Interim infection control guidelines for the management of Middle Eastern Respiratory Syndrome Coronavirus

September 2015
Interim Infection control guidelines for the management of Middle Eastern Respiratory Syndrome Coronavirus

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1. **Purpose**

This guideline provides recommendations regarding best practice for managing patients with suspected or confirmed Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) in a hospital setting. These guidelines aim to prevent infection of healthcare workers caring for persons with a MERS-CoV through the implementation of appropriate infection control measures.

2. **Scope**

This guideline provides information for all Queensland Health employees, contractors and consultants who in the course of their work may be required to care for a patient with suspected or confirmed MERS-CoV.

3. **Infection control guideline for the management of MERS-CoV in Queensland**

**Background**

The risk that a febrile/coughing patient will have MERS-CoV is low however due to the severity of the disease early identification is critical and the infection prevention interventions are deliberately cautious.

The incubation period for MERS-CoV is 2-14 days, most commonly 5 days. MERS-CoV is a zoonotic virus, with evidence to date indicating that camels are the source of the infection to humans. Human to human transmission occurs mostly in healthcare settings and to a much limited extent, within communities, mainly within households. Close contact is required and there is no clear evidence of sustained, human-to-human transmission. The method of transmission particularly in healthcare settings is still incompletely understood; respiratory (mainly), trans ocular and enteric spread all probably occur in some circumstances.

**Heightened degree of awareness**

Early recognition is critical for preventing transmission of MERS-CoV. Healthcare workers must be able to recognise a possible case and be ready to employ practical infection prevention and control precautions.

Patients presenting with acute respiratory symptoms should be triaged as a high priority and asked about recent overseas travel from the Middle East or any other region where MERS is occurring.

If a symptomatic person advises that they have recently resided in or travelled to an area with known transmission of MERS-CoV within the last 14 days, they should immediately be placed in a single room in accordance with the patient placement
section of this guideline. Clinical and epidemiological aspects of the case should be evaluated as soon as possible and should be complimented by laboratory evaluation.\(^2\)

MERS-CoV recommended PPE should be worn by staff attending the patient until a diagnosis is negative or the patient is recovered and no longer considered infectious.

**Case definition**


**Patients who should be evaluated for MERS-CoV**

A. Fever AND pneumonia or pneumonitis or acute respiratory distress syndrome (ARDS) AND
   - history of travel from or residence in affected countries in the Middle East* within 14 days before symptom onset, OR
   - contact\# (within the incubation period of 14 days) with a symptomatic traveller who developed fever and acute respiratory illness of unknown aetiology within 14 days after travelling from affected countries in the Middle East, OR
   - contact (within the incubation period of 14 days) with a symptomatic traveller who developed fever and acute respiratory illness of unknown aetiology within 14 days after travelling from a region with a known MERS-CoV outbreak at that time\^,

OR

B. Fever AND symptoms of respiratory illness (e.g., cough, shortness of breath) AND
   - being in a healthcare facility (as a patient, worker, or visitor) in a country or territory in which recent healthcare-associated cases of MERS have been identified\^ within 14 days before symptom onset, OR
   - being in contact with camels or raw camel products within affected countries in the Middle East within 14 days before symptom onset.

OR

C. Fever OR acute symptoms compatible with MERS-CoV AND onset within 14 days after contact with a probable or confirmed MERS-CoV case while the case was ill.

OR

D. Testing and initial infection control and public health actions for MERS-CoV should also be considered, in consultation with the public health unit, where there is a cluster of patients with severe acute respiratory illness of unknown aetiology following routine microbiological investigation, particularly where the cluster includes health care workers.

*Affected countries in the Middle East include Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia (KSA), United Arab Emirates (UAE) and Yemen*
Laboratory testing for MERS-CoV

For information relating to laboratory testing for MERS-CoV please see the *Middle East Respiratory Syndrome Coronavirus (MERS-CoV) CDNA National guidelines for Public Health Units* available from:


Notification

Facilities must have mechanisms and policies in place to promptly alert key facility staff including infection control, infectious diseases physician (if applicable), hospital leadership, clinical laboratory, frontline staff and the Hospital and Health Service Public Health Physician about suspected or confirmed MERS-CoV patients. The public health physician should then notify the Executive Director of Communicable Diseases Branch. If, on assessment the patient is suspected to have MERS-CoV, the facility’s emergency department must immediately implement these processes.

Patient placement

All patients meeting the case definition of suspected or confirmed MERS-CoV should be managed in a single room under transmission based precautions (contact and airborne). The following patient placement options should be applied in order according to facility resources.

Option one

*Single room with ensuite facilities, negative pressure air handling and dedicated anteroom*

- Patients should be placed in a single room containing a private bathroom and an anteroom with a negative pressure air handling system, and managed under standard and transmission based contact and airborne precautions.
- Donning and removing of PPE is to be undertaken in the anteroom with a clear separation between clean and potentially contaminated areas.

Option two

*Single room with ensuite facilities without negative pressure air handling*

- When option one is not available, patients should be placed in a single room containing a private bathroom with the door closed and be managed under standard and transmission based contact and airborne precautions.
• An adjacent room or area for storage of and putting on, clean PPE and a separate area of adequate size for the safe removal of PPE and the disposal of clinical waste are required.1

**Option three**

**Single room without ensuite facilities and without negative pressure**

• When options one and two are not available, patients should be placed in a single room with the door closed and be managed under standard and transmission based contact and airborne precautions.
• An adjacent room or area for storage of and putting on, clean PPE and a separate area of adequate size for the safe removal of PPE and the disposal of clinical waste are required.1

**Cohorting**

If patients are cohorted, spatial separation of at least 1m should be maintained between each patient2 and curtains should be used4 to separate patients to help reduce the spread.

**Personal protective equipment**

Personal Protective Equipment (PPE) is one of the key elements of preventing the spread of communicable diseases including MERS-CoV to healthcare workers (HCW). Compliance with processes for donning and removing PPE is critical to staff safety. The following principles should be adhered to in relation to PPE:

• HCWs must have received training and instruction on the donning and removing process and must have practiced these.
• HCWs must be given sufficient time to don and remove PPE correctly without disturbances.
• PPE must remain in place and be worn correctly for the duration of exposure to potentially contaminated areas. PPE should not be adjusted during patient care.
• The removal of used PPE is a high-risk process that requires a structured and systematic procedure. PPE must be removed slowly and deliberately in the correct sequence to reduce the possibility of self-contamination or other exposure to MERS-CoV. Therefore, facilities must ensure that a step-by-step process for removal of PPE is developed and documented.
• All personal items should be removed (e.g. jewellery, watches, lanyards, mobile phones, pagers, pens etc.) before donning PPE. Hair should be tied back out of the face and eyes.
• A trained observer should always be available to monitor and instruct the HCW during both the donning and removal processes.
**Donning**

The healthcare worker should don their PPE in the following order:

- Long sleeve fluid resistant, disposable gown (and plastic apron if required)
- P2/N95 respirator (perform a fit check)
- Goggles or a face shield
- Gloves which should be pulled over the cuffs of the gown.

**Removal**

PPE should be removed in the following order:

- While still in the patient room the HCW should remove their gloves and gowns being careful to avoid contaminating their clothing underneath
- Once outside of the patient room the HCW should perform hand hygiene and then remove the goggles/face shield and perform hand hygiene.
- Remove the P2/N95 respirator being careful not to touch the front of the respirator. Hand hygiene should be performed immediately after this.

**Additional recommendations**

- Hand hygiene should be undertaken in accordance with the “5 moments for hand hygiene.”
- Gloves should be changed if they become torn or heavily contaminated
- Gowns should be changed if they become soiled
- If re-useable PPE is used such as goggles, these must be cleaned and disinfected prior to re-use. Staff must be trained in this process.

**Visitors**

Family members and visitors should be limited to those essential for patient support. The following principles should be followed in relation to visitors who enter the patient care area:

- They should be trained on the risk of transmission and the use of infection prevention measures including the use of PPE
- A log of all visitors who enter the patient room should be maintained
- Visitors should not be allowed to be present during aerosol generating procedures
- They should be instructed to limit their movements within the facility and to report any signs or symptoms of acute illness for a period of 14 days after the last known exposure to the patient
- Visitors should be screened for symptoms of acute respiratory illness before entering the facility.
Patient care equipment

Where possible all equipment required for patient care should be dedicated for the use of an individual patient. If equipment cannot be dedicated to the patient for the duration of illness it should be thoroughly cleaned and disinfected before being used with other patients.

Patient movement

The transportation and movement of patients outside of the negative pressure room should be limited to medically essential purposes only. The use of designated portable x-ray equipment and other important diagnostic equipment may make this easier. In situations where it is necessary for the patient to be transported outside of their designated room they should wear a surgical mask to contain secretions and routes of transport that minimise exposures of staff, other patients and visitors should be used. Staff who are transporting the patient should wear appropriate PPE.

The receiving area should be informed of the patient’s suspected or confirmed diagnosis and the necessary precautions required prior to the patient being moved.

Staff

Staffing allocation

In order to minimise the risk of transmission of MERS-CoV, facilities should consider the following when allocating staff to care for patients with suspected or confirmed MERS-CoV:

- dedicated HCWs to minimise the risk of transmission and exposure to other patients and HCWs
- only allocate staff who have undergone appropriate training in the use of PPE, environmental cleaning, and disinfection of equipment. This training should include the relevant categories of HCWs (including cleaning staff)
- staff rosters should include adequate numbers of staff to avoid staff fatigue. Wearing a P2/N95 respirator can be tolerated for only limited periods; regular breaks are required
- Facilities should keep a log of all persons who care for or enter the room of these patients.

Certain health conditions may preclude HCWs from providing direct care for MERS-CoV patients and should be taken into consideration when allocating staff. These may include:

- medical conditions that could affect their ability to exit the room quickly and safely, or may require another HCW to enter the room to provide urgent medical assistance (e.g. seizure disorder, hypoglycaemia)
- inability to safely put on, use, or remove recommended PPE (e.g. claustrophobia, significant anxiety, body morphology, mobility issues)
interim infection control guidelines for the management of middle eastern respiratory syndrome coronavirus

- conditions that increase the severity of illness such as diabetes, chronic lung, liver or heart disease, renal impairment, lowered immune competence, including cancer
- pregnancy is a relative contraindication for working in high risk clinical areas.¹

**Staff monitoring**

HCWs who care for patients with MERS-CoV should be monitored until 14 days after the last known contact with a MERS-CoV patient regardless of PPE use.⁵ If a HCW who has cared for a patient with suspected or confirmed MERS-CoV develops any acute illness or signs or symptoms such as fever, cough, or shortness of breath⁴ they should immediately:

- stop work or not report for work⁴
- notify the facility designated person
- seek medical evaluation
- comply with work exclusion until they are no longer considered infectious to others.⁴

**Food services staff**

Non-essential staff should be restricted from entering the MERS-CoV patient care area. Food services staff should deliver all food and beverages to the designated clean area; these should then be delivered into the patient room by staff directly caring for the patient.

**Aerosol generating procedures**

Some procedures may be more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking or breathing.⁴ Although not quantified the procedures that might pose an increased risk to HCWs include cough-generating procedures, bronchoscopy, sputum induction, intubation and extubation, cardiopulmonary resuscitation and open suctioning of airways.⁴ Aerosol generating procedures (AGP) should be avoided where possible.¹

If AGPs can’t be avoided a combination of measures should be used to reduce exposures when performing these on suspected or confirmed MERS-Cov patients:

- Only perform AGPs when medically necessary
- Limit the number of HCWs present during the procedure to those essential for patient care and support⁴
- Conduct the procedures in negative pressure rooms⁴
- Conduct environmental cleaning following these procedures as described in the environmental cleaning section⁴
- PPE should be worn as recommended⁴ this should include an apron if high volumes of fluid are expected²
- Visitors should not be present⁴.
Environmental cleaning and disinfection

Routine Cleaning

Daily cleaning tasks of the patient care environment should be undertaken as per usual practice using an appropriate disinfectant solution. Cleaning environmental surfaces with water and detergent and applying commonly used disinfectants (such as hypochlorite) is an effective and sufficient procedure.²

The preferred disinfectant solution is sodium hypochlorite made up to 1000 parts per million (ppm) available chlorine for routine environmental cleaning. Minimum frequencies for routine cleaning are outlined in Queensland Health's guideline on: <i>Environmental Cleaning Risk Levels, Frequencies and Standards</i> which is available on the Queensland Health’s intranet site only.

The preferred routine cleaning process should involve either:

- a physical clean using combined surfactant and 1000 ppm available chlorine solution (2-in-1 clean) made up daily from a concentrated solution
- a physical clean using detergent followed by a clean with 1000 ppm available chlorine solution (2-step clean).

Final disinfectant clean

Once the patient vacates a room, cleaning should not commence until sufficient air changes to remove potentially infectious airborne particles has occurred, please see appendix one for advice, this should be used in conjunction with advice from local engineers who manage the facilities air handling systems. Prior to cleaning the room all of the patient's personal effects and privacy curtains and window curtains if present should be removed for laundering. Handle used textiles and fabrics with minimum agitation to avoid contamination of air, surfaces and persons.⁵ PPE for transmission based precautions should still be used.

The room and all patient care equipment remaining in the room should be physically cleaned. All furniture, patient equipment items, horizontal surfaces, frequently touched surfaces (e.g. light switches and call buttons) and bathroom / toilet / shower area should be thoroughly cleaned. All consumables that are unable to be cleaned should be discarded.

Patient care equipment

Patient-care devices (e.g. electronic thermometers, sphygmomanometers, glucometers, hoists, pat slides) may transmit MERS-CoV if devices are shared between patients. To reduce the risk of transmission, disposable or patient dedicated equipment is preferred. Equipment that is unable to be dedicated should be cleaned and disinfected after use, allowed to dry and stored clean.
Duration of infection control precautions

The duration of infectivity for MERS-CoV infection is unknown.² The need for ongoing isolation and use of transmission-based precautions in the case of a recovering patient should be determined on a case-by-case basis. The use of transmission based contact and airborne precautions should be used for the duration of symptomatic illness and continue for 24 hours after the resolution of symptoms.²

Expert opinion should be sought prior to ceasing patient isolation and transmission based precautions. Factors that should be considered include, but are not limited to:

- Presence of symptoms related to MERS-CoV
- Date symptoms resolved⁴
- Patient information: this should also be used to determine if there is a concern about the patient shedding the virus for a prolonged period of time e.g. immune status and medications²
- Testing for viral shedding should assist decision making.²

4. Review

This Guideline is due for review on: 10/09/2018

5. Business Area Contact

Communicable Diseases Branch

6. Definitions of terms used in the policy and supporting documents

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<tr>
<th>Term</th>
<th>Definition / Explanation / Details</th>
<th>Source</th>
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<tr>
<td>Aerosol generating procedures</td>
<td>Any medical procedure that can induce the production of aerosols of various sizes, including small (&lt;5 µm) particles</td>
<td>WHO²</td>
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<td>Co-horting</td>
<td>Placing together in the same room patients who are infected with the same pathogen and are suitable roommates.</td>
<td>NHMRC⁶</td>
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<tr>
<td>Negative pressure room</td>
<td>A single-occupancy patient-care room used to isolate persons with a suspected or confirmed airborne infectious disease. Environmental factors are controlled in negative pressure rooms to minimise the transmission of infectious agents that are usually transmitted from person to person by droplet nuclei associated with coughing or aerosolisation of contaminated fluids.</td>
<td>NHMRC⁶</td>
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<td>Term</td>
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<tr>
<td>Personal Protective Equipment (PPE)</td>
<td>A variety of barriers used alone or in combination to protect mucous membranes, skin, and clothing from contact with infectious agents. PPE includes gloves, masks, respirators, protective eyewear, face shields, and gowns.</td>
<td>NHMRC⁶</td>
</tr>
<tr>
<td>Zoonotic Disease</td>
<td>A zoonotic disease is a disease that can be passed between animals and humans. Zoonotic diseases can be caused by viruses, bacteria, parasites, and fungi.</td>
<td>CDC⁷</td>
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7. **Approval and Implementation**

**Document Custodian:**
Executive Director, Communicable Diseases Branch

**Approving Officer:**
Dr Sonya Bennett, Communicable Diseases Branch

**Approval date:** 10/09/2015

8. **Version Control**

New Document

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9. **References**


**Appendix one**

The following guidance has been adopted from the Centers for Disease Control and Prevention, Healthcare Infection Control Practices Advisory Committee (HICPAC): Guidelines for Environmental Infection Control in Health-Care Facilities, available from: [http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf](http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf)

Airborne Contaminant Removal. Air changes/hour (ACH) and time required for airborne-contaminant removal efficiencies of 99% and 99.9%*

<table>
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<th>ACH+ § ¶</th>
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* This table is revised from Table S3-1 in reference 4 and has been adapted from the formula for the rate of purging airborne contaminants presented in reference 1435. Please use the following link: [http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf](http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf)

+ Shaded entries denote frequently cited ACH for patient-care areas.

§ Values were derived from the formula:

\[
t_2 - t_1 = - \left[ \ln \left( \frac{C_2}{C_1} \right) / \left( \frac{Q}{V} \right) \right] H 60, \text{ with } t_1 = 0 \text{ and where:}
\]

- \( t_1 \) = initial timepoint in minutes
- \( t_2 \) = final timepoint in minutes
- \( C_1 \) = initial concentration of contaminant
- \( C_2 \) = final concentration of contaminant
- \( C_2 / C_1 = 1 - \text{(removal efficiency} / 100) \)
- \( Q \) = air flow rate in cubic feet/hour
- \( V \) = room volume in cubic feet
- \( Q / V = ACH \)

§ Values apply to an empty room with no aerosol-generating source. With a person present and generating aerosol, this table would not apply. Other equations are...
available that include a constant generating source. However, certain diseases (e.g., infectious tuberculosis) are not likely to be aerosolized at a constant rate. The times given assume perfect mixing of the air within the space (i.e., mixing factor = 1). However, perfect mixing usually does not occur. Removal times will be longer in rooms or areas with imperfect mixing or air stagnation. Caution should be exercised in using this table in such situations. For booths or other local ventilation enclosures, manufacturers’ instructions should be consulted.