High vaccine MERS-CoV
Diagnosis

<table>
<thead>
<tr>
<th>Laboratory confirmation of a MERS-CoV case will trigger an immediate and thorough investigation. Because shipment and testing of specimens can take several days or longer, WHO's recommended strategy is to begin an investigation immediately, thus requiring immediate operational support and supplies.</th>
<th>Upper and lower respiratory samples (nasopharyngeal and sputum samples), blood</th>
<th>Polymerase Chain Reaction (PCR)</th>
<th>Immunoassay</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several commercial RT-PCR kits available</td>
<td>1 IgM/IgG ELISA (NPO)</td>
<td>2 IgM/IgG IFAs (NPO)</td>
<td>Confirmation via microneutralization</td>
<td>Viral transport medium</td>
</tr>
</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

<table>
<thead>
<tr>
<th>PREVENTION &amp; CONTROL</th>
<th>Travel &amp; Trade</th>
<th>Vaccine</th>
<th>Infection Protection &amp; Control (IPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>Restriction/ban of movement of camels</td>
<td>Several candidates in development. Please refer to most recent guidance established in the R&amp;D Blueprint.</td>
<td>Respiratory (standard, droplet IPC); Airborne precautions for aerosolized generating procedures, Personal Protective Equipment (PPE) for screening Use of PPE for at-risk health facilities</td>
</tr>
<tr>
<td>Investigation and follow-up</td>
<td>Respiratory (standard, droplet IPC); Airborne precautions for aerosolized generating procedures, Personal Protective Equipment (PPE) for screening Use of PPE for at-risk health facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intubation, ICU, ECMO required for severe patients</td>
<td>Use of Oximeter highly recommended for aerosolized generating procedures, Possibly Home Care Kits for home isolation of asymptomatic cases or mildly symptomatic (in the case of a large outbreak)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>CASE MANAGEMENT</th>
<th>Treatment</th>
<th>Personal Protective Equipment (PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no proven specific treatment or vaccine, however there are ongoing R&amp;D efforts. See WHO 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.</td>
<td>Several candidates under consideration for evaluation. On outbreak-specific basis, the Monitored Emergency Use of Unregistered Interventions (MEUR) may be considered. Please refer to most recent WHO guidance.</td>
<td>Respiratory (standard, droplet IPC); Airborne precautions for aerosolized generating procedures, Personal Protective Equipment (PPE) for screening Use of PPE for at-risk health facilities</td>
</tr>
</tbody>
</table>

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 R&D Blueprint.

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>COMMODITY</th>
<th>TECHNICAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURVEILLANCE</strong></td>
<td><strong>Sample Collection</strong></td>
<td><strong>Guidance on regulations for Transport of Infectious Substances 2017 - 2018</strong></td>
</tr>
<tr>
<td>Triple packaging boxes</td>
<td>Triple packaging boxes for transport</td>
<td>WHO performance specification E101/IC.1 WHO/NICEN standard E101/IC.2 or equivalent</td>
</tr>
<tr>
<td><strong>Diagnoses</strong></td>
<td>Gloves, examination</td>
<td>Gloves, examination, nitrile, powder-free, non-sterile. Cuff length preferably reach mid-forearm (eg. minimum 280mm total length. Sizes, S, M, L) Outer glove should have long cuffs, reaching well above the wrist, ideally to mid forearm. Inner glove should be worn under the cuff of the gown/coveralls (and under any thumb/finger loop) whereas the outer glove should be worn over the cuff of the gown/coveralls.</td>
</tr>
<tr>
<td>Gloves, surgical, length to forearm (longer than examination gloves)</td>
<td>Gloves, surgical, nitrile, powder-free, single use. Outer glove should have long cuffs, reaching well above the wrist, ideally to mid forearm. Inner glove should be worn under the cuff of the gown/coveralls (and under any thumb/finger loop) whereas the outer glove should be worn over the cuff of the gown/coveralls. Sizes 5 to 8.5</td>
<td></td>
</tr>
<tr>
<td><strong>Prevention &amp; Control</strong></td>
<td>Face mask, particulate respirator, grade N95 or higher</td>
<td>Fluid resistant particulate respirator. Surgical N9S respirator or higher</td>
</tr>
</tbody>
</table>

*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: For greater clarity, please refer to most recent applicable WHO technical guidance.
To evaluate effectiveness of seal for tight fitting respiratory protection devices

- Option 1: fluid penetration resistant: EN 13795 high performance, or AAMI PB70 level 3 performance or above, or equivalent
- Option 2: blood borne pathogens penetration resistant: AAMI PB70 level 4 performance, or (EN 14126-B) and partial body protection (EN 13034 or EN 14605), or equivalent

Gown

- Single use, fluid resistant, disposable, length mid-calf to cover the top of the boots, light colors preferable to better detect possible contamination, thumb/finger loops or elastic cuff to anchor sleeves in place.

Oxygen concentrators

- Device concentrates oxygen from ambient air. On 4 anesthetic swivel castors, 2 with brakes. Integrated handle allows for easy moving and positioning. Oxygen sensing device is integrated and measures concentration at flow meter entrance. Four-step filtering of air-intake, including bacterial filter. All filters replaceable, coarse filter washable/nontearable. Continuous monitoring with visual and audible alerts, on low/high output pressure, low oxygen concentration, power failure and battery test. Operating conditions: Temperature between 5 to 45 degrees Celsius, Relative humidity max. 90% without condensation. Spare parts should be required for operating at least one year.

-Oxygen concentrator Flow splitter

- Splitter of oxygen flow provided by an oxygen concentrator. Each flow can be adjusted individually via its flow meter, range: 0.125 to 2LPM (Liter Per Minute). The output nozzle can either be fitted with tubing or left blank. Input pressure: 50 to 350kPa.

Oxygen prongs, nasal, non-sterile, single use

- Nasal prongs (nassal cannula) is a device designed for easy administration of oxygen and comfort of patient. The device consists of a plastic tube which fits behind the ears, and a set of two prongs which are placed in the nostrils. Soft twin prongs nasal tips to ensure equal oxygen flow to both. Star lumen main tube to avoid accidental blockage. Adjustable, smoothly finished, nasal tips for maximum patient comfort. Soft funnel shaped connector to facilitate easy connection to oxygen source. Oxygen tube length: approximately 2m.

Oxygen tube, extension

- Tube used to deliver oxygen through the nose. Material: PVC. Automatic, open distal (patient) end, with 6 to 12 lateral eyes. Proximal end with connector enabling the tube to be connected to an oxygen supply tube of any diameter (e.g. serrated male conical tip). Sterile, for single patient use. Diameter: CH 10. Length: 40cm

Portable ventilator

- 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.

- 2 Modes of ventilation:
  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

- 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

- ISO 13485:2003 Medical devices -- Quality management systems -- Requirements for regulatory purposes
- (Australia, Canada and EU)
- ISO 14971:2007 Medical devices -- Application of risk management to medical devices
- IEC 60601-1-2:2007 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance
- IEC 60601-1-2:2009 Medical electrical equipment - Part 1-1: General requirements for safety - Collateral standard: Safety requirements for medical electrical systems
- ISO 80601-2-12:2011 Medical electrical equipment -- Part 2-12: Particular requirements for basic safety and essential performance of critical care ventilators

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 airinlet and needle, sterile, single-use

Paracetamol

- Paracetamol, 500mg, tablets

- 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

Gloves, examination

- Gloves, examination, nitrile, powder-free, non-sterile. Cuff length preferably reach mid-forearm (e.g. minimum 280mm total length. Sizes, S, M, L.

- Outer glove should have long cuffs, reaching well above the wrist, ideally to mid-forearm. Inner glove should be worn over the cuff of the gown/coversall (and under any thumb/finger loop) whereas the outer glove should be worn over the cuff of the gown/coversall.

WHO Core: Concentrator, Oxygen

Oxygen Concentrator Technical Guidelines
<table>
<thead>
<tr>
<th><strong>Gloves, surgical, length to forearm large (longer than examination gloves)</strong></th>
<th>Gloves, surgical, nitrile, powder-free, single use. Outer glove should have long cuffs, reaching well above the wrist, ideally to mid-forearm. Inner glove should be worn under the cuff of the gown/coveralls (and under any thumb/finger loop) whereas the outer glove should be worn over the cuff of the gown/coveralls. Sizes 5 to 8.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Face shield</strong></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 (preferred). 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>
</tr>
<tr>
<td><strong>Fit Test Kit</strong></td>
<td>To evaluate effectiveness of seal for tight fitting respiratory protection devices</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>Single use, light colours preferable to better detect possible contamination, thumb/finger loops to anchor sleeves in place, good freedom of movement. Sizes: M, L, XL</td>
</tr>
<tr>
<td><strong>Face mask, particulate respirator, grade N95 or higher</strong></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>
</tr>
<tr>
<td><strong>Mask, surgical</strong></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>
</tr>
<tr>
<td><strong>Scrubs, tops</strong></td>
<td>Tunic/tops, woven, scrubs, reusable or single use, short sleeved (tunic/tops), worn underneath the coveralls or gown.</td>
</tr>
<tr>
<td><strong>Scrubs, pants</strong></td>
<td>Trouser/pants, woven, scrubs, reusable or single use, short sleeved (tunic/tops), worn underneath the coveralls or gown.</td>
</tr>
<tr>
<td><strong>Gown</strong></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/finger loops or elastic cuff to anchor sleeves in place.</td>
</tr>
<tr>
<td><strong>Head cover</strong></td>
<td>Single use, fluid resistant, adjustable and should stay securely in place once adjusted, facial opening constructed without elastic, cover reaches upper part of the gown</td>
</tr>
<tr>
<td><strong>Boot, rubber</strong></td>
<td>Non-slip sole pattern, PVC or polyurethane sole which is completely sealed and waterproof. Knee-high in order be higher than the bottom edge of the gown. Range of sizes available to improve comfort and avoid trauma to the test. Materials of construction include rubber, PVC, neoprene, nitrile, polyurethane. Favor light colours to better identify possible contaminations.</td>
</tr>
<tr>
<td><strong>Goggles, protective</strong></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>
</tr>
<tr>
<td><strong>Apron</strong></td>
<td>Apron, disposable or single use, made of polyester with PVC-coated, or other waterproof material. Straight apron with bib, minimum basis weight: 250g/m², waterproof, Covering size: 70-90 cm (width) X 120-150cm (height), or standard adult size</td>
</tr>
<tr>
<td><strong>Alcohol-based hand rub</strong></td>
<td>Bottle of 100ml</td>
</tr>
<tr>
<td><strong>Bio-hazardous bag</strong></td>
<td>Disposable bag for bio-hazardous waste, 30x50cm, with “Bio Hazard” print, autoclavable polypropylene. 50 or 70 micron thickness</td>
</tr>
</tbody>
</table>

**OSHA 29 CFR 1910.134 Appendix A**

MERS-CoV

**Class Management**

**PPE: Health Care Facilities**

**Operational Support & Logistics**

**Disease Commodity Packages**

MERS-CoV
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| Body bag     | Made of linear enforced, U-shape zipper and 2 zipper pulls with tie ribs.  
              | adult size 250x120cm  
              | Protector Body Bag specifications:  
              | • 6 handles  
              | • Impermeable, linear reinforced LLDPE, LDPE, EVA, PEVA, (avoid PVC), minimum thickness 400 microns;  
              | • Should be able to hold 100-125 kilos (200-250 lbs),  
              | • 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.  
              | • At least 6 handles included in the body bag to allow burial team to hand carry it safely  
              | • Heat-sealed: insure superior strength and safety,  
              | • Provide full containment of blood borne pathogens  
              | • Cracking point of 25 - 32 degrees below zero  
              | • Shelf life: minimum 10 years  
              | • Bag and hands should be white color |
| Chlorine     | NaDCC, granules, 1kg, 65 to 70% + dosage spon |