

Summary and Key Points – Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

*Note: The following summary and key points are up to date as of May 2, 2014.
Newly updated information is in red, including the first MERS case in the United States, confirmed May 2, 2014.*

SUMMARY

- **On May 2, 2014, the first confirmed case of MERS was reported in a traveler to the United States.**
- MERS-CoV is a virus that is new to humans; it is associated with respiratory illness and high death rates.
- All reported cases to date have been linked to six countries in the Arabian Peninsula: Saudi Arabia, Qatar, Jordan, the United Arab Emirates (UAE), Oman, and Kuwait; the first known cases of MERS-CoV occurred in Jordan in April 2012.
- **Starting in March 2014, there has been an increase in the number of cases reported from Saudi Arabia and UAE. The reason for this increase in cases is not yet known; public health investigations are ongoing.**
- There is no vaccine or specific treatment recommended for the virus.
- We do not know where the virus came from or exactly how it spreads. In addition to humans, evidence of the virus has been found in camels and a bat. However, we don't have scientific evidence of the connection between virus detections in animals and humans.
- In some cases, the virus has spread from infected people to others through close contact**. However, there is currently no evidence of sustained spread of MERS-CoV in the community.
- The virus has spread in hospitals; the largest reported outbreak to date occurred April through May 2013 in eastern Saudi Arabia and involved 23 confirmed cases in four healthcare facilities.
- CDC advises that people protect themselves from respiratory illnesses by washing their hands often, using a tissue when coughing or sneezing, avoiding touching their face with unwashed hands, staying away from ill people, and disinfecting frequently touched surfaces.
- CDC recommends that healthcare providers evaluate patients for MERS-CoV using CDC guidance. They should contact their state or local health department if they have questions.

KEY POINTS

Laboratory-confirmed MERS Cases and Deaths

- As of May 2, 2014, 401 people in 12 countries have been confirmed to have MERS-CoV infection; 93 of these people have died. The first known cases of MERS occurred in Jordan in April 2012.

Cases in countries in or near the Arabian Peninsula:

- Saudi Arabia: 322 cases (68 deaths)
- UAE: 48 cases (7 deaths)
- Qatar: 9 cases (5 deaths)
- Oman: 4 cases (4 deaths)
- Jordan: 4 cases (3 deaths)
- Kuwait: 3 cases (1 death)

Cases in other countries:

- **United States: 1 case (0 deaths)**
- UK: 3 cases (2 deaths)
- France: 2 cases (1 death)
- Tunisia: 3 cases (1 death)
- Italy: 1 case (0 deaths)
- Malaysia: 1 case (1 death)

For more information, see the CDC MERS website: www.cdc.gov/coronavirus/mers. For updates on cases and deaths, see the WHO coronavirus website: www.who.int/csr/disease/coronavirus_infections/en/index.html.

MERS-CoV

- MERS-CoV is different from other coronaviruses that have been found to infect people.
 - It is most similar to coronaviruses found in bats.
 - MERS-CoV is not the same coronavirus that caused SARS in 2003. However, like SARS, MERS-CoV has caused severe acute respiratory illness and pneumonia in most reported cases.

- We don't know where the virus came from or exactly how it spreads.
 - Scientists are investigating clusters of MERS in countries in and near the Arabian Peninsula* to learn how the initially infected people (index cases) were exposed to the virus.
 - It is likely that MERS-CoV originally came from an animal source. However, the reservoir animal(s), the possible intermediate animal host(s), and the ways the virus transmits from animals to humans are not known.
 - Studies have been done to test animals, including camels, for evidence of MERS-CoV infection
 - A recent study detected evidence of MERS-CoV (gene sequences) in three out of 14 camels on a farm, linked to two confirmed human infections from Qatar.
 - MERS-CoV gene sequences have also been identified from dromedary camels in Saudi Arabia and Egypt.
 - Other studies have shown that camels from several countries including in Egypt, Oman, and Spain had antibodies to MERS-CoV. This indicates that they had previous exposure to MERS-CoV or another closely related virus.
 - Another study identified limited MERS-CoV gene sequence from a bat in Saudi Arabia.
 - More information is needed to identify the role that camels, bats, and other animals may play in possible transmission of MERS-CoV.

Symptoms

- Most people confirmed to have MERS-CoV infection have had severe acute respiratory illness.
 - Symptoms included fever, cough, and shortness of breath.
 - Most of them had pneumonia.
 - Many people also had gastrointestinal symptoms, including diarrhea.
 - Some have had kidney failure.
 - About 30% of them died.
- Some people did not have symptoms, or had only mild respiratory illness; they recovered.

Risks

- Based on the information we have so far, people with pre-existing health conditions (comorbidities) or weakened immune systems may be more likely to become infected with, or have a severe case of, MERS-CoV.
 - Comorbidities from reported cases for which we have information have included diabetes, cancer, and chronic lung, heart, and kidney disease.

Transmission

- In some cases, infected people have spread the virus to others through close contact**, such as to people who were caring for or living with them. There is no evidence of sustained spreading of MERS-CoV in the community.
 - A cluster of cases in the UK in February 2013 provided the first clear evidence that MERS-CoV can spread from person to person.
 - About twenty-six distinct spatiotemporal clusters have been reported to date.
- Infected people have spread MERS-CoV to others in healthcare settings. This has happened in hospitals in Saudi Arabia, France, Jordan, UAE, and Qatar.
 - The largest reported MERS outbreak to date occurred April through May 2013 in eastern Saudi Arabia and involved 23 confirmed cases in four healthcare facilities.
- During an outbreak of MERS-CoV in Jordan in April 2012, one pregnant woman had a second trimester stillbirth during the course of an acute respiratory illness which was attributed to MERS-CoV, based on exposure history and positive MERS-CoV serology. This was identified as a probable case, according to WHO guidelines.
- Most people who had close contact** with people who had MERS-CoV infection did not get infected or ill.
 - This information is based on public health investigations of clusters of cases in Jordan, Saudi Arabia, the United Kingdom (UK), France, and Germany.
 - To better understand the risk for infection, we need additional information about the extent of exposures to infected people, frequency of community and household contacts, and contacts before and during illness.
 - We are working with our partners to carefully evaluate the first case of MERS in the U.S. Through this public health investigation, we hope to gain a better understanding of the virus.
- All reported cases have been linked to six countries in the Arabian Peninsula*: Saudi Arabia, Qatar, Jordan, the United Arab Emirates (UAE), Oman, and Kuwait.

- Most infected people either lived in the Arabian Peninsula* or recently traveled from the Arabian Peninsula before they became ill.
 - Some people became infected with MERS-CoV after having close contact** with an infected person who had recently traveled from the Arabian Peninsula*.
- Public health agencies continue to investigate clusters of cases in several countries to better understand how MERS-CoV spreads from person to person.

Infection Control

- Any patient seeking care for symptoms consistent with MERS should be immediately placed in a private room with the door closed until an isolation room can be arranged.
- Evaluation and care of the patient should be performed using Standard, Contact and Airborne precautions while awaiting confirmation of diagnosis.
- Place a facemask on the patient whenever the patient is outside of the isolation room.
- Healthcare personnel should use eye protection in addition to disposable gowns, gloves, and respiratory protection when entering the isolation room.
- Patient care equipment such as stethoscopes and blood pressure cuffs should be dedicated to the isolation room and not moved from room to room.
- The patient care environment should be cleaned using an EPA-registered hospital disinfectant, applied according to label instructions, with attention to toilet and frequently touched surfaces.
- People who have had unprotected contact (i.e., not wearing personal protective equipment) with a suspected MERS patient need to be monitored for symptoms, including, fever, cough and shortness of breath.
- Contacts are asked to seek medical care immediately if they develop symptoms and notify their local health department.

Prevention

- CDC advises that people follow these tips to help prevent many respiratory illnesses:
 - 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 such as toys and doorknobs.

Vaccine and Treatment

- There is no vaccine to prevent MERS-CoV infection.
- There is no specific antiviral treatment recommended for MERS-CoV infection; medical care can help relieve symptoms. For severe cases, current treatment includes care to support vital organ functions.
- CDC has participated in an interagency working group led by the U.S. National Institutes of Health (NIH) to address the possibility of antiviral treatment, vaccine, and other possible treatments for MERS-CoV infection.
 - NIH has the lead in exploring possibilities for a MERS-CoV vaccine.
 - NIH has supported and conducted foundational work on potential SARS vaccines; this work may be helpful for developing a MERS-CoV vaccine.
- The FDA has not approved specific antiviral treatment for people with MERS-CoV infection. Also, CDC, NIH, FDA, and WHO do not currently have recommendations for specific antiviral treatment.

MERS in the U.S.

- On May 2, 2014, the first confirmed case of MERS-CoV was reported in a traveler to the United States. This person is currently being treated and isolated in a hospital in Indiana.
- We are working very quickly to investigate this first U.S. case of MERS and ensure that Americans are safe. We expect to learn much more in the coming hours and days, and our guidance and recommendations may change as the situation evolves. We will share updated information through the CDC and Indiana State Department of Health websites at www.cdc.gov/coronavirus/mers and www.in.gov/isdh/25796.htm.

CDC Has Been Preparing for the First Case of MERS-CoV in the U.S.

CDC recognizes the potential for MERS-CoV to spread further and cause more cases globally and in the United States. In this interconnected world we live in, we expected MERS-CoV to make its way to the United States. In preparation for this, CDC is doing/has done the following:

- collaborating with WHO and other global partners on public health investigations, laboratory testing, and studies to better understand the virus, how it spreads, the source, and the risks to the public's health.
- collaborating with state and local health departments to:
 - enhance disease surveillance to detect MERS cases
 - conduct public health investigations and contact tracing to identify people at risk for MERS-CoV infection
 - reinforce infection prevention and control, and other measures, to protect people from MERS-CoV infection.
- provided MERS-CoV testing kits to state public health laboratories so they can identify MERS cases. Most of these laboratories are now equipped and qualified to test for the virus.
- provided MERS case definitions and guidance to help healthcare providers and health departments detect, control, and prevent the spread of MERS-CoV infection. This includes guidance to:
 - evaluate patients for MERS-CoV infection (www.cdc.gov/coronavirus/mers/interim-guidance).
 - report cases to CDC (www.cdc.gov/coronavirus/mers/data-collection).
 - ensure that infection prevention and control practices in healthcare settings are followed (www.cdc.gov/coronavirus/mers/infection-prevention-control).
 - care for and isolate people at home who are being evaluated for MERS-CoV infection (www.cdc.gov/coronavirus/mers/hcp/home-care).
 - prepare healthcare providers and facilities to handle MERS cases (www.cdc.gov/coronavirus/mers/preparedness).
- participated in an interagency working group led by the U.S. National Institutes of Health (NIH) to address the possibility of antiviral treatment, vaccine, and other possible treatments for MERS-CoV infection.
- educating people who are traveling to, and returning from, the Arabian Peninsula* about MERS-CoV by posting messages on CDC's Travelers' Health website (wwwnc.cdc.gov/travel/notices/watch/coronavirus-saudi-arabia-qatar) and on electronic message boards at airports.
- maintaining the capacity to assess ill travelers returning from the Arabian Peninsula* and provide informational cards, which include health guidance, to those travelers who are reported to CDC quarantine stations.
- posting up-to-date MERS information and guidance on CDC's website (www.cdc.gov/coronavirus/mers).

CDC Recommendations for International Travelers

- CDC does not recommend that travelers change their plans because of MERS.
 - The current CDC travel notice is an Alert (Level 2), which provides special precautions for travelers. Because spread of MERS has occurred in healthcare settings, the notices advises travelers going to countries in or near the Arabian Peninsula to provide health care services to practice CDC's recommendations for infection control of confirmed or suspected cases and to monitor their health closely. Travelers who are going to the area for other reasons are advised to follow standard precautions, such as hand washing and avoiding contact with people who are ill. See wwwnc.cdc.gov/travel/notices/watch/coronavirus-saudi-arabia-qatar.
 - CDC recommends that U.S. travelers to countries in and near the Arabian Peninsula* pay attention to their health during and after their trip.
 - Travelers who develop a fever and symptoms of respiratory illness, during their trip and within 14 days after traveling from countries in and near the Arabian Peninsula,* should see a healthcare provider and mention their recent travel.

CDC Recommendations for Healthcare Professionals

- Healthcare providers should evaluate patients for MERS-CoV infection if they develop fever and symptoms of respiratory illness within 14 days after traveling from countries in or near the Arabian Peninsula*. Providers should also evaluate patients for MERS-CoV infection if they have fever and symptoms of respiratory illness, and have had close contact** with a recent traveler from this area who has fever and symptoms of respiratory illness. Consider

evaluating people with severe acute respiratory illness with unknown etiology despite extensive testing. See CDC's definition of a patient under investigation (PUI): www.cdc.gov/coronavirus/mers/case-def.

- Patients who meet the criteria for a PUI should also be evaluated for common causes of community-acquired pneumonia^{***}. This evaluation should be based on clinical presentation, and epidemiologic and surveillance information.
 - For all PUIs, CDC recommends collecting multiple specimens from different sites at different times after symptom onset. See CDC's Clinical Specimen Guidelines: www.cdc.gov/coronavirus/mers/guidelines-clinical-specimens.
 - Testing for MERS-CoV and other respiratory pathogens can be done simultaneously. Positive results for another respiratory pathogen should not necessarily preclude testing for MERS-CoV.
- Clusters^{****} of patients with severe acute respiratory illness (e.g. fever and pneumonia requiring hospitalization) should be evaluated for common respiratory pathogens^{***} and reported to state and local health departments. If the illness remains unexplained, particularly if the cluster includes healthcare providers, testing for MERS-CoV should be considered, in consultation with state and local health departments. See: www.cdc.gov/coronavirus/mers/interim-guidance.
- Healthcare providers should immediately report any person being evaluated for MERS-CoV infection as a patient under investigation (PUI), to CDC through the state or local health department. See: www.cdc.gov/coronavirus/mers/data-collection.
- CDC recommends using appropriate infection prevention and control measures, including standard, contact, and airborne precautions, while managing hospitalized patients with known or suspected MERS-CoV infections. See: www.cdc.gov/coronavirus/mers/infection-prevention-control.
- People being evaluated for MERS-CoV infection who do not require hospitalization for medical reasons may be cared for and isolated at home. See: www.cdc.gov/coronavirus/MERS/hcp/home-care.
- Healthcare providers and facilities can take key actions now to enhance preparedness for MERS-CoV infection control. See: www.cdc.gov/coronavirus/mers/preparedness.
- Healthcare providers should contact their state or local health department if they have questions.
- Health departments should contact CDC's Emergency Operation Center (770-488-7100) if they have questions.
- CDC recommendations and guidance for healthcare providers, health departments, and labs are available at www.cdc.gov/coronavirus/mers/interim-guidance.

More Information

- CDC MERS-CoV website: www.cdc.gov/coronavirus/mers.
- WHO coronavirus infections website: www.who.int/csr/disease/coronavirus_infections/en/index.html.

*Countries in and near the Arabian Peninsula include: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE), and Yemen.

**Close contact is defined as: a) any person who provided care for the patient, including a healthcare worker or family member, or had similarly close physical contact; or b) any person who stayed at the same place (e.g. lived with, visited) as the patient while the patient was ill.

*** Examples of respiratory pathogens causing community-acquired pneumonia include influenza A and B, respiratory syncytial virus, *Streptococcus pneumoniae*, and *Legionella pneumophila*.

****A cluster is defined as two or more persons with onset of symptoms within the same 14 days period, and who are associated with a specific setting such as a classroom, workplace, household, extended family, hospital, other residential institution, military barracks, or recreational camp.