incubation periods for MERS-CoV is estimated to range from 2 to 14 days (median 5 days).

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

Healthcare providers/Local health departments should continue to routinely ask about travel history and healthcare facility exposure and consider a diagnosis of MERS-CoV infection in persons who meet the criteria for patient under investigation ([PUI](#)). Please fax to ODH Bureau of Infectious Diseases (614) 564-2456.

#### Treatment

No vaccine or specific treatment for MERS-CoV infection is available; care is supportive. See World Health Organization (WHO) [Guidance for Clinical Management of MERS Patients](#).

### Isolation

Ill people who are being evaluated for MERS-CoV infection and do not require hospitalization for medical reasons may be cared for and isolated in their home. Isolation is defined as the separation or restriction of activities of an ill person with a contagious disease from those who are well. Guidance on the evaluation of patients for MERS-CoV infection, clinical specimen collection and testing, infection control, and home care and isolation measures is available at CDC [MERS](#).

CDC recommends healthcare providers should adhere to recommended infection control measures, including standard, contact, and airborne precautions while managing patients in healthcare settings who are PUIs or confirmed cases of MERS-CoV infection. See CDC [Updated Guidance on MERS-CoV Infection Control in Healthcare Settings](#).

Droplet precautions should be added to the standard precautions when providing care to all patients with symptoms of acute respiratory infection. Contact precautions and eye protection should be added when caring for probable or confirmed cases of MERS-CoV infection. Airborne precautions should be applied when performing aerosol generating procedures.

WHO issued new guidelines for management of asymptomatic persons who are RT-PCR positive for Middle East respiratory syndrome coronavirus (MERS-CoV) in January 2018. Until more is known, asymptomatic RT-PCR positive persons should be isolated, followed up daily for development of any symptoms and tested at least weekly – or earlier, if symptoms develop – for MERS-CoV.

The place of isolation (hospital or home) shall depend on the healthcare system's isolation bed capacity, its capacity to monitor asymptomatic RT-PCR positive persons daily outside a healthcare setting, and the conditions of the household and its occupants. See [Management of Asymptomatic Persons who are RT-PCR positive for Middle East respiratory syndrome coronavirus \(MERS-CoV\)](#) for additional information.

### **Contacts**

#### Investigation

As part of investigation of confirmed cases, in consultation with a state or local health department, a person who develops fever or symptoms of respiratory illness within 14 days following close contact with a confirmed case of MERS while the case was ill should be evaluated for MERS-CoV infection.

Other contacts of the ill person, such as community contacts or contacts on conveyances (e.g., airplane, bus), may be considered for evaluation in consultation with state and local health departments.

Evaluation and management of close contacts of a [PUI](#) should be discussed with state and local health departments. Close contacts of a PUI should monitor themselves for fever and respiratory illness and seek medical attention if they become ill within 14 days after contact; healthcare providers should consider the possibility of MERS in these contacts.

CDC does not recommend the quarantine of asymptomatic individuals who have had exposure to MERS-CoV; however, asymptomatic contacts are advised to monitor their health (i.e. measure temperature twice daily and respiratory symptoms) for at least 14 days after the last possible contact with an infected person. During this time, in the

absence of both fever and respiratory symptoms, persons who may have been exposed to MERS-CoV patients need not limit their activities outside the home and should not be excluded from work, school, out-of-home child care, church or other public areas. They should immediately seek medical attention if they develop symptoms such as fever, respiratory symptoms (including coughing and shortness of breath), or diarrhea.

Close contacts of a confirmed case who are ill and do not require hospitalization for medical reasons may, in consultation with the state and local health department, be cared for and isolated in their home while being evaluated for MERS-CoV infection.

Contacts with no apparent symptoms who test positive by PCR, especially in respiratory specimens or serum, likely pose a low but not no risk of transmission. Local health departments should contact ODH to discuss home isolation, home quarantine or other measures for close contacts, patients who test positive, and to discuss criteria for discontinuing these measures.

### **Additional Resources**

CDC [Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\)](#).

United States Food and Drug Administration. (2014). [Fact Sheet for Health Care Professionals: Interpreting CDC Novel Coronavirus 2012 Real-time RT-PCR Assay Test Results](#).

WHO (July 2015) [Guidelines for Investigation of Cases of Human Infection with Middle East Respiratory Syndrome Coronavirus \(MERS-CoV\)](#).

**What is MERS?**

Middle East Respiratory Syndrome (MERS) is a respiratory illness. It is caused by a virus called Middle East Respiratory Syndrome Coronavirus, or MERS-CoV. This virus was first reported in 2012 in Saudi Arabia. It is different from any other coronaviruses that have been found in people before.

**What is the source of MERS-CoV?**

MERS-CoV likely came from an animal source in the Arabian Peninsula. In addition to humans, MERS-CoV has been found in camels in several countries. It is possible that some people became infected after having contact with camels. However, more information is needed to figure out the possible role that camels and other animals may play in transmission of MERS-CoV.

**What are the symptoms and complications of MERS?**

Most people confirmed to have MERS-CoV infection have had severe acute respiratory illness with symptoms of:

- Fever
- Cough
- Shortness of breath

About 3 to 4 out of every 10 people reported with MERS have died. Most of the people who died had an underlying medical condition. Some infected people had mild symptoms (such as cold-like symptoms) or no symptoms at all.

**How does the virus spread?**

MERS-CoV, like other coronaviruses, is thought to spread from an infected person's respiratory secretions, such as through coughing. However, the precise ways the virus spreads are not currently well understood.

MERS-CoV has spread from ill people to others through close contact, such as caring for or living with an infected person. Infected people have spread MERS-CoV to others in healthcare settings, such as hospitals.

**Have there been cases in the United States (U.S.)?**

In May 2014, the Centers for Disease Control and Prevention (CDC) confirmed two cases of MERS. Both patients were healthcare providers who lived and worked in Saudi Arabia. Both fully recovered. CDC and other public health partners continue to look for and test people who may have MERS; more than 800 people in the United States have tested negative. See CDC's [MERS in the U.S.](#) website for the most current information.

**Am I at risk for MERS in the U.S.?**

MERS represents a very low risk to the general public in this country. Only two patients in the U.S. have ever tested positive for MERS-CoV infection – both in May 2014. CDC continues to closely monitor the situation. Some people may be at increased risk for MERS-CoV infection, including

- Recent travelers from the Arabian Peninsula
- People who have had close contact, such as caring for or living with, an ill traveler from the Arabian Peninsula

- People who have had close contact, such as caring for or living with, a confirmed case of MERS
- Healthcare personnel who do not use recommended infection-control precautions
- People who have had contact with camels

If you think you may have been exposed to MERS-CoV, call ahead to a doctor and see information on the CDC website for [People Who May Be at Increased Risk for MERS](#).

### **Can I still travel to countries in the Arabian Peninsula or neighboring countries where MERS-CoV cases have occurred?**

CDC does not recommend that anyone change their travel plans because of MERS. If you are traveling to countries in or near the Arabian Peninsula to provide healthcare services, you should review CDC's [Infection Control Recommendations for Hospitalized Patients with MERS](#). Other travelers to these areas should take general steps to protect their health. For a list of countries with MERS cases, see the World Health Organization [Coronavirus Infections](#).

### **How can I help protect myself?**

CDC routinely advises that people help protect themselves from respiratory illnesses by taking everyday preventive actions:

- Wash your hands often with soap and water for 20 seconds, and help young children do the same. If soap and water are not available, use an alcohol-based hand sanitizer.
- Cover your nose and mouth with a tissue when you cough or sneeze, then throw the tissue in the trash.
- Avoid touching your eyes, nose and mouth with unwashed hands.
- Avoid personal contact, such as kissing, or sharing cups or eating utensils, with sick people.
- Clean and disinfect frequently touched surfaces and objects, such as doorknobs.

If you are caring for or living with a person confirmed with, or being evaluated for, MERS, see CDC [Guidance for Preventing MERS-CoV from Spreading in Homes and Communities](#).

### **What if I recently traveled to countries in the Arabian Peninsula or neighboring countries and got sick?**

If you develop a fever and symptoms of respiratory illness, such as cough or shortness of breath, within 14 days after traveling from countries in or near the Arabian Peninsula<sup>1</sup>, you should call ahead to a doctor and mention your recent travel. While sick, stay home from work or school and delay future travel to reduce the possibility of spreading illness to others. Countries considered in the Arabian Peninsula and neighboring include: Bahrain; Iraq; Iran; Israel, the West Bank, and Gaza; Jordan; Kuwait; Lebanon; Oman; Qatar, Saudi Arabia; Syria; the United Arab Emirates (UAE); and Yemen.

### **Is there a vaccine?**

There is currently no vaccine to protect against MERS. The U.S. National Institutes of Health is exploring the possibility of developing one.

### **What are the treatments?**

There is no specific antiviral treatment recommended for MERS-CoV infection. Individuals with MERS can seek medical care to help relieve symptoms. For severe cases, current treatment includes care to support vital organ functions.