Middle East respiratory syndrome (MERS)

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Key facts

To better understand public health terms included in this Disease Tool (e.g. What is a case definition? or What is an infectious agent?), consult our page on Key concepts on epidemiology.

Importance

Middle East respiratory syndrome (MERS) is a zoonotic disease and was first identified in Saudi Arabia in 2012, with 27 countries now having reported cases. Approximately 35 per cent of *MERS-Coronavirus* (MERS-CoV) infection cases are fatal. This may, however, be an overestimate of the true mortality rate, as mild cases may be missed by existing surveillance systems. Until more is known about the disease, the case fatality rates are counted only amongst the laboratory-confirmed cases.

Case definition

A **case definition** is a set of uniform criteria used to define a disease for public health surveillance. It enables public health officials to classify and count cases consistently.

The following are standard case definitions to allow national health authorities to interpret data in an international context. However, during an outbreak case definitions may be adapted to the local context and the Red Cross Red Crescent should use those agreed/established by national health authorities. NB: Consider that during community-based surveillance, ***volunteers*** *should use broad (simplified) case definitions (referred to as community case definitions) to recognize most or all possible cases, provide relevant risk communication and appropriate actions and encourage them to seek care. Other actors such as* ***healthcare workers or investigators*** *studying the cause of a disease, on the other hand, can use more specific case definitions that may require laboratory confirmation.*

Probable case

Definition 1: A febrile acute respiratory illness with clinical, radiological or histopathological evidence of pulmonary parenchymal disease (e.g. pneumonia or acute respiratory distress syndrome (ARDS)) AND direct epidemiologic link with a laboratory-confirmed MERS-CoV case AND testing for MERS-CoV is unavailable, negative on a single inadequate specimen or inconclusive.

Definition 2: A febrile acute respiratory illness with clinical, radiological or histopathological evidence of pulmonary parenchymal disease (e.g. pneumonia or ARDS) that cannot be explained fully by any other aetiology AND the person resides in or has travelled in the Middle East, or in countries where MERS-CoV is known to be circulating in dromedary camels or where human infections have recently occurred; AND testing for MERS-CoV is inconclusive.

Definition 3: An acute febrile respiratory illness of any severity AND direct epidemiologic link with a confirmed MERS-CoV Case AND testing for MERS-CoV is inconclusive.

Confirmed case: A person with laboratory confirmation of MERS-CoV infection, irrespective of clinical signs and symptoms.

WHO case definition source of information:
https://www.who.int/csr/disease/coronavirus_infections/mers-interim-case-definition.pdf?ua=1

Risk factors

- People with close exposure to camels, like traders or those who use camels as a means of transport.
- Lack of appropriate sanitation and hygiene measures.
- Close contacts to cases of MERS, e.g. working as a caregiver.
- Refugees, internally displaced people and migrants in outbreak regions are at increased risk to become infected.
- Health personnel not using recommended infection control precautions.

Attack rate (AR)

The **attack rate** is the risk of getting a disease during a specific time period (such as during an outbreak).

Attack rates will vary from one outbreak to another. In case of an outbreak, consult the latest information provided by health authorities.

Secondary attack rate among household contacts: 0.4 per cent to 15.8 per cent.

To date it is difficult to provide an attack rate in a rare disease with low numbers of known cases.

Groups at increased risk of severe illness (most vulnerable)

- Elderly
- People with weakened immune systems.
- Immunosuppressed persons such as those receiving chemotherapy, transplant recipients or HIV carriers.
- People with chronic diseases such as renal disease, cancer, chronic lung or liver disease, and diabetes.

Infectious agent

Infectious agents are bacteria, viruses, fungi, prions and parasites. A disease caused by an infectious agent or its toxic products is defined as an infectious disease.

Middle East Respiratory Syndrome Coronavirus (MERS-CoV).

Reservoir / host

A **reservoir of infection** is a living organism or material in or on which an infectious agent lives and/or usually multiplies. Reservoirs include humans, animals and the environment.

A **susceptible host** is a person at risk of being infected. The level of susceptibility depends on age, sex, ethnicity and genetic factors, specific immunity also depends on other factors that affect an individual's ability to resist infection or to limit its ability to cause infection.

A **zoonotic disease** or **zoonosis** is an infectious disease that has jumped from a non-human animal to humans.

Zoonotic disease: Dromedary camels.

How disease is spread (modes of transmission)

Categorisation of **modes of transmission** varies from one agency to another. In addition, some infectious agents can be transmitted by more than one mode. A list of modes of transmission can be found in the key concepts to serve as guidance to better understand the diseases included in this website.

- **Zoonotic disease:** the route of transmission from animals to humans is not fully understood, but dromedary camels are a major reservoir host for MERS-CoV and an animal source of infection in humans.
- **Contact transmission:** the virus does not pass easily from person to person unless there is close contact, such as providing unprotected care to an infected patient. Few human-to-human transmissions have been identified among family members, patients and healthcare workers.

Incubation period

This time from when infection occurs to the onset of symptoms is called the **incubation period**. It is a range of days and it can be different for each disease.

2—14 days.

Period of infectiousness

Period of infectiousness is the time interval during which an infected person can transmit the infection to other susceptible persons.

The duration of infectivity for MERS-CoV infection is unknown. While standard precautions should always be applied, additional barrier precautions should be used for the duration of symptomatic illness and continued for 24 hours after the resolution of symptoms.

Clinical signs and symptoms

- The clinical spectrum of MERS-CoV infection ranges from no symptoms (asymptomatic) or mild respiratory symptoms to severe acute respiratory disease and death.
- A typical presentation of MERS-CoV disease is fever, cough and shortness of breath. Pneumonia is a common finding, but not always present.
- Gastrointestinal symptoms, including diarrhoea, have also been reported.
- Severe illness can cause respiratory failure that requires mechanical ventilation and support in an intensive care unit and multi-organ failure.

Other diseases with similar clinical signs and symptoms

Common cold, influenza, avian influenza, severe acute respiratory syndrome (SARS), pneumonia, respiratory syncytial virus (RSV) infection, COVID-19 disease.

Diagnosis

- Real time polymerase chain reaction (PCR).
- Serology testing (for surveillance purpose only).

Vaccine or treatment

Please refer to the appropriate local or international guidelines for clinical management. All clinical management including the administration of any treatment should be conducted by health professionals.

- No vaccine or specific treatment is currently available. Treatment is supportive and based on the patient's clinical condition.
- Isolation of suspected cases is necessary.

Immunity

There are two types of immunity:
- **Active immunity** results when exposure to an agent triggers the immune system to produce antibodies to that disease.
- **Passive immunity** is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.

It is not clearly understood whether a naturally acquired immunity provides a lifelong protection from reinfection.

Which interventions are most effective for prevention and control?

The following is a list of activities considered for Red Cross Red Crescent volunteers to take part in. It is not an exhaustive list of all prevention and control activities for the specific disease.

- Communicate risks about the disease or epidemic, not only to share information on prevention and mitigation measures, but also to encourage informed decision-making, positive behaviour change and maintenance of trust in the Red Cross Red Crescent response. This includes the identification of rumours and misinformation around disease—frequent during health emergencies—to manage them appropriately. Volunteers should use the most context-appropriate communication techniques (ranging from social media to face-to-face interactions).
- Community education and engagement activities to encourage the adoption of protective behaviours:
  - Handwashing with soap.
  - Use of personal protection/barriers (e.g. masks or cloth face covering that covers mouth and nose, respirators).
  - Coughing etiquette (cover mouth when coughing or sneezing; tissues should be disposed of immediately).
  - Avoid touching eyes, nose and mouth.

  - Regular cleaning and disinfection of “high-touch” surfaces such as doorknobs, light switches, phones.
  - Avoiding personal contact such as kissing or sharing eating utensils with people who are sick.
  - Social distancing.
- Isolation of suspected and confirmed patients in treatment units.
- If feeling unwell, people should stay home and as much as possible stay in a different room from other people in the household.
- Contact tracing and follow-up. All contact tracing activities must be done in close coordination with health authorities.
- Rapid detection and encouragement of early health-seeking behaviours at health care centres.
- In MERS, a One Health approach is particularly important including animal surveillance initiatives like community-based surveillance for animal health and early warning systems.

Which interventions have NO evidence and therefore are NOT recommended?

Safe and dignified burials using full personal protective equipment (PPE) and other infection control prevention methods (e.g. as for Ebola interventions) are not necessary.

Epidemic characteristics and RCRC indicators and targets

The first table below includes data that should be gathered from health authorities and relevant non-governmental actors to understand the progress and characteristics of the epidemic in the specific country and area of intervention. The second table includes a list of suggested indicators that can be used for monitoring and evaluating Red Cross Red Crescent activities; wording of indicators may be adapted to specific contexts. Target values for a specific indicator can vary widely from one context to another and therefore managers should define them based on the specific population, area of intervention and programmatic capacity. Exceptionally, some indicators in this website may include target values when these are globally agreed as a standard; e.g. 80 per cent of individuals who slept under an insecticide-treated net (ITN) the previous night—the normative World Health Organization benchmark for universal coverage with ITNs.

Epidemic characteristics and progression
Cases of MERS in total population per week/month
Deaths from MERS in total population per week/month

Indicators for Red Cross Red Crescent activities
Number of volunteers trained on a specific topic (e.g. Epidemic Control for Volunteers (ECV); Community-based surveillance (CBS); WASH training; CBHFA training, etc.) ***Numerator*:** Number of volunteers trained Source of information: Training attendance sheets
Percentage of suspect cases detected by volunteers who were encouraged to seek healthcare and who arrived at a health facility *(NB. This indicator requires the implementation of a system in collaboration with the health facility, whereby health workers specifically asked the patient how they heard about the service)* ***Numerator:*** Suspect cases detected by volunteers in a determined period preceding this survey (e.g. two weeks) for whom advice or treatment was sought from a health facility ***Denominator:*** Total number of suspect cases in the same period preceding the survey Source of information: Survey
Percentage of people recognizing at least one transmission route and at least one measure for preventing it ***Numerator*:** Total number of people who cited at least one transmission route and at least one measure for preventing it during the survey ***Denominator*:** Total number of people surveyed Source of information: Survey
Number of community members who received epidemic prevention and control material (e.g. soap, IEC material) ***Numerator*:** Number of community members who received materials Source of information: Distribution lists

See also:

- For Community Engagement and Accountability (CEA) indicators for activities accompanying ECV actions, please refer to:- IFRC *CEA toolkit (Tool 7.1: Template CEA logframe, activities and indicators).* Available at: https://www.ifrc.org/document/cea-toolkit

Impact on other sectors

Sector	Link to the disease
WASH	Person-to-person transmission is reduced by proper sanitation and hygiene measures: handwashing is an effective prevention strategy as well as the use of personal protective equipment like masks.

Sector	Link to the disease
Nutrition	Malnutrition increases the risk for severe MERS.
Shelter and settlements	Close exposure to camels in settlements increases the risk of transmission. This is especially the case in communities using camels for transport or trade. Crowded shelters or shared households make social distancing during an outbreak difficult.
Psychosocial support and mental health	Psychological reactions during outbreaks may include fear of social stigma, anxiety and worry about the outcome, social withdrawal, sleeping problems and stress, among others.
Sex and Gender	Gender roles influence exposure to MERS. Men and boys may be at increased risk due to occupational exposure, particularly in animal handling, farming, camel care, as well as social behavior such as hookah smoking and close-contact gatherings, which may facilitate transmission. Gender norms can affect health-seeking behavior, with men often delaying testing or treatment in early stages of illness. Women and girls may also be exposed through caregiving responsibilities, including caring for sick family members, which can increase risk of infection and delay their own access to care. Pregnant women appear to be at higher risk of severe illness and complications from MERS, including adverse pregnancy outcomes, emphasizing the importance of early detection and access to maternal health services.
Education	When schools do not have clean running water or cannot maintain social distancing and provide personal protection, these can add transmission risks in places where there are outbreaks ongoing. Children may then be at risk of getting the disease if attending classes, or at risk of losing out on education if staying at home because of quarantine or isolations. Schools and other facilities dedicated to children and youth can offer an important space for them to engage, mobilize and raise awareness around health education issues. With support, trust and appropriate capacity-building, young people can be effective advocates for the adoption of preventive measures during an epidemic and are those best placed to mobilize their peers.
Livelihoods	A livelihood based on or involving camels (trade, transport) increases the risk of transmission. MERS-CoV infection leads to reduction in productivity as people may not be able to work due to disease or isolation. This can lead to a loss of income due to the reduction in work activity and to the diversion of resources to seek medical treatment.

References:

- WHO (2019) *Middle East respiratory syndrome coronavirus (MERS-CoV) Fact sheet*. Available at: https://www.who.int/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov)
- Centers for Disease Control and Prevention (CDC) (2019) *Middle East Respiratory Syndrom (MERS).* Available at: https://www.cdc.gov/coronavirus/mers/about/index.html