

Middle East Respiratory Syndrome (MERS)

MERS is a viral respiratory illness first reported in Saudi Arabia in 2012. It is caused by a coronavirus called MERS-CoV. Most people who have been confirmed to have MERS-CoV infection developed severe acute respiratory illness. They had fever, cough, and shortness of breath. About 30% of these people died. So far, all the cases have been linked to six countries in or near the Arabian Peninsula. This virus has spread from ill people to others through close contact. However, the virus has not shown to spread in a sustained way in communities.

TRANSMISSION

This summary was mostly prepared from information posted on the CDC website 5/5/2014

Source:

Camel, bat or other animal as primary reservoir (?)
Respiratory tract secretions
Stools (?)

Transmission:

--Large droplets
--Airborne: limited to a few feet
--Direct contact: with nasal or throat secretion
--Fomites: Article freshly soiled with nasal or throat secretion.
--Human>Human transmission known to occur but rare

Incubation Period:
2-14 days

Severe Lower Respiratory Tract Infection: 1 week
fever, cough, sore throat, body aches, headache, chills and fatigue.

Secondary cases with milder disease; many secondary cases are asymptomatic

Communicability: Undetermined

Complications:

- Acute renal failure
- Deaths (56% of acute cases)

The cells MERS-CoV infects in the lungs only account for 20% of respiratory epithelial cells, so a large number of virions are likely needed to be inhaled to cause infection

Close contact = 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.
- Being in the same airport as other passengers from the Mid-East is NOT close contact.

DIAGNOSIS

The virus MERS-CoV is a new member of the beta group of coronavirus, Betacoronavirus, lineage C. MERS-CoV genomes are phylogenetically classified into two clades, clade A and B. The earliest cases of MERS were of clade A clusters (EMC/2012 and Jordan-N3/2012), and new cases are genetically distinct (clade B).

MERS-CoV is distinct from SARS and from the common-cold coronavirus and known endemic human betacoronaviruses HCoV-OC43 and HCoV-HKU1. Until 23 May 2013, MERS-CoV had frequently been referred to as a SARS-like virus, or simply the novel coronavirus, and early it was referred to colloquially on message boards as the "Saudi SARS"

Cases are descended from a single zoonotic event. It would appear the MERS-CoV has been circulating in the human population for greater than one year without detection and suggests independent transmission from an unknown source.

- **Confirmatory laboratory testing** requires
- a **positive PCR** on at least **two specific genomic targets** or
- a **single positive target with sequencing on a second.**
- Examples of laboratory results that may be considered inconclusive, include a positive test on a single PCR target, a positive test with an assay that has limited performance data available, or a negative test on an inadequate specimen.

A patient under investigation (PUI) is a person with the following characteristics:

- fever ($\geq 38^{\circ}\text{C}$, 100.4°F) 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
 - is 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.

Confirmed Case: A confirmed case is a person with laboratory confirmation of MERS-CoV infection.

Probable Case: 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.

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



LABORATORY CONFIRMATION

The Louisiana OPH state laboratory was approved to test for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) using CDC's rRT-PCR assay. Specimen testing should be coordinated with CDC for specimen testing. The CDC's 2012 real-time reverse transcription-PCR assay was approved by the FDA to test for MERS-CoV in clinical respiratory, blood, and stool specimens.

Testing for MERS-CoV has to be approved by the Infectious Disease Epidemiology Section (800-256-2748) which will coordinate testing with the OPH and CDC Labs

Specimen collection site

Maintain proper infection control when collecting specimens

- The number of days between specimen collection and symptom onset
- Symptoms at the time of specimen collection
- Early in the infection: Lower respiratory specimen, NP/OP specimen, preferably within 7 days of onset and before administration of anti-virals
- Late in the infection: LR, NP/OP and also collect blood for serology

Respiratory Specimens: Lower respiratory tract

Bronchoalveolar lavage, tracheal aspirate, pleural fluid

Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Sputum: Rinse the mouth with water and then expectorate deep cough sputum directly into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Upper respiratory tract

Nasopharyngeal AND oropharyngeal swabs (NP/OP swabs):

Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts (may inhibit PCR testing).

Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media. NP/OP specimens can be combined, placing both swabs in the same vial. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Nasopharyngeal swabs - Insert a swab into the nostril parallel to the palate. Leave the swab in place for a few seconds to absorb secretions. Swab both nasopharyngeal areas.

Oropharyngeal swabs - Swab the posterior pharynx, avoiding the tongue.

Nasopharyngeal wash/aspirate or nasal aspirates: Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Blood Components

Serum (for antibody testing): Serologic testing is currently available at CDC upon request and approval. The MERS-CoV serologic test is for research/surveillance purposes and not for diagnostic purposes

- Serum specimens collected during the acute stage (first week after onset of illness), and during convalescence (≥3 weeks after acute sample).
- To avoid unnecessary delay: a single serum sample collected 14 or more days after symptom onset may be beneficial.

Serum (for rRT-PCR testing):

a single serum specimen collected during first week after symptom onset, preferably within 3-4 days, after symptom onset,

Children and adults. Collect 1 tube (5-10 mL) of whole blood in a serum separator tube. Allow the blood to clot, centrifuge briefly, and separate sera into sterile tube container. The minimum amount of serum required for testing is 200 µL. Refrigerate the specimen at 2-8°C and ship on ice-pack; freezing and shipment on dry ice is permissible.

Infants. A minimum of 1 mL of whole blood is needed for testing. If possible, collect 1 mL in an EDTA tube and in a serum separator tube. If only 1 mL can be obtained, use a serum separator tube.

EDTA blood (plasma): Collect 1 tube (10 mL) of heparinized (green-top) or EDTA (purple-top) blood. Refrigerate specimen at 2-8°C and ship on ice-pack; do not freeze.

Stool

Collect 2-5 grams of stool specimen (formed or liquid) in sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Shipping

- Specimens should be stored and shipped at the **temperatures** indicated above. If samples are unable to be shipped within 72 hours of collection, they should be stored at -70°C and shipped on dry ice. When shipping frozen specimen from long distances or from international locations, it is best to use a combination of dry ice and frozen gel ice-packs. The gel ice-packs will remain frozen for a day or two after the dry ice has dissipated.
- All specimens must be **pre-packed** to prevent breakage and spillage. Specimen containers should be sealed with Parafilm® and placed in ziplock bags. Place enough absorbent material to absorb the entire contents of the Secondary Container (containing Primary Container) and separate the Primary Containers (containing specimen) to prevent breakage. Send specimens with cold packs or other refrigerant blocks that are self-contained, not actual wet ice. This prevents leaking and the appearance of a spill. When large numbers of specimens are being shipped, they should be organized in a sequential manner in boxes with separate compartments for each specimen.

List of No-Nos

- Do not place any dry ice in the "Primary Container" or "Secondary Container", foam envelopes, ziplock bags, cryovial boxes, or hermetically sealed containers.
- Do not place Primary Containers sideways or upside down in ziplock bags.
- Do not use red top Secondary Containers for Category A Infectious Substances.
- Do not place any paperwork in the Secondary Containers or ziplock bags, so as not to damage the paperwork.
- Do not use biohazard/autoclave bags to prepack your materials due to the inadequate seal of these bags.

PREVENTION OF TRANSMISSION: INFECTION CONTROL

Health Care Facility

About 75% of recently reported cases appear to be secondary cases, they are considered to have acquired infection from another infected person. **The majority these secondary cases are mainly healthcare workers** who have been infected within the healthcare setting

Airborne Precautions

Private room with

- Negative pressure,
- > 12 air exchange /hr
- N95 Mask, fitting

Aerosol producing procedures:

- Bronchoscopy
- Intubation
- Nebulization
- Suction

Additional rules for Airborne Isolation

- If an Airborne Isolation Room (AIR) is not available, transfer ASAP to facility where AIR available.
- Pending transfer, place facemask on patient and isolate in a single-patient room with door closed.
- Do not place in room where exhaust is recirculated without high-efficiency particulate air (HEPA) filtration.
- When outside of the AIIR, patients should wear a facemask to contain secretions
- Limit transport and movement of the patient outside of the AIIR to medically-essential purposes.
- Implement staffing policies to minimize the number of personnel that must enter the room.

Contact Precautions

- 1-Gown before entering the room
- 2-Wear gloves in the room
- 3-Wear mask and eye protection
- 4-Dedicated equipment: stethoscope, blood pressure, monitors
- 5-NO computers in the room
- 6-Know what is clean and what is contaminated, keep them apart



Prevent emission

Respiratory hygiene Cough etiquette

- Cover cough, sneeze
- Use tissues, dispose safely
- Wear mask
- Spatial separation 3 ft
- Early triage to institute Respiratory hygiene

No-No's

- Touching eyes, nose or mouth with contaminated hands (gloved or ungloved).
- Making adjustments to the PPE during patient care or removal.
- Careful placement of PPE before patient contact will help avoid the need to and risk self-contamination during use.
- Touching contaminating environmental surfaces that are not directly related to patient care (e.g., door knobs, light switches)
- Touching pen, glasses and other personal items during patient care

Close Contacts

Close contact = Close contact for investigation purpose 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.
- Being in the same airport as other passengers from the Mid-East is NOT close contact

Close Contacts should

- **Monitor health for 14 days**, starting from the day last exposure to the ill person. Watch for these symptoms:
 - Fever (100.4° Fahrenheit or 38° 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 above symptoms are observed call a healthcare provider ASAP.**
 - Before medical appointment, advise about possible exposure to MERS-CoV.
 - Ask the healthcare provider to call the Louisiana Office of Public Health.



If travelling in the Arabian Peninsula: Avoid contact with camels, practice good hand hygiene, and avoid drinking raw milk or eating camel steaks that may be contaminated with animal secretions or products unless they are properly washed, peeled, or cooked.

Home Care

- Sick people evaluated for MERS-CoV infection who do not require hospitalization for medical reasons may be cared for and isolated in their home.

Before the Ill Person is Isolated at Home

Assess whether the home is suitable and appropriate for isolating the ill person. Conduct assessment by phone or direct observation.

- The home should have a functioning **bathroom** that only the ill person and household members use. If there are multiple bathrooms, one should be designated solely for the ill person.
- The ill person should have his or her own **bed** and preferably a **private room** for sleeping.
- **Basic amenities**, such as heat, electricity, potable and hot water, sewer, and telephone access, should be available.
- If the home is in a multiple-family dwelling, such as an apartment building, the area in which the ill person will stay should use a **separate air-ventilation system**, if one is present.
- There should be a **primary caregiver** who can follow the healthcare provider's instructions for medications and care. The caregiver should help the ill person with basic needs in the home and help with obtaining groceries, prescriptions, and other personal needs.

Stay home

Restrict activities outside home, except for getting medical care. Do not go to work, school, or public areas, and do not use public transportation.

Separate from other people in your home: As much as possible, stay in a different room from other people in the home. Use a separate bathroom, if available.

Call ahead before visiting a health care facility: Before medical appointment, call the healthcare provider and explain you may have MERS-CoV infection. This will help the healthcare provider's office take steps to keep other people from getting infected.

Wear a facemask: Wear a facemask when in the same room with other people and when visiting a healthcare provider. If a face mask cannot be worn, people who live with you should wear one while they are in the same room with you.

Cover coughs and sneezes: Cover mouth and nose with a tissue when coughing or sneezing, or cough or sneeze into your sleeve. Throw used tissues in a lined trash can, and immediately wash hands with soap and water.

Wash hands: Wash hands often and thoroughly with soap and water. Use an 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.

Avoid sharing household items: Do not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with other people. After using these items, wash them thoroughly with soap and warm water.

Caregivers and Household Members

Understand and help the ill person follow the healthcare provider's instructions for medication and care. Help the ill person with basic needs in the home and provide support for getting groceries, prescriptions, and other personal needs.

Have only people in the home who are essential for providing care for the ill person.

- Other household members should stay in another home or place of residence. If this is not possible, they should stay in another room, or be separated from the ill person as much as possible. Use a separate bathroom, if available.
- Restrict visitors who do not have an essential need to be in the home.
- Keep elderly people and those who have compromised immune systems or specific health conditions away from the ill person. This includes people with chronic heart, lung or kidney conditions, and diabetes.

Shared spaces in the home should have good air flow, such as by air-conditioner or an opened window, weather permitting.

Wear a disposable facemask, gown, and gloves when you touch or have contact with the ill person's **blood, body fluids and/or secretions**, such as sweat, saliva, sputum, nasal mucous, vomit, urine, or diarrhea.

- Throw out disposable facemasks, gowns, and gloves after using them. Do not reuse.
- Wash hands immediately after removing your facemask, gown, and gloves.

Wash hands often and thoroughly with soap and water. Use an 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.

Avoid sharing household items. Do not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with an ill person who is being evaluated for MERS-CoV infection. After the ill person uses these items, wash them thoroughly with soap and warm water.

Clean all "high-touch" surfaces, such as counters, tabletops, doorknobs, bathroom fixtures, toilets, and bedside tables, every day. Also, clean any surfaces that may have blood, body fluids and/or secretions on them.

- Wear disposable gloves and gowns while cleaning surfaces.
- Use a diluted bleach solution or a household disinfectant with a label that says "EPA-approved." To make a bleach solution at home, add 1 tablespoon of bleach to 1 quart (4 cups) of water. For a larger supply, add ¼ cup of bleach to 1 gallon (16 cups) of water.

Wash laundry thoroughly.

- Immediately remove and wash clothes or bedding that have blood, body fluids and/or secretions on them.
- Wear disposable gloves while handling soiled items. Wash hands immediately after removing your gloves.
- Wash the items with detergent and warm water at the maximum available cycle length then machine dry them.

Proper disposal: Place all used gloves, gowns, facemasks, and other contaminated items in a lined container before disposing them with other household waste. Wash hands immediately after handling these items.

Follow the guidance for close contacts above.