5/9/2014

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Key Points – Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
Newly updated information is indicated in red

Situation Update

- The first case of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection in the United States, identified in a traveler, was reported to CDC by the Indiana State Department of Health (ISDH) on May 1, 2014, and confirmed by CDC on May 2. The traveler is a healthcare provider currently working and residing in Saudi Arabia.
    - On April 14, the traveler developed a low-grade fever while still in Saudi Arabia.
    - On April 24, the traveler departed Riyadh, Saudi Arabia and traveled by plane to London, England, then from London to Chicago, Illinois. The traveler then took a bus from Chicago to Indiana.
    - On April 27, the traveler experienced increasing fever and developed respiratory symptoms including runny nose, coughing and shortness of breath. The traveler went to an emergency department of a hospital in Indiana on April 28, and was admitted to that hospital on the same day.
- The patient is doing well and is being prepared for discharge from the hospital in Indiana.
- This first U.S. case of MERS represents a very low risk to the general public in this country.
- Public health and hospital officials continue to investigate and respond to the situation by:
    - Reviewing appropriate infection control measures being taken by the hospital
    - Interviewing the healthcare staff who had close contact[2] with the patient and family members to obtain detailed information on their exposures, collecting and testing specimens from them, and monitoring their health for relevant respiratory symptoms related to MERS-CoV infection.
    - Identifying other people who had close contact[2] with the patient, and
        - interviewing them
        - monitoring them to see if they become ill
        - collecting and testing specimens from them, if needed
        - requesting that they monitor their health and seek care if they develop symptoms
- CDC is conducting airline and bus contact investigations to identify and notify any travelers who may have been exposed to the U.S. imported case during that person's travel.
- CDC is conducting these contact investigations to
    - Refer any contacts, such as fellow passengers or crew, who are identified with fever or signs of respiratory illness, for medical evaluation, laboratory testing, and medical care, as needed.
    - Provide information to exposed passengers and crew so they can recognize any symptoms of illness, then isolate themselves, if needed, and seek medical care.
    - Determine whether MERS-CoV may have spread on the flight or bus and which passengers were at risk.
- CDC gathered contact information from the airline and federal partners for passengers and crew who may have been exposed to this traveler during the flight to the United States.
- CDC worked closely with the bus company to identify contact information and contact people who may have been exposed to the traveler on the bus.
- CDC shared contact information of passengers on the airplane with the U.S. imported case with state and local health departments in the areas where the travelers live or are staying.

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- A number of state health departments have helped CDC locate exposed passengers and determine whether they have symptoms and need to be tested and receive medical care for MERS-CoV infection.
- Public Health England is conducting a contact investigation for the flight from Saudi Arabia to England.
  - US residents who were on that flight are being contacted by CDC.

- To date, CDC and state and local public health partners have contacted and interviewed almost all of the people on the airplane and bus with the patient.
  - At this time, none of the contacts on the airplane and bus have had evidence of being infected with MERS-CoV.

- At this time, no additional MERS cases have been identified, in association with this case or otherwise, in the United States.

- Our guidance and recommendations may change as the situation evolves and we learn more.

- 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 infection using CDC guidance (see the section of this document entitled, "what healthcare professionals should do"). They should contact their state or local health department if they have questions.

MERS Cases and Deaths (WHO)

- As of May 9, 2014, a total of 266 laboratory-confirmed cases, including 95 deaths of MERS-CoV infection have been reported and confirmed by the World Health Organization (WHO).
  - Reported illness onsets were between April 2012 and April 2014.
  - A total of 285 cases, including 59 deaths, were reported by ministries of health but are pending WHO confirmation.
  - During a short amount of time 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.

Cases among residents in countries in or near the Arabian Peninsula[1]:

- Saudi Arabia: 185 cases (68 deaths)
- UAE: 48 cases (7 deaths)
- Qatar: 9 cases (5 deaths)
- Oman: 4 cases (4 deaths)
- Jordan: 6 cases (4 deaths)
- Kuwait: 3 cases (1 death)
- Yemen: 1 case (1 death)

Cases identified in other countries:

- 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)

MERS and MERS-CoV

- Middle East Respiratory Syndrome (MERS) is the illness caused by Middle East Respiratory Syndrome Coronavirus (MERS-CoV).

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- MERS-CoV is different from other coronaviruses that have been found to infect people.
    - 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 many 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[1] to learn how the initially infected people (index cases) were exposed to the virus.

    - 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, some associated with human cases.
        - Other studies have shown that camels from several countries, including 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 define the role that camels, bats, and other animals may play in possible transmission of MERS-CoV.

- In other countries affected by MERS:
    - Limited human-to-human spread has been reported, usually after close and prolonged contact, such as caring for or living with an infected person.
    - There is no definitive evidence of sustained spreading in community settings.
    - Clusters of human-to-human spread have been seen most frequently in healthcare workers caring for MERS patients. A cluster is defined as two or more persons with onset of symptoms within the same 14-day 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.

Symptoms

- Most people confirmed to have MERS-CoV infection have had severe acute respiratory illness.
    - Symptoms included fever, cough, and shortness of breath.
    - Many of them had pneumonia.
    - Some people also had gastrointestinal symptoms, including diarrhea.
    - Some have had kidney failure.
    - More than 30% of them died.

- Some people did not have any 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.
    - 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 definitive evidence of sustained spreading of MERS-CoV in the community.

- Infected people have spread MERS-CoV to others in healthcare settings. This has happened in hospitals in Saudi Arabia, France, Jordan, UAE, and Qatar.
    - A large MERS outbreak occurred April through May 2013 in eastern Saudi Arabia and involved 23 confirmed cases in four healthcare facilities.

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- Additional hospital outbreaks are currently ongoing in Saudi Arabia and the United Arab Emirates.

- Most people who had close contact[2] with people who had MERS-CoV infection did not get infected or ill.
  - This information is based on public health investigations 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, risk of transmission, and the spectrum of illness it causes.

- All reported cases have been linked to seven countries in the Arabian Peninsula[1]: Saudi Arabia, Qatar, Jordan, the United Arab Emirates (UAE), Oman, Kuwait, and Yemen.
  - Most infected people either lived in the Arabian Peninsula or recently traveled from the Arabian Peninsula before they became ill.
  - A few people became infected with MERS-CoV after having close contact[2] 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.

Vaccine and Treatment

- There is no vaccine to prevent MERS-CoV infection at the present time.

- 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.

What CDC has done to prepare for MERS importations to the United States

- CDC continues to closely monitor the MERS situation globally and work with the World Health Organization and other partners to understand the risks of this virus to the public's health. We recognize the potential for MERS-CoV to spread further and cause more cases globally and in the United States. In preparation for this, we have
  - Enhanced surveillance and laboratory testing capacity in states to detect cases
  - Developed guidance and tools for health departments to conduct public health investigations
  - Provided recommendations for healthcare infection control and other measures to prevent disease spread
  - Provided guidance for flight crews, Emergency Medical Service (EMS) units at airports, and U.S. Customs and Border Protection (CPB) officers about reporting ill travelers to CDC
  - Disseminated up-to-date information to the general public, international travelers, and public health partners

What the general public should do to protect themselves

- CDC routinely advises that people help protect themselves from respiratory illnesses by taking everyday preventive actions like washing their hands often; avoiding close contact with people who appear sick;

avoiding touching the eyes, nose, and mouth with unwashed hands; and disinfecting frequently touched surfaces.

What recent travelers from the Arabian Peninsula should do

- 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[1], you should call ahead to a healthcare provider 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.

What close contacts[2] of an ill traveler from the Arabian Peninsula should do

- If you have had close contact[2] with someone who recently traveled from a country in or near the Arabian Peninsula, and the traveler has/had fever and symptoms of respiratory illness, such as cough or shortness of breath, you should monitor your health for 14 days, starting from the day you were last exposed to the ill person.

- If you develop fever and symptoms of respiratory illness, such as cough or shortness of breath, you should call ahead to a healthcare provider and mention your recent contact with the traveler. While sick, stay home from work or school and delay future travel to reduce the possibility of spreading illness to others.

What people who have had close contact[2] with a confirmed or probable case should do

- If you have had close contact[2] with someone who has a probable or confirmed MERS-CoV infection, you should contact a healthcare provider for an evaluation. Your healthcare provider may request laboratory testing and outline additional recommendations, depending on the findings of your evaluation and whether you have symptoms. You most likely will be asked to monitor your health for 14 days, starting from the day you were last exposed to the ill person. Watch for these symptoms:
    - Fever (100° Fahrenheit or 37.7° Celsius, or higher). Take your temperature twice a day.
    - Coughing
    - Shortness of breath
    - Other early symptoms to watch for are chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose.

- If you develop symptoms, call your healthcare provider as soon as possible. Before your medical appointment, call the healthcare provider and tell him or her about your possible exposure to MERS-CoV. This will help the healthcare provider's office take steps to keep other people from getting infected. Ask your healthcare provider to call the local or state health department.

What healthcare professionals should do

- Healthcare professionals should evaluate patients for MERS-CoV infection who:
    - have fever and pneumonia or acute respiratory distress syndrome (ARDS), and either
        - a history of travel from countries in or near the Arabian Peninsula within 14 days before symptom onset, or
        - have had close contact[2] 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
        - are part of a cluster of patients with severe acute respiratory illness of unknown etiology in which MERS-CoV is being evaluated

    - They should also evaluate, in consultation with state and local health departments, anyone who has had close contact with a confirmed or probable case.

- Patients with lower respiratory illness should also be evaluated for common causes of community-acquired pneumonia[3], guided by clinical presentation and epidemiologic and surveillance information. For these patients, testing for MERS-CoV and other respiratory pathogens can be done simultaneously. Positive results for another respiratory pathogen (e.g. influenza) should not necessarily preclude testing for MERS-CoV because co-infection can occur.

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- Healthcare professionals should immediately report to their state or local health department any person being evaluated for MERS-CoV infection as a patient under investigation (PUI), who will then report this information to CDC. Data collection forms are available at www.cdc.gov/coronavirus/mers/data-collection.

- Additional information, including criteria for PUI are at http://www.cdc.gov/coronavirus/mers/interim-guidance.html. Healthcare providers should contact their state or local health department if they have any questions.

- People who had close contact[2] with a confirmed or probable case of MERS while the case was ill, if not using recommended infection control precautions (e.g. appropriate use of personal protective equipment), are at increased risk of developing MERS-CoV infection and should be evaluated and monitored by healthcare professionals with a higher index of suspicion. See Interim Guidance for Health Professionals for more information: www.cdc.gov/coronavirus/mers/interim-guidance.

- Healthcare providers should adhere to recommended infection-control measures, including standard, contact, and airborne precautions, while managing symptomatic close contacts[2], patients under investigation, and patients who have probable or confirmed MERS-CoV infections. Recommended infection control precautions should also be utilized when collecting specimens. For CDC guidance on MERS-CoV infection control in healthcare settings, see Interim Infection Prevention and Control Recommendations for Hospitalized Patients with MERS-CoV at http://www.cdc.gov/coronavirus/mers/infection-prevention-control.html.

- For suspected MERS-CoV cases, healthcare providers should collect the following specimens for submission to CDC or the appropriate state public health laboratory: nasopharyngeal swab, oropharyngeal swab (which can be placed in the same tube of viral transport medium), sputum, serum, and stool/rectal swab. Specimens can be sent using category B shipping containers. Additional information is available at http://www.cdc.gov/coronavirus/mers/guidelines-clinical-specimens.html.

- Healthcare providers and facilities can take key actions now to enhance preparedness for MERS-CoV infection control. See: www.cdc.gov/coronavirus/mers/preparedness.

- 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.

- Additional or modified recommendations may be forthcoming as the investigation proceeds.

What CDC is doing to help the scientific community

- CDC, in collaboration with the Hellenic Center for Disease Control and Prevention and the Hellenic Pasteur Institute in Greece, obtained on April 30, 2014, sequences of the complete N and S genes from a specimen collected from a MERS case reported by Greece.
    - CDC and these institutions submitted on May 3, 2014, the sequences to GenBank to make them available to the scientific community for further testing and analysis.

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Infection Control

- Any patient seeking care for symptoms consistent with MERS-CoV infection 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 Environmental Protection Agency-registered hospital disinfectant, applied according to label instructions, with attention to toilets and frequently touched surfaces.

- People who have had unprotected contact, such as not wearing personal protective equipment, with a suspected MERS-CoV patient need to be monitored for symptoms, including fever, cough or shortness of breath.
    - Contacts are asked to seek medical care immediately if they develop symptoms and notify their local health department.

Travel

- At this time, CDC does not recommend that anyone change their travel plans.

- CDC recommends that travelers stay informed by visiting www.cdc.gov/travel and following @CDCtravel for updates and the latest advice.
    - The travel notice for MERS-CoV was upgraded to a level 2 alert. The travel notice advises people traveling to the Arabian Peninsula[1] for health care work to follow CDC's recommendations for infection control and other travelers to the Arabian Peninsula to take general steps to protect their health.

- CDC is continuing to do surveillance by working with our partners at U.S. ports of entry, including Customs and Border Protection, airlines, and Emergency Medical Service units at airports.
    - CDC has developed guidance to educate partners on the symptoms to watch out for and how to report illnesses to CDC's quarantine station staff.
        - CDC is reaching out to these partners to remind them about what to look for and report to CDC.
    - Together with partners at ports of entry, CDC staff continue to assess ill travelers returning from affected areas who have been reported to CDC.
        - The assessment helps determine whether the ill travelers are at risk for MERS-CoV infection and whether any additional public health actions are needed, such as a referral to a healthcare provider or public health department for evaluation and testing.
        - CDC is advising people who develop 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[1] to call ahead to a healthcare provider and mention their recent travel.

- CDC is also educating travelers to monitor their own health after returning from countries in or near the Arabian Peninsula[1].
    - Electronic monitors in airport international arrival areas direct people to information about MERS-CoV.

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- Informational cards are provided to ill travelers, which recommend that they monitor their symptoms, call a doctor to make an appointment, and take steps to protect others from infection.
- Health Advisory posters about MERS displayed for travelers heading to the Arabian Peninsula to raise awareness about MERS and advise travelers to follow general steps to protect their health.

Where people get more information about MERS

- CDC will continue to post new information about MERS on the following websites as it becomes available:
  - CDC MERS website: www.cdc.gov/coronavirus/mers/index.html
  - Travelers' Health: http://wwwnc.cdc.gov/travel/notices/alert/coronavirus-arabian-peninsula-uk

- Indiana State Department of Health: http://www.state.in.us/isdh/

- WHO coronavirus infections website: www.who.int/csr/disease/coronavirus_infections/en/index.html

1. 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.
2. 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.
3. Examples of respiratory pathogens causing community-acquired pneumonia include influenza A and B, respiratory syncytial virus, *Streptococcus pneumoniae*, and *Legionella pneumophila*.