Middle East Respiratory Syndrome Coronavirus

Background

- Middle East Respiratory Syndrome (MERS) is an illness caused by a distinctive coronavirus (MERS-CoV).
- Typical symptoms include fever, cough, chills, and shortness of breath. Although certain patients with compromised immune systems might not mount a fever. Some cases have had head and body aches, sore throat, abdominal pain, diarrhea, nausea, or vomiting. Other cases have been asymptomatic.
- Complications include severe pneumonia, acute respiratory distress syndrome, and organ failure. Approximately 35% of confirmed cases have died. Most severe cases of MERS have had underlying chronic medical conditions.
- Zoonotic transmission from infected dromedary (single-hump) camels to human caretakers is the primary mode of virus transmission.
- Limited human-to-human transmission of MERS-CoV has occurred in family members and healthcare settings. The largest outbreak, in the Republic of Korea, had 186 cases over four generations.
- There is no specific antiviral treatment for MERS-CoV infection; management is supportive.

MERS Person Under Investigation (PUI) Definition

People that meet the following MERS PUI criteria should be evaluated for MERS-CoV infection.

Severe Illness and Epidemiologic Risk Criteria:

A person with fever (≥ 38°C, 100.4°F) **and** pneumonia or acute respiratory distress syndrome (based on clinical or radiological evidence) with no other more likely alternative diagnosis; **and either**

- History of travel from countries in or near the Arabian Peninsula[1] within 14 days before symptom onset; **Or**
- Close contact with a symptomatic person who developed fever and acute respiratory illness within 14 days of residing in or traveling from countries in or near the Arabian Peninsula[1]; **Or**
- History of direct or indirect physical contact[2] with camels in Africa[3] within 14 days before symptom onset; **Or**
- A member of a cluster of patients with severe acute respiratory illness (e.g., fever and pneumonia requiring hospitalization) of unknown etiology; **Or**
- High risk occupational exposure to MERS-CoV, such as laboratory or research personnel[4].

Milder Illness and Epidemiologic Risk Criteria:

A person with fever or symptoms of respiratory illness (not necessarily pneumonia; e.g. cough, shortness of

breath) with no other more likely alternative diagnosis **and either**

- History of 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[1] in which recent healthcare associated cases of MERS have been identified; **Or**
- History of direct or indirect physical contact[2] with camels in or near the Arabian Peninsula[1]; **Or**
- Close contact[5] with a confirmed MERS case while the case was ill; **Or**
- High risk occupational exposure to MERS-CoV, such as laboratory or research personnel[4].

MERS Infectious Period

The infectious period for MERS-CoV is not clearly established but typically, patients with more severe disease shed virus longer than laboratory confirmed cases with mild or no symptoms.

MERS Incubation Period

Most patients develop symptoms approximately 5 days after an exposure to an infected person or camel. The incubation period can range from 2 to 14 days.

Public Health Reporting

Local health departments (LHD) should immediately notify CDPH of suspect MERS cases by first creating a MERS-CoV incident report in CalREDIE. LHDs should additionally notify the Coronavirus Control Branch at CDPH via email at (CoronavirusClinical@cdph.ca.gov and COVIDEpi@cdph.ca.gov) and, if after hours, contact the CDPH Duty Officer (916) 328-3605.

The CDPH MERS investigation team will work with LHDs to determine if testing is indicated, and if so, how to proceed.

Testing Considerations for MERS PUIs

A full differential diagnosis should be considered for MERS PUIs. Pathogen-specific testing should be ordered based on the most likely etiology for the patient's clinical presentation. In most scenarios in the United States, testing for other more common pathogens should be done before testing for MERS-CoV.

Consider testing for common viral respiratory pathogens. Including SARS-CoV-2, influenza A, influenza B, respiratory syncytial virus (RSV), human metapneumovirus, human parainfluenza viruses, seasonal human coronaviruses, adenovirus, enterovirus/rhinovirus, and other respiratory viruses. Also, other common bacterial pathogens including, *Streptococcus pneumoniae, Chlamydia pneumophila, Legionella pneumophila, Mycoplasma pneumoniae,* and other bacterial pathogens that cause severe lower respiratory infections.

If there is strong suspicion that a PUI is infected with MERS-CoV, simultaneous testing for MERS-CoV along with other possible pathogens should be considered.

MERS-CoV Specimen Collection and Testing

Polymerase chain reaction (PCR) testing for MERS-CoV is available at the CDPH Viral and Rickettsial Disease Laboratory

(VRDL). LHD should 1.) Obtain approval from CDPH and then 2.) Contact VRDL at 510-307-8585 to arrange shipping.

Collect and priority ship specimens

Acceptable types:

1. Lower respiratory tract specimens have the highest yield. Whenever possible collect one or more of: bronchoalveolar lavage fluid, tracheal aspirate, pleural fluid, or sputum.
2. Upper respiratory tract specimens: Obtain nasopharyngeal and oropharyngeal (throat) swabs using synthetic fiber swabs with plastic shafts. Do not use calcium alginate or wooden shaft swabs. Nasal washes are not acceptable.
- Send respiratory samples in viral transport media.

For additional specimen collection information, see CDPH VRDL Specimen Guidelines.

Forward completed forms to VRDL:

- VDRL general purpose specimen submittal form (one for each specimen) (PDF)
- Include CalREDIE incident ID number for PUI Epidemiologic and Clinical information.

Laboratories should **not** attempt to perform viral culture on specimens from patients with suspected or laboratory-confirmed MERS infection.

Infection Control

Hospital Isolation

Suspect or confirmed MERS cases who are ill enough to be hospitalized should be placed in an airborne infection (negative-pressure) isolation room with airborne, contact, and standard precautions, including eye protection. Isolation should continue until the patient is asymptomatic and has two consecutive upper respiratory tract samples (e.g. nasopharyngeal l [NP] and/or oropharyngeal [OP] swabs) taken at least 24 hours apart test negative on RT-PCR. See updated CDC and WHO (PDF) hospital infection control guidance for more information.

Home Isolation

Persons with suspect or confirmed MERS infection who are not ill enough to require hospitalization should:

1. **Stay home:** Restrict activities outside the home, except for getting medical care. Do not go to work, school, or public areas, or use public transportation.
2. **Separate themselves from other people in the home:** Stay in a different room from other people in the home as much as possible. Use a separate bathroom, if available.
3. **Call ahead before visiting the doctor:** Before a medical appointment, notify the healthcare provider about the possibility of MERS infection.
4. **Wear a facemask:** Wear a facemask when in the same room with other people and when visiting a healthcare provider. If a

facemask cannot be worn, persons in the home should wear one while in the same room with the patient.

5. **Cover coughs and sneezes:** Cover mouth and nose with a tissue when coughing or sneezing, or cough or sneeze into a sleeve. Throw used tissues in a lined trash can, and immediately wash hands with soap and water.
6. **Keep hands clean:** Wash hands often and thoroughly with soap and water. Use alcohol-based hand sanitizer if soap and water are not available and if hands are not visibly dirty. Avoid touching eyes, nose, and mouth with unwashed hands.
7. **Avoid sharing household items:** Do not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with other people in the home. These items should be washed thoroughly after use with soap and warm water.

These recommendations should be followed until symptoms are resolved based on either clinical and/or laboratory findings (two negative RT-PCR tests at least 24 hours apart).

MERS Close Contact Definition

Any person who was:

- Within approx. 6 feet or within the room or care area for a prolonged period of time (e.g., healthcare personnel, household members) while not wearing recommended personal protective equipment (PPE) (i.e., gowns, gloves, respirator, eye protection).

Or

- In direct contact with infectious secretions (e.g., being coughed on) while not wearing recommended PPE.

At this time, brief interactions, such as walking by a person, are considered low risk and do not constitute close contact. If an exposure occurs in a venue in which individual contacts cannot be identified, local healthcare providers should be notified to be on the alert for possible cases.

Management of Contacts

Close contacts of suspect or confirmed MERS cases should monitor their health for 14 days, starting from the day they were last exposed to the ill person.

Symptom monitoring includes temperature checks twice daily and self-observation for:

- Fever (≥ 38°C/100.4°F)
- Coughing
- Shortness of breath
- Any other symptoms such as chills, body aches, sore throat, headache, runny nose, abdominal pain, diarrhea, nausea or vomiting.

Close contacts should alert their LHD immediately if they develop symptoms. The LHD should arrange for evaluation and testing in a healthcare setting that can provide appropriate isolation and infection control.

While being evaluated, symptomatic contacts should stay home other than for medical care and follow other recommendations for persons under home quarantine.

Additional Resources

- CDPH | VRDL Specimen Submittal Form
- CDC | MERS Reporting
- CDC | Laboratory Guidance
- WHO | Infection Control in Home and Community Settings
- CDC | About Middle East Respiratory Syndrome (MERS)
- CDC | Evaluation for MERS-CoV Infection
- WHO | Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
- WHO | MERS Fact Sheet
- WHO | MERS Global Summary and Risk

CDPH Contact Information for LHDs

Coronavirus Control Branch MERS Subject Matter Experts:

- CoronavirusClinical@cdph.ca.gov
- COVIDEpi@cdph.ca.gov
- CDPH Duty Officer (916) 328-3605 (After Hours)

References

[1] Includes Bahrain, Iraq, Iran, Israel, the West Bank and Gaza, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE), and Yemen.

[2] Direct physical contact could include touching, riding, hugging, kissing, grooming, racing, shepherding, pageant showing, working in an abattoir, or exposure to camel respiratory secretions. Indirect contact can include consumption of raw camel milk, undercooked camel meat or use of camel urine.

[3] Consider MERS evaluation for travelers coming from North, West, or East Africa regions who develop severe respiratory illness within 14 days of direct or indirect physical camel contact.

[4] Laboratory exposure can occur through contact with infected animals and viral specimens without proper precautions and PPE.

[5] Close contact is defined as: a) being within approximately 6 feet (2 meters), or within the room or care area, of a confirmed MERS patient 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 patient) while not wearing recommended PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection). Or b) having direct contact with infectious secretions of a confirmed MERS patient (e.g., being coughed on) while not wearing recommended PPE.