MERS-CoV

Epidemic Potential: High

Last Update: January 2020

Managing Epidemics Handbook [LINK]

### Diagnosis

<table>
<thead>
<tr>
<th>Sample Collection</th>
<th>Polymerase Chain Reaction (PCR)</th>
<th>Immunassay</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper and lower respiratory samples (nasopharyngeal and sputum samples), blood</td>
<td>several commercial rRT-PCR kits available</td>
<td>1 IgM/IgG ELISA (NPQ)</td>
<td>Viral transport medium</td>
</tr>
<tr>
<td>2 RT-PCR</td>
<td>Non-prequalified (NPQ)</td>
<td>2 IgM/IgG IFAs (NPQ)</td>
<td></td>
</tr>
<tr>
<td>Confirmation via microneutralization</td>
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</tbody>
</table>

Note: Many diagnostics supplies are also used for Case Management purposes, but have been included only in Surveillance.

### Laboratory Testing for Middle East Respiratory Syndrome Coronavirus - Interim Guidance January 2018 [LINK]

### Prevention & Control

**MERS-CoV** causes zoonotic infections in humans by direct or indirect contact with infected dromedary camels or camel-related products, but such primary infections account for a minority of cases. Most are infected from human-to-human contact due to breaches in IPC practices. Thus, the central focus of any prevention/control strategy is protecting healthcare workers with appropriate IPC supplies and ensuring basic health logistics at responding facilities.

**Travel & Trade**

Restriction/ban of movement of camels

**Vaccine**

Several candidates in development. Please refer to most recent guidance established in the R&D Blueprint.

**Infection Protection & Control (IPC)**

- Respiratory (standard, droplet IPC): Airborne precautions for aerosolized generating procedures, Personal Protective Equipment (PPE) for screening
- Use of PPE for at-risk health facilities

Please see WHO MERS guidance [LINK]

R&D Blueprint [LINK]

### Case Management

There is no proven specific treatment or vaccine, however there are ongoing R&D efforts. See WHO current guidance on case management for MERS. Rapid progression of the disease from severe pneumonia to respiratory failure usually occurs within the first week requiring rapid deployment and use of supplies and health logistics support.

**Aetiological**

Several candidates under consideration for evaluation. On outbreak-specific basis, the Monitored Emergency Use of Unregistered Interventions (MEURI) may be considered. Please refer to most recent WHO guidance.

**Supportive**

- **Oxygen Therapy**
  - Mechanical Ventilation of severe cases (40%)
  - Use of Oximeter highly recommended
- **Intubation, ICU, ECMO** required for severe patients

**Antibiotics, Pain/Fever**

PPE for at-risk health facilities
- Respiratory (standard, droplet IPC): Airborne precautions for aerosolized generating procedures, Possibly Home Care Kits for home isolation of asymptomatic cases or mildly symptomatic (in the case of a large outbreak)

### Key outbreak control activities considered for material supply

- **Supportive treatment** (oxygen, antibiotics, hydration & fever/pain relief) to reduce mortality
- **Personal Protective Equipment** and material for the establishment of IPC measures at health care level to reduce transmission

Note: Products for Surveillance, Prevention & Control, and Case Management are undergoing rapid and continuous development and refinement. For greater clarity, please refer to most recent applicable WHO technical guidance.

### Interventions

#### Surveillance

<table>
<thead>
<tr>
<th>Collection</th>
<th>Commodity</th>
<th>Technical Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triple packaging boxes</td>
<td>Triple packaging boxes for transport</td>
<td>Guidance on regulations for Transport of Infectious Substances 2017 - 2018 [LINK]</td>
</tr>
<tr>
<td>Viral Transport Medium</td>
<td>Medium for specimen to transport to laboratory</td>
<td>WHO performance specification E10/IC.1</td>
</tr>
<tr>
<td>Sharps container boxes</td>
<td>Puncture resistant container for collection and disposing of used, disposable and auto-disable syringes, needled. 5 L capacity accommodating approximately 100 syringes. Boxes prominently marked.</td>
<td>WHO/UNICEF standard E10/IC.2 or equivalent</td>
</tr>
<tr>
<td>Sputum Collection</td>
<td>Sputum collection container, 30ml, 5.7x3.5cm, with screw cap, autoclavable, polypropylene.</td>
<td></td>
</tr>
</tbody>
</table>

#### Diagnostics

Criteria for selection of specific diagnostic tests may include historical efficacy, adherence to any existing Target Product Profiles, ease of use, necessary throughput, distribution and logistics requirements, and manufacturer production capacity. For some pathogens, consideration may need to be given to the presence of mutations in targeted gene sequences or proteins. WHO can advise on the selection of tests on a case by case basis as determined by a specific event.

| Gloves, examination | Gloves, examination, nitrile, powder-free, non-sterile. Cuff length preferably reach mid-forearm (eg. minimum 280mm total length. Sizes, S, M, L | EU standard directive 93/42/EEC Class I, EN 455, EU standard directive 89/686/EEC Category III, EN 374, ANSI/ISEA 105-2011, ASTM D6319-10 or equivalent |

OSL | Disease Commodity Packages
Case Management

Prevention & Control

- **PPE - Standard**
  - **Mask, surgical**: Medical/surgical mask, high fluid resistance, good breathability, internal and external faces should be clearly identified, structured design that does not collapse against the mouth (e.g. duckbill, cup-shaped)
  - **Gown**: Single use, fluid resistant, disposable, length mid-calf to cover the top of the boots, light colours preferable to better detect possible contamination, thumb/finger loops or elastic cuff to anchor sleeves in place.

Supportive Treatment

- **Portable ventilator**
  - **Modes of ventilation**:
    - a) Tidal volume up to 1,000 mL
    - b) Pressure (inspiratory) up to 80 cm H2O
    - c) Volume (inspiratory) up to 120 L/min
    - d) Respiratory rate: up to 60 breaths per minute
    - e) SIMV Respiratory Rate: up to 40 breaths per minute
    - f) CPAP/PEEP up to 20 cm H2O
    - g) Pressure support up to 45 cm H2O.
    - h) FiO2 between 21 to 100 %
    - i) Inspiratory and expiratory times up to at least 2 sec and 8 sec respectively
    - j) I:E Ratio at least from 1.1 to 1.3
  - **Modes of ventilation** (continued)
    - a) Volume controlled
    - b) Pressure controlled
    - c) Pressure support
    - d) Synchronized intermittent mandatory ventilation (SIMV) with pressure support
    - e) Assist / control mode
    - f) CPAP/PEEP
    - g) Alarms required: FiO2, minute volume, pressure, PEEP, apnoea, occlusion, high respiration rate, disconnection
  - **System alarms required**: power failure, gas disconnection, low battery, vent inoperative, self diagnostics
  - **If alarm silencing feature is incorporated, it must be temporary and clearly displayed when activated**
  - **Air and externally supplied oxygen mixture ratios fully controllable**
  - **Inlet gas supply (O2) pressure range at least 35 to 65 psi**
  - **Medical air compressor integral to unit, with inlet filter**
  - **Heart rate and signal strength**:
    - Measuring range: SpO2 30 to 100% (minimum graduation 1%), Heart rate 20 to 250 bpm (minimum graduation 1bpm)
    - **Line-powered, or Extra-batteries/rechargeable batteries are required at least one year.**
  - **Algorithm for ventilation modality**:
    - a) Volume controlled
    - b) Pressure controlled
    - c) Pressure support
    - d) Synchronized intermittent mandatory ventilation (SIMV) with pressure support
    - e) Assist / control mode
    - f) CPAP/PEEP
    - g) Alarms required: FiO2, minute volume, pressure, PEEP, apnoea, occlusion, high respiration rate, disconnection

- **Pulse Oximeter**
  - **Compact portable device measures arterial blood oxygen saturation (SpO2)**
  - **Heart rate and signal strength**:
    - Measuring range: SpO2 30 to 100% (minimum graduation 1%), Heart rate 20 to 250 bpm (minimum graduation 1bpm)
    - **Line-powered, or Extra-batteries/rechargeable batteries are required at least one year.**
  - **ISO 80601-2-61:2011** or equivalent

Antibiotics

- According to national guidelines and clinical presentation

Compound Sodium Lactate Solution

- Compound solution of sodium lactate (Ringer’s lactate), injection solution, w/o IV set and needle, 1000ml

Infusion giving set

- Infusion giving set, with air inlet and needle, sterile, single-use
<table>
<thead>
<tr>
<th><strong>Paracetamol</strong></th>
<th><strong>Gloves, examination</strong></th>
<th><strong>Gloves, surgical, length to forearm large (longer than examination gloves)</strong></th>
<th><strong>Face shield</strong></th>
<th><strong>Fit Test Kit</strong></th>
<th><strong>Face mask, particulate respirator, grade N95 or higher</strong></th>
<th><strong>Mask, surgical</strong></th>
<th><strong>Scrubs, tops</strong></th>
<th><strong>Scrubs, pants</strong></th>
<th><strong>Gown</strong></th>
<th><strong>Goggles, protective</strong></th>
<th><strong>Alcohol-based hand rub</strong></th>
<th><strong>Bio-hazardous bag</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol, 500mg, tablets</td>
<td>Gloves, examination, nitrile, powder-free, non-sterile. Cuff length reach mid-forearm (eg. minimum 280mm total length. Sizes, S, M, L</td>
<td>Gloves should have long cuffs, reaching well above the wrist, ideally to mid-forearm.</td>
<td>Made of clear plastic and provides good visibility to both the wearer and the patient, Adjustable band to attach firmly around the head and fit snugly against the forehead, Fog resistant (preferable), Completely cover the sides and length of the face. May be re-usable (made of robust material which can be cleaned and disinfected) or disposable.</td>
<td>To evaluate effectiveness of seal for tight fitting respiratory protection devices</td>
<td>Fluid resistant particulate respirator. Surgical N95 respirator or higher High fluid resistance. Good breathability. Internal and external faces should be clearly identified, Structured design that does not collapse against the mouth (e.g. duckbill, cup-shaped)</td>
<td>Medical/surgical mask, high fluid resistance, good breathability, internal and external faces should be clearly identified, structured design that does not collapse against the mouth (e.g. duckbill, cup-shaped)</td>
<td>Tunic/tops, woven, scrubs, reusable or single use, short sleeved (tunic/tops), worn underneath the coveralls or gown.</td>
<td>Trouser/pants, woven, scrubs, reusable or single use, short sleeved (tunic/tops), worn underneath the coveralls or gown.</td>
<td>Single use, fluid resistant, disposable, length mid-calf to cover the top of the boots, light colours preferable to better detect possible contamination, thumb/forehead loops or elastic cuff to anchor sleeves in place.</td>
<td>Good seal with the skin of the face, Flexible PVC frame to easily fit with all face contours with even pressure, Enclose eyes and the surrounding areas, Accommodate wearers with prescription glasses, Clear plastic lens with fog and scratch resistant treatments, Adjustable band to secure firmly so as not to become loose during clinical activity, Indirect venting to avoid fogging, May be re-usable (provided appropriate arrangements for decontamination are in place) or disposable.</td>
<td>Bottle of 100ml</td>
<td>Disposal bag for bio-hazardous waste, 30x50cm, with &quot;Bio Hazard&quot; print, autoclavable polypropylene, 50 or 70 micron thickness</td>
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</tbody>
</table>

**MERS-CoV**

**Operational Support & Logistics**

**Disease Commodity Packages**

**CASE MANAGEMENT**

**PPE Health Care Facilities**

**OSL | Disease Commodity Packages**
### MERS-CoV

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>Body bag</strong></td>
<td>Made of linear reinforced, U-shape zipper and 2 zipper pulls with tie ribs. Adult size 250x120cm</td>
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<tr>
<td></td>
<td>Protector Body Bag specifications:</td>
</tr>
<tr>
<td></td>
<td>• 6 handles</td>
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<tr>
<td></td>
<td>• Impermeable, linear reinforced LLDPE, LDPE, EVA, PEVA, (avoid PVC), minimum thickness 400 microns;</td>
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<td></td>
<td>• Should be able to hold 100-125 kilos (200-250 lbs),</td>
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<td></td>
<td>• Should contain no chlorides: burning of chlorides pollute the environment and can cause damage to retort chambers. Body bags should be non carcinogenic to health of funeral workers when used for cremations.</td>
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<tr>
<td></td>
<td>• At least 6 handles included in the body bag to allow burial team to hand carry it safely</td>
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<td>• Heat-sealed: insure superior strength and safety,</td>
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<td></td>
<td>• Provide full containment of blood borne pathogens</td>
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<tr>
<td></td>
<td>• Cracking point of 25 - 32 degrees below zero</td>
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<td></td>
<td>• Shelf life: minimum 10 years</td>
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<td>• Bag and hands should be white color</td>
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<tr>
<td><strong>Chlorine</strong></td>
<td>NaDCC, granules, 1kg, 65 to 70% + dosage spon</td>
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