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# MIDDLE EAST RESPIRATORY SYNDROME CORONAVIRUS; GUIDELINES FOR HEALTHCARE PROFESSIONALS

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## 2. INTRODUCTION

Middle East Respiratory Syndrome (MERS) is a viral respiratory disease caused by a novel coronavirus (Middle East Respiratory Syndrome Coronavirus, or MERS-CoV) that was first identified in Saudi Arabia in 2012.

Typical MERS-CoV symptoms include fever, cough and shortness of breath. Pneumonia is common, but not always present. Approximately 35% of reported patients with MERS-CoV have died.

Although some of human cases of MERS-CoV have been attributed to human-to-human infections in health care settings, current scientific evidence indicates that dromedary camels are a major reservoir host for MERS-CoV and an animal source of MERS-CoV infection in humans.

This is the fifth edition (updated May 2018) of the national MERS-CoV guidelines. A large group of national and international experts in epidemiology, infectious diseases, infection control, intensive care, laboratory, veterinary medicine and public health were hosted by Saudi Ministry of Health (MOH) to review current knowledge and update the guidelines.

## 3. OBJECTIVES

This document provides guidelines on managing MERS-CoV infection based on the best available scientific evidence and broad consensus through the following:

- Provide guidance on MERS-CoV surveillance activities in the healthcare setting and in the community.
- Provide guidance on the infection control precautions for suspected and confirmed MERS-CoV cases.
- Standardize the clinical management of MERS-CoV patients.
- Provide guidance for rational use of resources including laboratory testing.
- To act as focus for quality control, including audit.

## 4. CASE DEFINITION

### 4.1 SUSPECTED CASE[1]

| Age | Clinical Presentation | Epidemiologic Link |
|---|---|---|
| Adults | I. Severe pneumonia (severity score ≥3 points) (Appendix 4) or ARDS (based on clinical or radiological evidence) | Not required |
| Adults[2] | II. Unexplained deterioration[3] of a chronic condition of patients with congestive heart failure or chronic kidney disease on hemodialysis | Not required |
| Children and adults | III. Acute febrile illness (T ≥38$^0$ C) with/without respiratory symptoms OR<br>IV. Gastrointestinal symptoms (diarrhea or vomiting), AND leukopenia (WBC≤3.5x10$^9$ /L) or thrombocytopenia (platelets < 150x109/L) | Within 14 days before symptom onset:<br>1. Exposure[4] to a confirmed case of MERS-CoV infection OR<br>2. Visit to a healthcare facility where MERS-CoV patients(s) has recently (within 2 weeks) been identified/treated OR<br>3. Contact with dromedary camels[5] or consumption of camel products (e.g. raw meat, unpasteurized milk, urine) |

### 4.2 CONFIRMED CASE

A Confirmed case is defined as a suspected case with laboratory confirmation of MERS-CoV infection.

[1] All suspected cases should have samples collected for MERS-CoV testing (nasopharyngeal swabs or sputum, and when intubated, lower respiratory secretions) [2]

Adult is defined as > 14 years old

[3] Chronic renal failure and congestive heart failure patients may exhibit fever and presence of fluid overload may mask the radiological features of pneumonia [4] Exposure is defined as a contact within 1.5 meters with a confirmed MERS-CoV patient.

[5] Exposure to camels include:

- Direct physical contact with camels or their surroundings (milking and handling excreta are especially risky), drinking raw camel milk or other unpasteurized products derived from camel milk, and handling raw camel meat.
- Indirect contact include casual contact with camel places like visiting camel market or farms without direct physical contact with camels, living with a household member who had direct contact with camels.

# 5. INFECTION PREVENTION AND CONTROL

## 5.1 ADMINISTRATIVE INTERVENTIONS

To prevent the transmission of respiratory infections in the healthcare settings, including MERS-CoV and influenza, the following infection control administrative measures should be incorporated into infection control practices and implemented:

- Triage for patients with Acute Respiratory Illness (ARI):
  - Visual triage should be used for early identification of all patients with ARI in the Emergency Room and dialysis units. o Visual triage station should be placed at the entry point of the healthcare facility (i.e. emergency room entrance, dialysis unit entrance) or other designated areas and attended by a trained nurse or nurse assistant. o All patients attending hemodialysis units and all emergency room attendees (except those with immediately life-threatening conditions) must be triaged at the entrance using predefined scoring (Appendix B). o Identified ARI patients should be asked to perform hand hygiene and wear a surgical mask. They should be isolated and evaluated immediately in an area separate from other patients, ideally a separate room
- Dedicate a waiting area for the ARI patients with spatial separation of at least 1.2 meter between each ARI patient and others.

- Post visual alerts (in appropriate languages) at the entrance of healthcare facilities (e.g. emergency rooms and clinics). Messages in the visual alerts include the following:
    - Cover your mouth and nose with a tissue when coughing or sneezing. o Dispose of the tissue in the nearest waste receptacle immediately after use.
    - Perform hand hygiene (e.g. hand washing with non-antimicrobial soap and water, alcohol-based hand sanitizer, or antiseptic hand wash) after having contact with respiratory secretions and contaminated objects or materials.
- Prevent overcrowding in clinical areas to reduce the risk of transmission between patients and to staff.
    - The distance that should be maintained between patients` beds are:
        - Minimum of 1.2 meters in General words, Hemodialysis units and Emergency units.
        - Minimum of 2.4 meters in Critical care units.

## 5.2 TRANSMISSION PRECAUTIONS

MERS-CoV is believed to spread between humans mainly through contact and respiratory droplets. However, transmission through small particle droplet nuclei (aerosols) may occur. Environmental contamination during outbreaks in healthcare facilities can be extensive and might contributes to amplifying outbreaks, if adequate disinfection procedures are not followed.

- For patients with suspected, or confirmed MERS-CoV infection who are NOT CRITICALLY ILL, Standard, Contact, and Droplet precautions are recommended.
- For patients who are CRITICALLY ILL, Standard, Contact, and Airborne precautions are recommended due to the high likelihood of requiring aerosol-generating procedures.

## 5.3 PATIENT PLACEMENT

Every healthcare facility should have the capacity to care for patients with transmissible infections including airborne infections. However, the availability of single rooms and negative pressure rooms are a challenge in most facilities. The infection control teams should take the lead in managing isolation rooms.

- Patients with suspected or confirmed MERS-CoV infection who are not critically ill should be placed in single patient rooms in an area that is clearly segregated from other patient-care areas. A portable HEPA filter could be used and placed according to the manufacturer recommendations.

- Critically ill patients with suspected or confirmed MERS-CoV infection should be placed in Airborne Infection Isolation Rooms (Negative Pressure Rooms), if available. When negative pressure rooms are not available, the patients should be placed in adequately ventilated private rooms with a portable HEPA filter and is placed according to the manufacturer recommendations.

When single rooms are not available, suspected or confirmed MERS-CoV patients should be placed with other patients of the same diagnosis (cohorting). If this is not possible, place patient beds at least 1.2 meters apart.

## 5.4 PATIENT TRANSPORT

Avoid the movement and transport of patients out of the isolation room or area unless medically necessary. The use of designated portable X-ray, ultrasound, echocardiogram and other important diagnostic machines is recommended when possible.

If transport is unavoidable, the following should be observed:

- Patients should wear a surgical mask during movement to contain secretions.

- Use routes of transport that minimize exposures of staff, other patients, and visitors.
- Notify the receiving area of the patient's diagnosis and necessary precautions as soon as possible before the patient's arrival.
- Ensure that healthcare workers (HCWs) who are transporting patients wear appropriate PPE and perform hand hygiene afterward.

## 5.5 PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR HCWS

The following PPE should be worn by HCWs upon entry into patient rooms or care areas in the respected order:

- Gowns (clean, non-sterile, long-sleeved disposable gown). • Surgical mask (or N95 when airborne precautions are applied)
- Eye protection (goggles or face shield).
- Gloves.

For patients on airborne precautions, any person entering the patient's room should wear a fit-tested N95 mask instead of a surgical mask. For those who failed the fit testing of N95 masks (e.g. those with beards), an alternative respirator, such as a powered air-purifying respirator (PAPR), should be used.

- Upon exit from the patient room or care area, PPEs should be removed and discarded.
- Except for N95 masks, remove PPE at the doorway or in the anteroom. Remove N95 mask after leaving the patient room and closing the door.
- Remove PPEs in the following sequence: 1. Gloves, 2. Goggles or face shield, 3. Gown and 4. Mask or respirator.

- The following also should be noted:
    - o The outside of gloves, masks, goggles and face shield are contaminated. o Never wear a surgical mask under the N95 mask as this prevents proper fitting and sealing of the N95 mask thus decreasing its efficacy. o For female staff who wear veils, the N95 mask should always be placed directly on the face behind the veil and not over the veil. In this instance, a face-shield should also be used along with the mask to protect the veil from droplet sprays.
    - o Whenever possible, use either disposable equipment or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers).

## 5.6 ENVIRONMENTAL CLEANING AND DISINFECTION

Recent data suggested that the environment in health care facilities used for MERS-CoV patients is widely contaminated. Thorough environmental cleaning and disinfection are critical.

- Consider designating specific, well-trained housekeeping personnel for cleaning and disinfecting of MERS-CoV patient rooms/units.
- Define the scope of cleaning that will be conducted each day; identify who will be responsible for cleaning and disinfecting the surfaces of patient-care equipment (e.g. IV pumps, ventilators, monitors, etc.).
- Consider using a checklist to promote accountability for cleaning responsibilities.
- Housekeeping personnel should wear PPE as described above. Housekeeping staff should be trained by the infection control team about MERS-CoV, in proper procedures for PPE use, including removal of PPE, and the importance of hand hygiene.
- Keep cleaning supplies outside the patient room (e.g. in an anteroom or storage area).

- Keep areas around the patient free of unnecessary supplies and equipment to facilitate daily cleaning.
- Use MOH-approved disinfectants (see the GCC Infection Prevention and Control Manual, 3rd edition). Follow manufacturer's recommendations for use-dilution (i.e. concentration), contact time, and care in handling.
- Clean and disinfect MERS-CoV patients' rooms at least daily and more often when visible soiling/contamination occurs.
- Give special attention to frequently touched surfaces (e.g. bedrails, bedside and over-bed tables, TV control, call button, telephone, lavatory surfaces including safety/pull-up bars, door knobs, commodes, ventilator and monitor surfaces) in addition to floors and other horizontal surfaces.
- Wipe external surfaces of portable equipment for performing x-rays and other procedures in the patient's room with a MOH-approved disinfectant upon removal from the patient's room.
- After an aerosol-generating procedure (e.g. intubation), clean and disinfect horizontal surfaces around the patient. Clean and disinfect as soon as possible after the procedure.
- Clean and disinfect spills of blood and body fluids by current recommendations for spill management outlined in the GCC Infection Prevention and Control Manual, 3rd edition.
- Cleaning and disinfection after MERS-CoV patient discharge or transfer:
    - Follow standard procedures for terminal cleaning of an isolation room. (See the GCC Infection Prevention and Control Manual, 3rd edition)

- Clean and disinfect all surfaces that were in contact with the patient or may have become contaminated during patient care including items such as blood pressure cuffs, pulse oximeters, stethoscopes, etc.
- Wipe down mattresses and headboards with an MOH-approved disinfectant. o Privacy curtains should be removed, placed in a bag in the room and then transported to be laundered. o No special treatment is necessary for window curtains, ceilings, and walls unless there is evidence of visible soil. o Use hydrogen peroxide vapor or UVC machines for disinfection of the room as mandatory part of the terminal cleaning process. o If all the procedures mentioned above are followed, then the patient room can be used immediately for another patient after terminal cleaning.

## 5.7 MEDICAL WASTE

Housekeeping staff must wear disposable gloves and perform hand hygiene after removal of gloves when handling waste.

Collection and disposal of MERS-CoV contaminated medical waste should follow the GCC Infection Prevention and Control Manual, 3rd edition.

## 5.8 TEXTILES

General concepts when dealing with linen in MERS-CoV patient's room are outlined in the GCC Infection Prevention and Control Manual, 3rd edition.

## 5.9 INFECTION PREVENTION AND CONTROL PRECAUTIONS FOR AEROSOL-GENERATING PROCEDURES

An aerosol-generating procedure (AGP) is defined as any medical procedure that can induce the production of aerosols of various sizes, including small (< 5 microns) particles.

AGPs includes bronchoscopy, sputum induction, intubation and extubation, cardiopulmonary resuscitation, open suctioning of airways, Ambu bagging, nebulization therapy, high frequency oscillation ventilation and Bilevel Positive Airway Pressure ventilation- BiPAP (BiPAP is not recommended in MERS-CoV infected patients because of the high risk of generating infectious aerosols and lack of evidence for efficacy).

Additional precautions should be observed when performing aerosol- generating procedures, which may be associated with an increased risk of infection transmission:

- Perform procedures in a negative pressure room.
- Limit the number of persons present in the room to the absolute minimum required for the patient's care and support.
- Wear N95 masks: Every healthcare worker should wear a fit-tested seal check N95 mask (or an alternative respirator if fit testing failed).
- Wear eye protection (i.e. goggles or a face shield).
- Wear a clean, non-sterile, long-sleeved gown and gloves (some of procedures require sterile gloves).
- Wear an impermeable apron for some procedures with expected high fluid volumes that might penetrate the gown.
- Perform hand hygiene before and after contact with the patient and his or her surroundings and after PPE removal.

## 5.10 FIT TEST AND SEAL CHECK

The protection offered by a disposable particulate respirator (e.g.N95) depends on its tight fitting to the user's face. Standardized respirator fit testing helps identify the correct respirator size and shape.

- Healthcare workers are required to have a respirator fit test at least once every 2 years and if weight fluctuates or facial/dental alterations occur.
- A fit test only qualifies the specific brand/make/model of a respirator with which an acceptable fit testing result was achieved and therefore users should only wear the specific brand, model, and size he or she wore during a successful fit test.
- Each time a respirator is donned, a seal check must be performed using the procedures recommended by the manufacturer of the respirator.
- For healthcare workers who have facial hair that comes between the sealing surface of the facepiece and the face of the wearer a Powered Air Purifying Respirator (PAPR) should be used instead.

## 5.11 MANAGEMENT OF EXPOSURE TO MERS-COV IN HEALTHCARE FACILITIES

### 5.11.1 Healthcare workers exposed to a MERS-CoV case

Healthcare facilities should identify and trace all health care workers who had protected (proper use of PPE) or unprotected (without wearing PPE or PPE used improperly) exposure to patients with suspected, or confirmed MERS-CoV infection.

The decision to permit a healthcare worker to resume his/her duties after an exposure to MERS-CoV should be individualized. Infection control team will be ultimately responsible for taking that decision.

The following are general guidelines but management will depend on the infection control team risk assessment:

a. Asymptomatic healthcare workers WITH protected exposure OR unprotected lowrisk exposure (more than 1.5 meters of the patient): o Testing healthcare

workers for MERS-CoV is not recommended o Healthcare workers can continue their duties

- o Healthcare workers shall be assessed daily for 14 days post exposure for the development of symptoms
- o Healthcare workers should delay travel until cleared by infection control team.
- o Asymptomatic healthcare workers WITH protected exposure OR unprotected low-risk exposure are considered CLEAR if they: - Remain asymptomatic AND
  - The observation period is over (14 days post exposure).

b. Healthcare workers who had unprotected high-risk exposure (within 1.5 meters of the patient) or have suggestive symptoms regardless of exposure type: o Healthcare workers shall stop performing their duties immediately. o Testing (Nasopharyngeal swabs) for MERS-CoV is required (preferably 24hr or more after the exposure)

- o Healthcare workers shall not resume their duties until cleared by infection control team. o Healthcare workers should delay travel until cleared by infection control team.
- o Healthcare workers who test positive for MERS-CoV (regardless of the exposure type); healthcare workers who develop MERS-CoV suggestive symptoms (regardless of the exposure type) and healthcare workers who had unprotected high-risk exposure are considered CLEAR if:
  - They are asymptomatic for at least 48 hrs AND
  - The observation period is over (14 days post exposure) AND - Had at least one negative RT-PCR for MERS-CoV.

### 5.11.2 Patients exposed to a MERS-CoV case

Patients can be exposed to MERS-CoV patients prior to diagnosis or due to the failure of implementing recommended isolation precautions. The following are general guidelines but management will depend on the infection control team risk assessment:

- Patients sharing the same room (any setting e.g. ward with shared beds, open ICU, open emergency unit, etc.) with a confirmed case of MERS-CoV for at least 30 minutes: o Testing (Nasopharyngeal swabs or deep respiratory sample if intubated) for MERS-CoV is required (preferably 24hr or more after the exposure).
  - o Patients should be followed daily for symptoms for 14 days after exposure. o If negative on initial testing, exposed patients should be retested with RTPCR if they develop symptoms suggestive of MERS-CoV within the follow up period. o Patients discharged during the follow up period must be reported to public health department to continue monitoring for symptoms.

## 5.12 OUTBREAK MANAGEMENT

Healthcare facility outbreak is defined as evidence of one or more secondary transmissions of MERS-CoV within the healthcare facility.

The investigation of MERS-CoV outbreak is managed by the Infection Prevention Unit of the hospital, Regional Command and Control Center (RCCC) and Central Command and Control Center and is discussed in *Communicable Diseases Outbreaks in Healthcare Facilities: Management Guidelines*.

Interventions such as media communication, partial or complete closure of hospitals or units, and activation of surge plan must be coordinated with the central Command and Control Center.

Contact tracing and testing shall follow approved protocols. Indiscriminate testing hamper outbreak control efforts and waste valuable resources.

## 5.13 PATIENT TRANSPORTATION AND PREHOSPITAL EMERGENCY MEDICAL SERVICES

Patients who may have MERS-CoV infection may be safely transported in any emergency vehicle with the proper precautions.

- Train EMS staff, including drivers, on basic infection control skills with emphasis on respiratory protection. Like other healthcare workers, respirator fit testing is also required.
- Minimize the number of people involved in the transport.
- When possible, use vehicles that have a separate driver and patient compartments and close the door/window between these compartments.
- Use a vehicle equipped with a HEPA filter incorporated into the ventilation unit especially for transporting patients on mechanical ventilation. If this unit is not available, set the regular vehicle's ventilation system to the non-circulating mode.
- Transport staff including the driver shall use PPE as described above (Personal Protective Equipment for Healthcare Workers).
- Place a surgical mask on the patient (if tolerated) and have the patient cover the mouth/nose with a tissue when coughing.
- Oxygen delivery with a non-rebreather face mask may be used to provide oxygen support during transport.
- Coordinate with the receiving facility to receive the patient at the ambulance door and limit the need for EMS personnel to enter the emergency department.
- Remove and discard PPEs in a medical waste container and follow standard operating procedures for reprocessing used linen.
- Clean and disinfect the vehicle and reusable patient-care equipment using an MOHapproved hospital disinfectant. Personnel performing the cleaning should wear a disposable gown and gloves (a respirator is generally not needed).
- Ensure appropriate follow-up and care of EMS personnel who transport MERS-CoV patients as recommended for HCWs.

### 5.14 DURATION OF ISOLATION PRECAUTIONS FOR MERS-COV INFECTION

The infectivity period for MERS-CoV may last as long as virus is being shed. Out of protocol testing in confirmed MERS-CoV patients is discouraged. For all patients, retesting can be done at the end of the first week of confirmation.

In order to discontinue isolation precautions, two negative lower respiratory samples 24 hours apart are required for ventilated patients and one negative respiratory sample in other patients including home isolated individuals. *(Appendix C)*

## 6. PUBLIC HEALTH CONSIDERATIONS

### 6.1 SURVEILLANCE AND REPORTING

MERS-CoV is a category I reportable infectious disease (within 24 hrs). All healthcare facilities must report suspected cases through Health Electronic Surveillance Network (HESN). Results of laboratory testing are also reported through HESN. Failure of healthcare organizations or healthcare professionals to report reportable infectious diseases will result in legal actions and may affect licensing and certification.

### 6.2 HOUSEHOLD AND COMMUNITY CONTACTS MANAGEMENT

The public health team at the regional health directorate is responsible for listing, tracing and follow up of household and other contacts of patients with MERS-CoV infection in the community.

A communication link with a healthcare provider should be established for the duration of the observation period.

Community and household contacts of MERS-CoV cases are defined as a person who shared the same enclosed space (e.g. room, office) for frequent or extended periods with the index case while the index case is symptomatic. Contact tracing assessment forms must be filled out for all contacts *(Appendix D)*.

Contacts are categorized by the presence or absence of suggestive MERS-CoV symptoms at the first assessment:

- Contacts without suggestive MERS-CoV symptoms should be listed for follow up (Appendix D). Screening for MERS-CoV is not generally required. In certain situations, MERS-CoV screening may be considered:
    - If the exposed contact had intense exposure to the MERS-CoV case (e.g. direct care, sleeping in same room)
    - If exposed contact is Immunocompromised (e.g. cancer, organ failure, use of immunosuppressive medications) or has other chronic underlying conditions (e.g. diabetes, hypertension)
- Contacts with suggestive MERS-CoV symptoms should be assessed clinically and referred to a healthcare facility if admission deemed necessary (Appendix D). A nasopharyngeal swab should be collected by a trained personnel and sent for MERS-CoV screening.

The observation period of a MERS-CoV community and household contacts is 14 days after the last exposure. Longer observation may be required if more than one generation of transmission is identified.

Contacts who develop symptoms require enhanced monitoring for disease progression. Health status must be checked by phone and if feasible, by face-to-face visits on a daily base.

## 6.3 HOME ISOLATION GUIDANCE

Individuals infected with MERS-CoV who are stable enough can be safely managed at their homes. The public health team at the regional health directorate should assess whether the house is suitable for home isolation.

A suitable home setting entails:

- A dedicated well ventilated bedroom for the infected individual

- An educated healthy and rapidly accessible caregiver
- A reliable communication tool (e.g. mobile phone)

Recommendations to Individuals infected and the caregivers include:

- The infected individual is instructed to limit contact with others as much as possible and to strictly adhere to respiratory etiquette and hand hygiene.
- The household members should stay in a different room or, if not possible, maintain a distance of at least one meter.
- The household members should wear a medical mask when in the same room (within one meter) with the infected individual. Masks should not be touched or handled during use. If the mask gets wet or dirty with secretions, it must be changed immediately.
- Caregiver should use disposable gloves when handling the infected individual`s body secretions and perform hand hygiene after removing gloves.
- Used mask, gloves, tissues and other disposable items should be discarded in a covered waste bin, and hand hygiene performed after touching these items.
- Touched surfaces in the infected individual's room should be cleaned daily with regular household cleaners or a diluted bleach solution (1 part bleach to 99 parts water). The bathroom and toilet surfaces should be daily with regular household cleaners or a diluted bleach solution (1 part bleach to 9 parts water).
- Soiled clothes, bed sheets, and towels of the infected individual should not be shaken. They can be cleaned using regular laundry soap and water.

### 6.4 HUMAN ANIMAL INTERFACE

Dromedary camels (Camelus Dromedarius) are the natural reservoir for MERS-CoV. Camel to human transmission seems to occur with direct or indirect contact with camels or their surrounding environment.

All community acquired MERS-CoV infections should be investigated for direct or direct links to camel (Appendix D). The exposure history might not be obvious and deep inquiries are usually necessary.

Direct or indirect exposure of human MERS-CoV cases to camels are reported to the field investigation team at the ministry of environment, water and agriculture.

Interventions from the animal health side include:

- Field visit to the presumed exposure site
- If camels are identified at the presumed exposure site, they will be quarantined and tested for MERS-CoV.
- Sampling testing techniques are detailed in the MEWA manual for field investigation.
- If live virus is detected in a camel herd, the quarantine period will be extended until the live virus is no longer detected.

As a general precaution, anyone visiting farms, markets, barns, slaughterhouses or other places where dromedaries are present should practice general hygiene measures, including regular hand washing after touching animals, avoiding touching eyes, nose or mouth with hands, and avoiding contact with sick animals. People should also consider wearing protective gowns and gloves while handling animals.

Slaughterhouses and meat processing plants are required to safely dispose heads and respiratory organs (trachea and lung) of slaughtered camels.

The consumption of raw or undercooked animal products, including milk and meat carries a high risk of infection from a variety of organisms that might cause disease in humans. Animal products processed appropriately through proper cooking or pasteurization are safe for consumption but should also be handled with care, to avoid cross-contamination with uncooked foods or from contaminated environment.

Camel barns, farms and markets must be permanently relocated outside residential areas. Since 2015, Hajj and Umrah zones are declared camel free areas.

For Approved MERS-CoV Surveillance forms see (Appendix D).

## 7. LABORATORY DIAGNOSIS OF MERS-COV

Laboratory testing for MERS-CoV is performed to confirm a clinically suspected case and to screen contacts as per approved protocols.

- Regional MOH and selected non-MOH governmental laboratories are approved to test for MERS-CoV by using validated commercial Real-time reverse-transcription polymerase chain reaction (rRT-PCR) assays.
- Laboratory confirmation of MERS-CoV infection requires either a positive rRT-PCR result for at least two specific genomic targets; region upstream and open reading frame1a (upE and ORF1a).
- It is strongly advised that lower respiratory specimens such as sputum, endotracheal aspirate, or bronchoalveolar lavage be used when possible. If patients do not have signs or symptoms of lower respiratory tract infection or lower tract specimens are not possible or clinically indicated, nasopharyngeal specimens should be collected.
- If initial testing of a nasopharyngeal swab is negative in a patient who is strongly suspected to have a MERS-CoV infection, patients should be retested using a lower respiratory specimen or, if not possible, repeat a nasopharyngeal specimen.

For guidelines on MERS-CoV Sample collection, packaging and shipping (Appendix E).

## 8. OTHER CONSIDERATIONS

### 8.1 GENERAL OUTLINES OF MANAGEMENT

Suspected or confirmed MERS-CoV patients should be admitted to health-care facilities only if medically indicated. Clinically stable patients or asymptomatic infections can be managed at home (see Home isolation guidance below).

Confirmed MERS-CoV cases can potentially be managed at any hospital. However, in certain occasions, it might be necessary to transfer a confirmed MERS-CoV case to a higher center in coordination with central command and control center. Indication for

transfer to a MERS-CoV designated hospitals (see *Communicable Diseases Outbreaks in Healthcare Facilities; Management Guidelines*) include:

- Inability to comply with infection control requirements as decided by the regional command and control center (e.g. staffing issues, overcrowding, lack of isolation rooms).
- Reduce the risk of outbreak during mass gathering (e.g. transfer confirmed cases outside Hajj zone during the Hajj season).
- Critically ill patients who may require sophisticated potentially lifesaving interventions (e.g. Extra-Corporeal Membrane Oxygenation).
- MERS-CoV is still a relatively uncommon cause of pneumonia. Therefore, patients admitted with suspected MERS-CoV pneumonia should be treated as per the community acquired pneumonia guidelines.

The use of non-invasive ventilation (e.g. Bi-level Positive Airway Pressure- BiPAP) should be avoided in patients with suspected or confirmed MERS-CoV pneumonia. This intervention enhances the risk of infection transmission through the aerosol generation and it lacks evidence of efficacy over endotracheal intubation and mechanical ventilation.

Meticulous supportive care is paramount to decrease mortality from MERS-CoV infection.

The use of antivirals for MERS-CoV is not recommended outside clinical trials.

## 8.2 EXTRA CORPOREAL MEMBRANE OXYGENATION (ECMO)

There is evidence that ECMO may offer survival benefits in some MERS-CoV patients. ECMO may be considered in patients with following parameters:

- Age < 60 years with a potentially reversible lung pathology • Murray score for Acute Lung Injury of 3-4 despite optimal care
- ECMO is relatively contraindicated in some situations, for example:
- Any condition that would limit the benefit of ECMO (such as severe neurologic injury or advanced malignancy).
- Any contraindication to anticoagulation.

- High $FiO_2$ requirements (>90) or high-pressure mechanical ventilation (P-plat >30) for 7 days or more.
- Limited vascular access
- Transfer of a MERS-CoV patient to an ECMO center shall be decided mutually between referring and accepting physicians.

Patients who meet above conditions and require transfer to an ECMO center may be considered for ECMO cannulation on-site in the correct clinical setting and then transferred.

List of centers that provide ECMO services to respiratory failure patients resulting from MERS-CoV and other etiologies can be accessed on Command and Control Center (CCC) page on the MOH website (www.moh.gov.sa/ccc).

### 8.3 MANAGING BODIES OF DECEASED MERS-COV PATIENTS

Although no postmortem transmission of MERS-CoV has ever been documented, deceased bodies theoretically may pose a risk when handled by untrained personnel.

Body washing of MERS-CoV cases should preferably be done at hospitals. However, it can be safely performed in public washing facilities attached to mosques provided that the washers have been trained on relevant infection control precautions including appropriate use of PPEs.

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## 2. APPENDICES

Appendix A: Pneumonia Severity Index (PSI) scoring

Appendix B: Visual triage checklist

Appendix C: Algorithm for Managing Suspected MERS-CoV Patients

Appendix D: MERS-CoV Surveillance Forms

o Form 1 : MERS CoV Hospital Based reporting Form o Form 2 : MERS CoV Community Surveillance Form o Form 3 : Line Listing Record for Household and Other Contacts o Form 4 : Line Listing Record for Healthcare Workers Contacts

Appendix E: Guidelines for MERS-CoV Sample Collection, Packaging and Shipping

## APPENDIX A

Severity Scores for Community-Acquired Pneumonia (CURB 65)*

| Clinical Factor | Points |
|---|---|
| Confusion | 1 |
| Blood urea nitrogen > 19 mg per dL | 1 |
| Respiratory rate ≥ 30 breaths per minute | 1 |
| Systolic blood pressure < 90 mm Hg OR Diastolic blood pressure ≤ 60 mm Hg | 1 |
| Age ≥ 65 years | 1 |
| Total points | |

* CURB-65 = Confusion, Urea nitrogen, Respiratory rate, Blood pressure, 65 years of age and older.

## APPENDIX B

### Visual Triage Checklist

### Visual Triage Checklist for Acute Respiratory Illness

Date: Time MRN:

Name: ID#: Hospital:

| | Points (adults) | Pints (children) | Score |
|---|---|---|---|
| *A. Clinical symptom/sign* | | | |
| Fever | 2 | 1 | |
| Cough (New or worsening) | 2 | 1 | |
| Shortness of breath (New or worsening) | 2 | 1 | |
| Nausea, vomiting, diarrhea | 1 | - | |
| Sore throat and/or runny nose | 1 | - | |
| Chronic renal failure, CAD/heart failure | 1 | - | |
| *B. Risk of exposure to MERS* | | | |
| Exposure to a confirmed MERS case in the last two weeks | 3 | 3 | |
| Exposure to camel or products (Direct or indirect*) in the last two weeks | 2 | 2 | |
| Visit to a healthcare facility that had MERS case in the last two weeks | 1 | 1 | |
| Total Score | | | |

* Patient or household

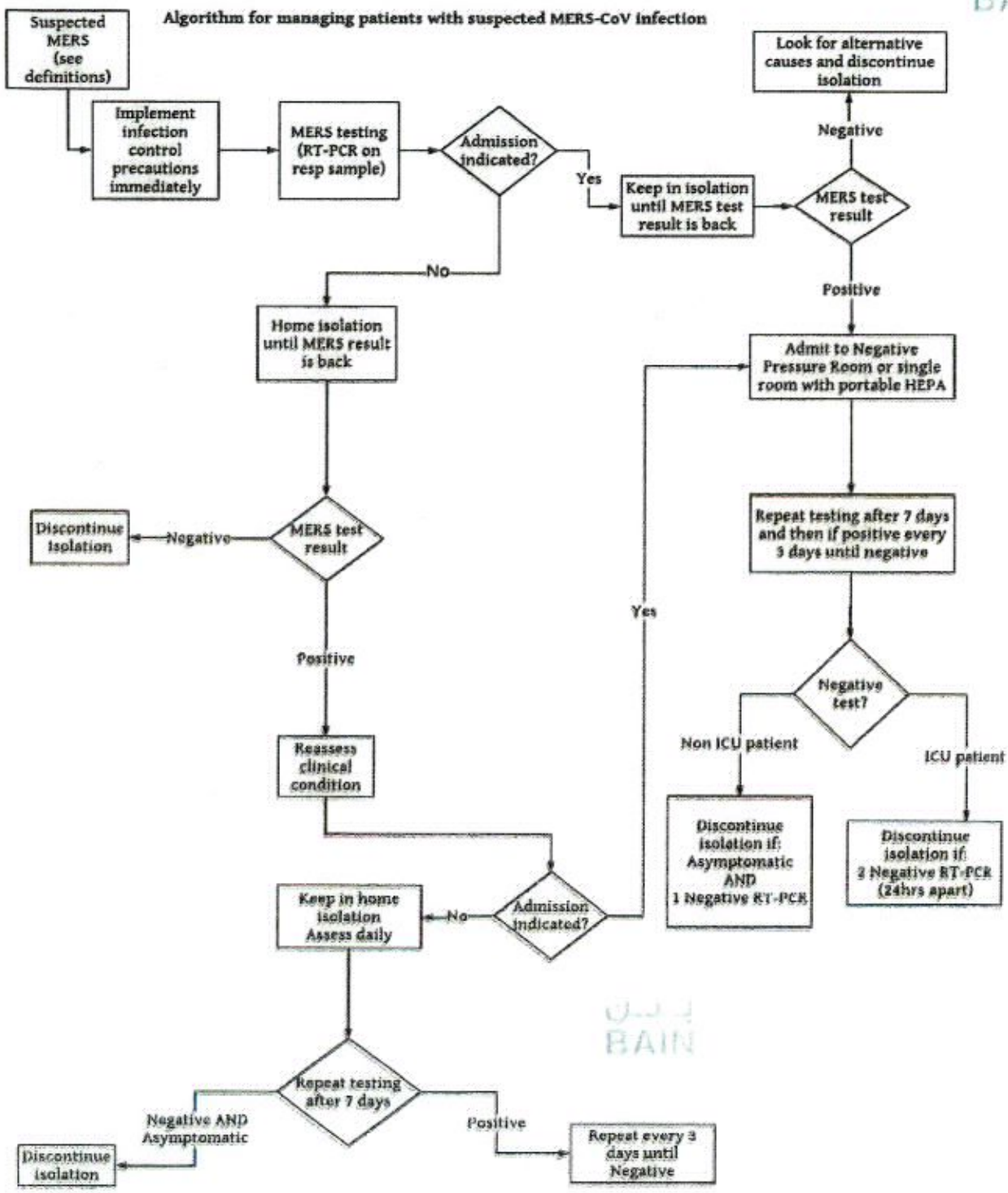
A SCORE ≥ 4, PLACE PATIENT IN AN ISOLATION ROOM AND INFORM MD FOR ASSESSMENT

MERS COV TESTING SHOULD BE DONE ONLY ACCORDING TO CASE DEFINITION

Staff name: _____ ID number: _____

## APPENDIX C

### Algorithm for Managing Suspected MERS-CoV Patients



## APPENDIX D

### MERS-CoV Surveillance Forms

MERS CoV Hospital Based reporting Form (Form 1)

التبليغ لحالات متلازمة الشرق الأوسط التنفسية
بالمستشفيات ( نموذج رقم 1)

| Part 1. InitialNotification Form (Suspect/Confirmed) | الجزء 1: التبليغ المبدئي لحالة متلازمة الشرق الأوسط التنفسية (مشتبة/ موكدة) |
|---|---|
| Date of initial notification: _____ | تاريخ التبليغ: |
| 1.0 Details on facility reported suspect case: | 0. 1 معلومات عن المنشأة الصحية: المبلغة للحالة: |
| 1. Hospital Name: | 1. اسم المستشفى: |
| City: / Province: _____ / Region: _____ | القصيم |
| 2. Name of who completed the — الدكتور علاء محمد عبد العليم | 2. اسم من قام بالتبليغ عن |
| 3. Phone / Fax:_____ / Mobile_____ | 3. رقم هاتف |
| 4. Email: | 4. البريد الإلكتروني : |
| 1.1 Case Information | 1.1 معلومات عن الحالة: |
| 1. Name (Family) اسم / (First, | عبد الرحمن حسين |
| 2. Date of Birth _____dd/_____mm/_____yyyy | 2. تاريخ الميلاد ( العمر ): |
| 3. Gender: Male ☐ ذكر / Female ☐ انثى | 3. الجنس : ذكر |
| 4. Nationality: | 4. الجنسية : |
| 5. Identification No.: | 5. رقم الهوية : |
| 6. Type of Identification: ID ☐ هوية وطنية / Iqama ☐ إقامة / Passport ☐ جواز سفر / ☐ Other: Specify | 6. نوع الهوية: |
| 7. Hospital File number ( If | 7. رقم الملف الطبي (إن توفر): |
| 8. Occupation: Health Care Worker: | 8. العمل : في المجال الصحي : |
| If No, | إذا كانت الإجابة بـ لا ، الرجاء تحديد نوع |
| 9. Phone / Home:_____ المنزل, / Mobile:_____ | 9. ارقام الهاتف |
| 10. House No. : _____ Street Name :_____ | 10. عنوان الحالة: |
| District Name: _____ اسم City: _____ Province/Region: _____ | |
| 11. Contact Person (friend, | 11. اسم شخص قريب |
| 12. Phone No.: Home: / Mobile: | 12. ارقام الهاتف: |
| 1.2 Suspected case | 2.1 الملامح الإكلينيكية للمريض: |
| 1.Date of onset of symptoms _____ | 1. تاريخ ظهور الأعراض: _____ |

| 2. Reason for testing: ☐ Health Care Worker عامل صحي | 2. سبب طلب الفحص المخبري : ☐ مخالط لحالة مخالط مجتمعي Community contact |
|---|---|

| 3. Reason for testing | 3. سبب طلب الفحص المخبري |
|---|---|

| 1. Case criteria | 2.Case criteria | ☐3.Case criteria | ☐4. Case criteria | . Infectious disease consultant recommended |
|---|---|---|---|---|
| Fever and community-acquired Severe pneumonia (severity score ≥3 points)Appendix-A or ARDS (based on clinical or radiological evidence) | Unexplained deterioration of a chronic condition of patients with congestive heart failure or chronic kidney disease on hemodialysis | Acute febrile illness (T ≥38° C) with/without respiratory symptoms | Gastrointestinal symptoms (diarrhea or vomiting), AND leukopenia (WBC≤3.5x10⁹ /L) or thrombocytopenia (platelets < 150x109/L) | . Patient Asymptomatic |

## 1.3 Laboratory MERS CoV testing results — 3.1 معلومات الفحص المخبري ونتائجها

| Type of specimen collected: | ☐ Throat swab | ☐ Nasopharyngeal swab | ☐ Broncho-alveolar lavage | ☐ Tracheal aspirate |
|---|---|---|---|---|
| | ☐ | ☐ EDTA blood | ☐ Tissue Biopsy | ☐ sputum | ☐ Urine ☐ other |

1.

| | |
|---|---|
| Date sample collected | تاريخ أخذ العينة: |
| Date sample sent | تاريخ إرسال العينة: |
| Date result obtained | تاريخ ظهور نتيجة الفحص المخبري: |
| Lab Result: ☐ Positive ☐ Negative ☐ Unclear ☐ Rejected ..... | نتيجة الفحص المخبري: |

| Type of specimen collected: | ☐ Throat swab | ☐ Nasopharyngeal swab | ☐ Broncho-alveolar lavage | ☐ Tracheal aspirate |
|---|---|---|---|---|
| | ☐ Serum | ☐ EDTA blood | ☐ Tissue Biopsy | ☐ Stool | ☐ Urine |

2.

| | |
|---|---|
| Date sample collected | _dd/_mm/_yyyy_ تاريخ أخذ العينة: |
| Date sample sent | _dd/_mm/_yyyy_ تاريخ إرسال العينة: |
| Date result obtained | _dd/_mm/_yyyy_ تاريخ ظهور نتيجة الفحص المخبري: |
| Lab Result: ☐ Positive ☐ Negative ☐ Unclear ☐ Rejected ..... | نتيجة الفحص المخبري: |

| Type of specimen collected: | ☐ Throat swab | ☐ Nasopharyngeal swab | ☐ Broncho-alveolar lavage | ☐ Tracheal aspirate |
|---|---|---|---|---|
| | ☐ Serum | ☐ EDTA blood | ☐ Tissue Biopsy | ☐ Stool | ☐ Urine |

3.

| | |
|---|---|
| Date sample collected | _dd/_mm/_yyyy_ تاريخ أخذ العينة: |
| Date sample sent | _dd/_mm/_yyyy_ تاريخ إرسال العينة: |
| Date result obtained | _dd/_mm/_yyyy_ تاريخ ظهور نتيجة الفحص المخبري: |
| Lab Result: ☐ Positive ☐ Negative ☐ Unclear ☐ Rejected ..... | نتيجة الفحص المخبري: |

Appendix D (count.)

| | | | | | |
|---|---|---|---|---|---|
| Type of specimen collected: | ☐ Throat swab | ☐ Nasopharyngeal swab | ☐ Broncho-alveolar lavage | | ☐ Tracheal aspirate |
| | ☐ Serum | ☐ EDTA blood | ☐ Tissue Biopsy | ☐ Stool | ☐ Urine |
| Date sample collected | _dd_/_mm_/_yyyy_ | | | | تاريخ أخذ العينة: |
| 4. Date sample sent | _dd_/_mm_/_yyyy_ | | | | تاريخ إرسال العينة: |
| Date result obtained | _dd_/_mm_/_yyyy_ | | | | تاريخ ظهور نتيجة الفحص المخبري: |
| Lab Result: ☐ Positive ☐ Negative ☐ Unclear ☐ Rejected ..... | | | | | نتيجة الفحص المخبري: |

| | | | | | |
|---|---|---|---|---|---|
| Type of specimen collected: | ☐ Throat swab | ☐ Nasopharyngeal swab | ☐ Broncho-alveolar lavage | | ☐ Tracheal aspirate |
| | ☐ Serum | ☐ EDTA blood | ☐ Tissue Biopsy | ☐ Stool | ☐ Urine |
| Date sample collected | _dd_/_mm_/_yyyy_ | | | | تاريخ أخذ العينة: |
| 5. Date sample sent | _dd_/_mm_/_yyyy_ | | | | تاريخ إرسال العينة: |
| Date result obtained | _dd_/_mm_/_yyyy_ | | | | تاريخ ظهور نتيجة الفحص المخبري: |
| Lab Result: ☐ Positive ☐ Negative ☐ Unclear ☐ Rejected ..... | | | | | نتيجة الفحص المخبري: |

**Note for Hospital:** *Complete the table for all of the samples sent to the laboratory. Add additional page if needed. According to treatment guidelines, if the patient is suspected in hospital, he will remain suspected until symptoms have resolved, irrespective of the negative test results*

End of Part 1

| Fill this part when the Case Confirmed | يستكمل هذا الجزء عند تأكيد تشخيص الحالة |
|---|---|
| **Part 2. Case confirmation** | **الجزء 2: الحالة مؤكدة** |
| **2.1 Confirmation details** | **2.1تفاصيل الحالة المؤكدة:** |

1. Is the case confirmed with the positive laboratory result. Yes ☐ نعم No ☐ لا — 1. هل الحالة تأكدت بالتحليل المخبري:

*Note: According to treatment guidelines, if a patient is suspected in the hospital, he/she will remain suspected until symptoms have resolved, irrespective of the negative test results, unless other infectious disease is confirmed.*

*If the clinical picture makes a MERS-CoV infection probable, please proceed with the following form.*

ملاحظة: إستنادا إلى دليل المعالجة، إذا كان المريض مشتبه بالمستشفى، تستمر معاملة الحالة على انها مشتبهة إلى حين إختفاء الأعراض بغض النظر عن النتائج السلبية للفحص المخبري. فيما عدا تأكيد التشخيص لمرض مختلف.

إذا كانت الشواهد الإكلينيكية تدل على أن الحالة محتملة بإصابتها بمتلازمة الشرق الأوسط التنفسية، الرجاء إستكمال هذا الجزء.

2. How many people live in the same household? ( 12. ) — 2. عدد الأشخاص الذين يعيشون مع المريض بالمنزل:

3. Was patient hospitalized when the positive result was obtained? — 3. هل كان المريض منوم بالمستشفى عند ظهور النتيجة إيجابية ؟ نعم

Yes ☐ نعم

Date of admission:..... تاريخ الدخول

4. If hospitalized, what was the initial reason for hospitalization? ما هو السبب الرئيسي للتنويم؟
☐ Respiratory symptoms أعراض تنفسية
☐ Home conditions considered inappropriate isolation المنزل غير مناسب للعزل
☐ Other, specify :..... غير ذلك، حدد :

5. Which department: حدد القسم المنوم به المريض
☐ ICU العناية المركزة
☐ Ward, specify : ..... حدد القسم :

6. If hospitalized, Isolated? Yes ☐ نعم No ☐ لا — 6. هل المريض بغرفة العزل؟

No ☐ لا

7.If not hospitalized, inform the Department of Public Health and send copy of the Hospital based form(Part 1 Jand Part2)

7. إذا المريض لم يكن منوما بالمستشفى، يجب إبلاغ إدارة الصحة العامة بالمنطقة/المحافظة مع إرسال نسخة من كامل النموذج

Date the case was transferred to Public Healthcare Department — تاريخ إبلاغ إدارة الصحة العامة بالمنطقة/ المحافظة

8. If the patient is not hospitalized to your facility at the time the case is confirmed, please specify the status of the patient: — 8. في حال لم يكن المريض منوم بالمستشفى عند تأكيد الحالة، الرجاء تحديد وضع المريض:

☐ Isolated at home تم عزله بالمنزل ☐ Free at home بالمنزل بدون عزل ☐ Hospitalized or transferred to another facility تم تنويمه بالمستشفى أو تمت إحالته إلى منشأة صحية أخرى ☐ Dead متوفي

| 2.2 Patient clinical information on admission | 2.2 المعلومات الإكلينيكية للمريض عند الدخول للمستشفى | |
|---|---|---|
| 1. Height_____ الطول cm | 2. Weight_____ .____Kg الوزن | 3. Temperature:_ _ C درجة الحرارة |
| 4. Heart rate____ نبضات القلب | 5. Blood pressure:__ ____ ضغط الدم | 6. $O^2$ saturation, ..... تركيز الاوكسجين |
| ☐ 1. No signs, no movements | ☐2 Mild | ☐3 Moderate ☐4 Severe |

| 2.3 Other lab results performed at the time of admission or the most recent results | | 3.2نتائج الفحوصات المخبرية الأخرى عند دخول المريض للمستشفى أو النتائج الأحدث: |
|---|---|---|
| 1. White blood cells count | 2. Creatinine | 3. Lymphocytes %( ..... ) |
| 4. Platelet count | 5. Neutrophils %(..... ) | 6. Blood Urea Nitrogen( ) 7.Date:_dd_/_mm__/_yyy |

## 2.4 History and Pre-Existing Conditions (Complete even if patient is dead)

1. Is the patient Healthcare worker? ☐ Yes ☐ No ☐ Unknown

2. If yes, name of HealthCare facility where patient is working: .....

3. If yes, type of the HC worker: ☐ Physician ☐ Nurse ☐ X-ray technician ☐ cleaner ☐ Respiratory rehabilitation therapist ☐ Not patient care related ☐ Laboratory worker ☐ Other patient care: .....

4. Department where working: ☐ ICU ☐ Radiology ☐ Emergency room ☐ Outpatient department ☐ Dialysis Dept ☐ Respiratory Rehabilitation ☐ Other patient care Dept.

5. Did the patient give care to a MERS patient? ☐ Yes ☐ No ☐ Unknown ☐ Non patient care department

What type of service and contact

6. If not a healthcare worker, did the patient visit any healthcare facilities during the last 14 days before onset of symptoms? ☐ Yes ☐ No ☐ Unknown

If yes, what healthcare facility: .....

| 7. Did the patient have any pre-existing conditions? | YES | NO | UNKNOWN |
|---|---|---|---|
| 1. Diabetes Mellitus | ☐ | ☐ | ☐ |
| 2. HIV/other immune deficiency | ☐ | ☐ | ☐ |
| a. On immune suppressive therapy | ☐ | ☐ | ☐ |
| b. On glucocorticoids | ☐ | ☐ | ☐ |
| c. Immune compromising disease | ☐ | ☐ | ☐ |
| 3. Hypertension | ☐ | ☐ | ☐ |
| 4. Heart disease | ☐ | ☐ | ☐ |
| 5. Asthma | ☐ | ☐ | ☐ |
| 6. Chronic liver disease | ☐ | ☐ | ☐ |
| 7. Chronic haematological disorder | ☐ | ☐ | ☐ |
| 8. Chronic lung disease | ☐ | ☐ | ☐ |
| 8. Pregnancy | ☐ weeks of..... gestation | ☐ | ☐ |
| 9. Chronic kidney disease | ☐ | ☐ | ☐ |
| 10. On dialysis | ☐ | ☐ | ☐ |
| 11. Had kidney transplant | ☐ | ☐ | ☐ |
| 12. Neoplastic disease | ☐ | ☐ | ☐ |
| | | | |
| 14. ☐ Other (specify): ..... | | | |

End of Part 2

## Part 3. Follow up form - *To be filled upon any status change of the hospitalised patient*

### 3.1 Status update

| S. N | Date (dd /mm/yyyy) | No change | Transferred to anotherhospital | Transfer within the hospital - Admitted to ICU | Transfer within the hospital from ICU to ward | Discharged for home isolation | Discharged to home- not isolated requires follow up | Requires additional follow up | Died[6] | Recovered from MERS CoV[7] | Readmitted due to the condition worsening | Transferred from another hospital |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7 | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8 | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9 | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10 | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11 | __/__/____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

### 3.2 Complications developed during the hospitalization

| | Yes | No | Unknown | Date developed |
|---|---|---|---|---|
| 1. Pneumonia | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| 2. Acute renal failure | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| 3. ARDS (Acute Respiratory Distress | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| 4. Respiratory failure | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| 5. Cardiac failure | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| 6. Multi-organ failure | ☐ | ☐ | ☐ | _dd/_mm/_yyyy |
| ☐ Other (specify) : ..... | | | | ____dd/____mm/____yy |

### 3.3 If transferred to another hospital

| | | |
|---|---|---|
| 1. Name of the hospital transferred to: ..... | | 2. Date of transfer: _____ |
| 3. Region: | 4. City: | 5. Sector: |

### 3.4 When discharged from hospital

| | | |
|---|---|---|
| 1. Date of discharge: | 2. Condition: ☐ Alive ☐ Deceased ☐ Against Medical advice | |
| 3. Home isolation recommended. | ☐ Yes ☐ No ☐ Unknown | |
| 4. Public Department of Health office name: | 5. Date case transferred to Public Department of Health _dd/_mm/_yyyy_ | |

End of Part 3.

[6] Complete the Case closure form
[7] Complete the Case closure form

| Part .4 Case Close | الجزء 4: إغلاق الحالة |
|---|---|
| 4.1. Reason for case closure | 1.4 أسباب إغلاق الحالة |
| ☐ Patient died وفاة المريض ☐ Patient discharged ☐ Another infectious disease has been confirmed تم تأكيد تشخيص أخر ☐. Give number of tests_____ حدد عدد العينات | |
| 4.2 If died | 2.4 إذا توفت الحالة |
| 1. Date of death تاريخ الوفاة (___dd/___mm/___yyyy ) | 2. Death certificate number: (_____ ) رقم وثيقة الوفاة |
| 3. Place of death مكان الوفاة ☐ At home بالمنزل ☐ بالمستشفى ☐ Unknown غير معروف | |
| 4. Post mortem tests performed? هل تم إجراء تشريح للجثة Yes ☐ نعم No ☐ لا | |
| Comment: *Please attach the copy of the death certificate and send it by fax or Email to Public Health* ملاحظة: الرجاء إرفاق نسخة من شهادة الوفاة وإرسالها بالفاكس أو البريد الإلكتروني إلى إدارة الصحة العامة بالمنطقة / المحافظة | |
| 4.3 If discharged | 3.4 إذا خرجت الحالة من المستشفى |
| 1. Latest MERS test results نتيجة أخر تحليل كرونا ☐ Positive إيجابي ☐ Negative, number of consecutive tests shown negative results prior to discharge_____ سلبية، عدد العينات السلبية قبل خروج الحالة من المستشفى | |
| 2. Discharge approved by: ..... اسم من اعتمد خروج المريض: | Date of discharge تاريخ الخروج ___/___/___(dd/ mm /yyyy) |
| 4.4 If another infectious disease has been confirmed | 4.4 إذا تم تأكيد تشخيص أخر للحالة |
| 1. Date of confirmation تاريخ تأكيد التشخيص الجديد ___dd/___mm/___yy | 2. Specific causative agent confirmed: تم تأكيد التشخيص لسبب أخر ، حدد |
| End Part 4 | |

MERS CoV Community Surveillance Form (Form # 2)

الإستقصاء الوبائي لحالات متلازمة الشرق الأوسط التنفسية (فيروس كرونا) (نموذج 2#)

| Note for interviewer: | ملاحظة لمن يقوم بالإستجواب: |
|---|---|
| If you are interviewing a patient ask all questions in the first person, If you are interviewing the patient's relative or contact person ask questions in the third person. | جميع الأسئلة تخص المريض. فإذا كنت تقابل المريض فاسأله مباشرة، اما إذا كنت تقابل شخص من أقرباء المريض فتكون الأسئلة عن المريض. |

| | |
|---|---|
| Date Investigation Start: | تاريخ إجراء الاستقصاء: |
| Form completed by: | اسم من قام بإستكمال النموذج: |
| Phone number: | رقم الهاتف: |
| Permanent jobsite: | جهة العمل الأساسية: |
| Sector القطاع: | Health Region المنطقة الصحية: |

## Part 1. Patient personal information

| | |
|---|---|
| 1. First & Father name: | اسم المريض |
| 2. Family name: | العائلة (اللقب): |
| 3. GPS coordinates N ..... E..... | إحداثيات موقع سكن الحالة: |
| 4. Address in detail: | العنوان بالتفصيل: |
| 5. What type of housing? ☐ Single family home/villa منزل ☐ Duplex مجمع سكني ☐ Other, specify..... أخرى حدد ☐ Apartment شقة | ما نوع المنزل الذي يسكنه المريض ؟ |
| 6. Home phone: + ( )___-___-___ | 8. Mobile phone: + ( ) Other mobile phone |
| 9. Does the patient have another home? Yes نعم ☐ No لا ☒ | هل للمريض منزل أخر؟ |

| | |
|---|---|
| 10 If yes: Address _____ Telephone Number _____ | الإجابة نعم : العنوان _____ رقم التلفون _____ |
| 12. Is the patient the head of household? Yes☐ No☐ | هل المريض هو رب العائلة؟ نعم☐ لا☐ |
| If YES, move to part 1.2 | إذا كانت الإجابة بنعم، انتقل الى الجزء 1.2 |
| **1.1 Head of Household Section** | **1.1جزء خاص برب العائلة** |
| 1. Name of head of household: | اسم رب العائلة: |
| 2. Identification Number: | رقم الهوية لرب العائلة: |
| National ID ☐ هوية وطنية / Iqama ☐ إقامة / Passport ☐ جواز سفر / Others ☐ اخرى | |
| 3. Relationship to patient: ☐Parent والد/والدة ☐Spouse العائل ☐ children الاطفال ☐Other, أخرى، حدد specify..... | صلة القرابة مع المريض |
| 4. Mobile phone number: + ( )_ _ _-_ _ _ _ _other mobile phone | رقم الجوال رب العائلة: |
| **1.2 Patient Social Information** | **1.2 معلومات اجتماعية للمريض** |
| 1. Education (Give highest year of school completed): ☐Child طفل ☐Illiterate غير متعلم ☐Preschool رياض اطفال ☐ Elementary ابتدائي ☐Intermediate متوسطة ☐Secondary ثانوية ☐Diploma دبلوم ☐Bachelor بكالوريوس ☐Master ماجستير ☐PHD دكتوراه | الحالة التعليمية للمريض (سجل اعلى مرحلة تعليمية وصل اليها المريض): |
| 2. Occupation: ☐Student طالب ☐Employed/ Government sector يعمل بالقطاع الحكومي ☐Employed/ Private sector يعمل بالقطاع الخاص ☐Retired متقاعد ☐Unemployed عاطل عن العمل ☐ Other أخرى,specify..... | مهنة المريض: |
| 3. If student, please provide Name of the college/school اسم المدرسة/الجامعة:..... Address العنوان:..... | إذا كان طالب، سجل |
| 4. If employed, please provide: Name of the employer اسم جهة العمل: Address العنوان:..... | إذا كان موظفاً، سجل التالي: |
| 5. Does the patient have Housemate / driver working in the home? Yes☐ نعم No☐ لا | هل المريض لديه خادمة/سائق؟ |
| 6. Sex..... الجنس 7. Age..... العمر | |
| If yes, include on contact list<br>إذا كانت الإجابة نعم، اضف أسمائهم ببيان المخالطين. | |

## Part 2 Personal Risk: الجزء 2 عوامل الخطورة الشخصية:

### 2.1 Smoking 2.1 التدخين

1. Does the patient smoke? Yes ☐ نعم No ☐ لا — هل المريض مدخن؟

2.If yes, Specify: ☐ Cigarettes سجاير ☐ Nargghile معسل ☐ Sheesha (جراك) شيشة — إذا كانت الإجابة نعم، حدد

☐ Electronic Cigarettes سيجارة الكترونية

3. For how many years? ..... كم سنة يدخن؟

4. How many per day? ..... كم مرة باليوم؟

The following exposure questions cover the 14 days before the patient developed the illness — التالي يتضمن أسئلة تغطي التعرض لعوامل خطورة قبل 14 يوماً من اصابة المريض

### 2.2. Exposure to possible human sources 2.2التعرض لمصدر عدوى إنساني محتمل

1. Did patient attend any mass gatherings? هل حضر المريض اي تجمع كبير؟

☐ Football or other large sporting events مباراة كرة قدم أو حدث رياضي كبير ☐ Janadria الجنادرية

☐ Um Rugaibah (Mazaleen-Camel festival) مزابين الإبل (ام رقيبة) ☐ Omra عمرة

☐ Esterahah (extended family gathering) إستراحة (تجمع عائلي كبير) ☐ Hajj حج

☐ Other Specify.....

### 2.3. Exposure to Human sources 2.3التعرض لمصدر عدوى إنساني

1. Is the patient a healthcare — هل المريض يعمل بالمجال

Yes ☐ نعم No ☐ لا

N.B1 If patients a healthcare worker, please make sure HOSPITAL FORM complete section 2.4 — ملاحظة 1: إذا كان المريض يعمل بالمجال الصحي، تأكد بأن نموذج المستشفى قد استوفى الجزء 2.4

N.B2 If not a healthcare worker, please provide answers to the following questions: ملاحظة2: إذا كان المريض لا يعمل بالمجال الصحي، استكمل الجزء التالي من الأسئلة:

2 Did the patient visit for any reason any health care facility during the 14 days before onset of symptoms? Yes نعم ☐ No لا ☐

هل زار المريض أي منشأة صحية لأي سبب كان خلال 14 يوم قبل ظهور الأعراض؟

3 Does the patient have regular visits to health care to receive treatments (e.g. renal dialysis, diabetes management, pregnancy, etc) Yes نعم ☐ No لا ☐

هل المريض يراجع منشأة صحية بصفة منظمة لتلقي العلاج (مثلا: غسيل كلوي، عيادة السكر، الحمل ،... الخ)

| | | |
|---|---|---|
| 4 | Did the patient visit a relative, neighbour, employer, co-worker, friend, while they were sick with a respiratory illness?<br>هل زار المريض اقربائه، جيرانه، موظفيه، زملائه بالعمل، أصدقائه أو المدرسة اثناء مرضهم بالجهاز التنفسي | Yes☐نعم No☐لا |

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| | | |
|---|---|---|
| 5 | Where did this happen? | ☐ At home في المنزل<br>☐ In a health care facility في منشأة |
| 6 If yes, إذا كانت الإجابة بنعم | Did the patient provide care for that person? هل قام المريض برعاية ذلك الشخص | Yes ☐ نعم No ☐ لا |

7. Was any family member diagnosed with MERS Corona virus infection **before** patient became sick? هل تم تشخيص أحد افراد العائلة بالكورونا **قبل** ظهور الأعراض على المريض — Yes ☐ نعم No ☐ لا

8. Was any family member diagnosed with MERS Corona virus infection **After** patient became sick? هل تم تشخيص أحد افراد العائلة بالكورونا **بعد** ظهور الأعراض على المريض — Yes ☐ نعم No ☐ لا

9. Was any other person who the patient knows personally diagnosed with MERS Corona virus? هل هنالك اشخاص يعرفهم المريض تم تشخيص حالتهم بالكورونا — Yes ☐ نعم No ☐ لا

9.1 Before patient became sick? **قبل** ظهور الأعراض على المريض — Yes ☐ نعم No ☐ لا

9.2 After patient became sick? **بعد** ظهور الأعراض على المريض — Yes ☐ نعم No ☐ لا

## 2.4. Travel History — 4.2تاريخ السفر

1. During the 14 days before patient became sick, did patient travel outside or inside Saudi Arabia?
خلال 14 يوم قبل ظهور الأعراض على المريض، هل سافر خارج او داخل المملكة ؟

**If yes, complete the following table:**
**إذا كانت الإجابة بنعم، أكمل بيانات الجدول ادناه:**

| Country/City | Departure | Return date | Mode of travel |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

2. During the 3 days before patient became sick or while they were sick, did patient travel outside or inside Saudi Arabia?
خلال 3 أيام قبل ظهور الأعراض على المريض أو كان مريضاء هل سافر خارج او داخل المملكة ؟

**If yes, complete the following table:**
**إذا كانت الإجابة بنعم، أكمل بيانات الجدول ادناه:**

| Country/City | Departure | Return date | Mode of travel |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## 2.5. Exposure to CAMELS — 5.2مخالطة الجمال

1. Does the patient raise camels? Yes ☐ نعم No ☐ لا — هل المريض لديه جمال ؟

2. Is the patient's profession one of the following: هل المريض يعمل في أحد المجالات ادناه ؟ لا

- ☐ Camel Trader تاجر جمال
- ☐ Herder يرعى الماشية
- ☐ Slaughter man يذبح الماشية
- ☐ Butcher جزار
- ☐ Camel milkier يحلب الجمال
- ☐ Veterinary طبيب بيطري

☐ Sidewalk meat seller يعمل ببيع اللحوم ☐ Camel rider يمتطي الجمال ☐ Other specify

3. Do they have any other occupation that regularly deals with camels? هل المريض لديه عمل أخر يختص بالتعامل مع الجمال بصورة منتظمة Yes ☐ نعم No ☐ لا Specify د

4. During the 14 days before the patient developed the illr يوم قبل من ظهور الأعراض على المريض، هل قام14خلال بالتالي: لا

☐ Visit a live animal market زار سوق الما شية ☐ Touch a camel جمل ☐ Visit a slaughterhouse أحتك ال لحس خ

☐ Drink camel m حضر سباق

☐ Ride a camel أمتطى جمل (الهجن)

☐ Handle raw camel meat تعامل مع لحوم جمال طازجة

☐ Eat raw camel liver or partly cook camel race ver كبدة ابل غير مطهية أو نصف مستوية

أكل

**Appendix D (count..)**

| List of patient's contacts *(Please include domestic servants and drivers)*<br>بيان بالمخالطين للمريض ( الرجاء إدراج أسماء العمالة المنزلية من خدم وسائقين ) | | | | | | |
|---|---|---|---|---|---|---|
| S.N<br>ت | Contact name<br>أسماء المخالطين | Age<br>العمر | Relationship to Patient<br>علاقته | Date swab Taken<br>تاريخ Symptomatic<br>أخذ العينة من بدء الأعراض | Identification Number<br>رقم الهوية | Type of Identification |
| 1. | | | | ..... | ..... | ☐ National I.D هوية<br>☐ Iqama إقامة<br>☐ Passport جواز سفر |
| 2. | | | | ..... | ..... | ☐ National I.D هوية<br>☐ Iqama إقامة<br>☐ Passport جواز سفر |
| 3. | | | | ..... | ..... | ☐ National I.D هوية<br>☐ Iqama إقامة<br>☐ Passport جواز سفر |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| 4. | | | | ..... | ..... | National I.D هوية<br>Iqama إقامة<br>Passport جواز سفر |
| 5. | | | | ..... | ..... | National I.D هوية<br>Iqama إقامة<br>Passport جواز سفر |
| 6. | | | | ..... | ..... | National I.D هوية<br>Iqama إقامة<br>Passport جواز سفر |
| 7. | | | | ..... | ..... | National I.D هوية<br>Iqama إقامة |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Passport جواز سفر |
| 8. | | | | ..... | ..... | National I.D هوية<br>Iqamaإقامة<br>Passport جواز سفر |
| 9. | | | | ..... | ..... | National I.D هوية<br>Iqamaإقامة<br>Passport جواز سفر |
| 10. | | | | ..... | ..... | National I.D هوية<br>Iqamaإقامة<br>Passport جواز سفر |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

| | |
|---|---|
| Note: Complete the table for all of the Contacts includes Housemates & Driver. Add additional page if needed. | **ملاحظة:** سجل جميع المخالطين للحالة الإيجابية بما في ذلك الخادمات والسائقين. استخدم صفحة أخرى من نفس النموذج إذا استدعى الأمر. |

Appendix D (count..)

| Part 3. Follow up form *(To be filled upon any status change of the isolated patient)*<br>الجزء 3. سجل متابعة حالة المريض ( يتم تعبئته دورياً أو عند حدوث أي تغيير لحالة المريض المعزول بالمنزل ) | | | | | | | |
|---|---|---|---|---|---|---|---|
| S.N<br>ت | Date<br>تاريخ الإتصال بالمريض (dd /mm/yyyy ) | Method of contact<br>طريقة الإتصال بالمريض | | Status update تحديث وضع المريض الصحي | | | |
| | | | | No change<br>لا تغيير | Requires hospitalization<br>يتطلب إحالته للمستشفى | Recovered from MERS CoV[8,9]<br>تعافى من كرونا | Died[10]<br>توفى |
| 1. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 2. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 3. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 4. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 5. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 6. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 7. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 8. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 9. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |
| 10. | _/_/___ | Phone ☐ هاتف | Visit ☐ زيارة | ☐ | ☐ | ☐ | ☐ |

[8] No symptoms for 24 hours and latest swab MERS test is negative

[9] Complete the Case closure form
[10] Complete the Case closure form

Appendix D (count..)

## Part 4. Case Closure — لجزء 4: إغلاق الحالة

### 4.1. Reason for case closure — 1.4 أسباب إغلاق الحالة

| | | | |
|---|---|---|---|
| ☐ Patient died<br>وفاة المريض | ☐ Patient discharged<br>خروج المريض | ☐ Another infectious disease has been confirmed<br>تم تأكيد تشخيص أخر | ☐. Give number of tests_____ حدد عدد العينات |

### 4.2 If died — 2.4 إذا توفت الحالة

| | | | |
|---|---|---|---|
| 1. Date of death__/__/____ تاريخ الوفاة (dd/ mm/ yyyy ) | | | 2. Death certificate number: (..... ) رقم وثيقة الوفاة |
| 3. Place of death مكان الوفاة | ☐ At home بالمنزل | ☐ In hospital | ☐ Unknown غير معروف |
| 4. Post mortem tests performed? هل تم إجراء تشريح للجثة | Yes ☐ نعم | No☐ لا | |

Comment: please attach the copy of the death certificate and send it by fax or Email to Public Health
ملاحظة: الرجاء إرفاق نسخة من شهادة الوفاة وإرسالها بالفاكس أو البريد الإلكتروني إلى إدارة الصحة العامة بالمنطقة / المحافظة

### 4.3 If discharged — 3.4 إذا خرجت الحالة من المستشفى

| | | | |
|---|---|---|---|
| 1. Latest MERS test results نتيجة آخر تحليل كورونا | ☐Positive إيجابي | ☐Negative, number of consecutive tests shown negative results prior to discharge_____ سلبية، عدد العينات السلبية قبل خروج الحالة من المستشفى | |
| 2. Discharge approved by: | ..... اسم من اعتمد خروج المريض: | Date of discharge تاريخ الخروج __/__/____ (dd / mm / yyyy ) | |

### 4.4 If another infectious disease has been confirmed — 4.4 إذا تم تأكيد تشخيص أخر للحالة

| | | |
|---|---|---|
| 1. Date of confirmation تاريخ تأكيد التشخيص الجديد__/__/____ (dd / mm / yyyy ) | 2. Specific causative agent confirmed: تم تأكيد التشخيص لمسبب أخر، | حدد عد العينات Give number of test |

Appendix D (count.)

## MERS-CoV Outbreak

### Line Listing Record for Household and Other Contacts (Form 3)

Region: _____ Public Health Investigator: _____

| | Personal Data<br>Record name once and do not remove name from line list | | | | Daily Progress Use Legend: SF=Symptoms Free; F=Fever; C=Cough; N/V=Nausea/Vomiting; BA= Body Aches; H=Headache Died=Death HOS=Hospitalization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name (To be typed in English and Arabic) | ID/ Iqama number | Age | Nationality | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | |

Appendix D (count..)

## MERS-CoV Outbreak

### Line Listing Record for Healthcare Workers Contacts: (Form 4)

Facility: _____ Facility Contact:_____

| | Personal Data<br>Record name once and do not remove name from line list | | | | | Daily Progress Use Legend: SF=Symptoms Free; F=Fever; C=Cough; N/V=Nausea/Vomiting; BA= Body Aches; H=Headache<br>Died=Death HOS=Hospitalization, Test=MERS-CoV tested | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Name (To be typed in English and Arabic) | ID/Iqama number | Age/Sex | Nationality | 1 Exposure risk high or low | Day 1<br>DD/MM/YY | Day 2<br>DD/MM/YY | Day 3<br>DD/MM/YY | Day 4<br>DD/MM/YY | Day 5<br>DD/MM/YY | Day 6<br>DD/MM/YY | Day 7<br>DD/MM/YY | Day 8<br>DD/MM/YY | Day 9<br>DD/MM/YY | Day 10<br>DD/MM/YY | Day 11<br>DD/MM/YY | Day 12<br>DD/MM/YY | Day 13<br>DD/MM/YY | Day 14<br>DD/MM/YY |
| 1 | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | |
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## APPENDIX E

### Guidelines for MERS-CoV Sample Collection, Packaging and Shipping

# APPROPRIATE COLLECTION, TRANSPORTATION AND STORAGE OF THE SAMPLE FOR MERS COV TESTING ACCORDING TO INTERNATIONAL STANDARDS PLAY A MAJOR ROLE IN THE ACCURACY OF THE RESULT

1. General Considerations:

1.1. Sample collection: Before collecting and handling specimens for Middle East Respiratory Syndrome Coronavirus (MERS-CoV), determine whether the person meets the current case definitions for Suspect, Probable or Confirmed cases.

1.2. Appropriate PPE should be worn by all laboratory staff handling these specimens (9.1, 9.2).

1.3. Proper biosafety policies and procedures should be maintained when collecting specimens (9.1, 9.2).

1.4. Use approved collection methods and equipment when collecting specimens.

1.5. Handle, store, and ship specimens following appropriate protocols.

1.6. It is very important to include patient national, Iqama or passport number in the request form to help trace records for patients that do doctor shopping. For illegal residents please put a note in the request which demonstrates that no Iqama is available due to illegal residency.

2. Specimen type and priority:

2.1. Best upper respiratory tract (URT) specimen is nasopharyngeal (NP) swab or combined nasopharyngeal and oropharyngeal (NP/OP) swab specimens in (9.3).

2.2. To increase the likelihood of detecting infection, lower respiratory Tract (LRT) specimens (Sputum, tracheal aspirate (TA), Endotracheal secretions, or Broncheoalveolar lavage(BAL)) are preferred. Based on the current data, they are the most likely to provide positive results. However, this should not exclude another specimen from the URT to enhance viral detection in challenging samples (9.3).

2.3. Additional specimens such as blood and serum can be collected on presentation and in convalescence period. (Please refer to specimen collection No.3).

2.4. Respiratory specimens should be collected as soon as possible after symptoms start, ideally within 7 days and before antiviral medications are administered.

2.5. However, if more than a week has passed since onset of illness and the patient is still symptomatic, lower respiratory samples are the preferred samples.

2.6. Samples should not be stored in hospitals for more than 4 hours (at 4 – 8oC) before delivering by the courier. Delivery of MERS-CoV specimens allowed ONLY by the courier. Specimens pick up SHOULD be requested at the following number (800 6149999).

2.7. Label each specimen container with the unique MERS-CoV number; patient hospital ID number, specimen type, the date and the time of sample collection include patient national, Iqama or passport number.

2.8.

Specimen Collection:

2.9. Use powder-less clean (Non-surgical) gloves when collecting specimens for MERS-CoV for PCR testing since, trace amount of powder in the sample could inhibit PCR testing producing false negative result (9.3).

2.10. All specimens should be regarded as potentially infectious, and HCWs, courier, laboratory personnel who collect, transport, or handle the clinical specimens should adhere rigorously to standard precautions to minimize the possibility of exposure to pathogens (9.3).

2.11. Ensure that HCWs who collect specimens should be properly trained on the technique and wear PPE appropriate for aerosol generating procedures.

2.12. Health caring facilities will assign and train personnel to perform nasopharyngeal swabbing.

2.13. Respiratory Specimens:

*2.7.1. Lower respiratory tract*

2.7.1.1. Broncheo-alveolar lavage (BAL), tracheal aspirate (TA) and/or pleural fluid should be collected whenever clinically appropriate: Collect 2-3 ml into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 28°C up to 48 hours; if exceeding 48 hours, freeze at -70°C and ship on dry ice.

2.7.1.2. Sputum: (induced or spontaneous) ask the patient to rinse the mouth with water 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 48 hours; if exceeding 48 hours, freeze at -70°C and ship on dry ice.

2.7.1.3. Mucoid specimens such as BAL, TA and sputum can be placed in VTM after collection to liquefy the specimens and preserve the trapped virus.

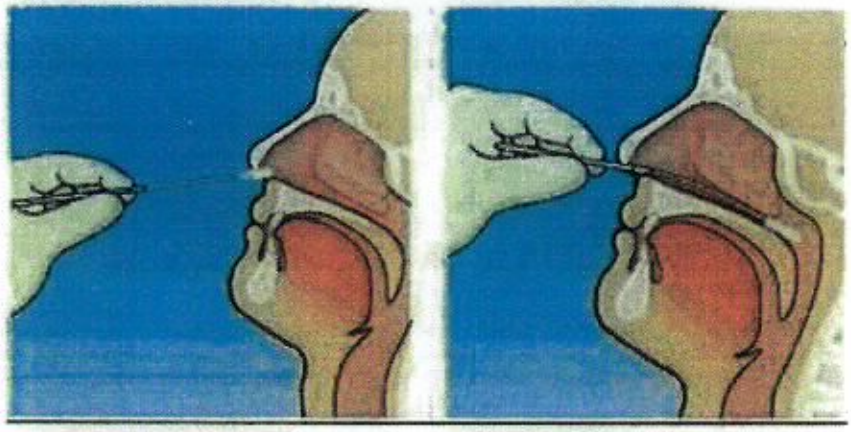
*2.7.2. Upper respiratory tract*

2.7.2.1. Nasopharyngeal and Oropharyngeal swabs (NP/OP swabs) MUST BE TAKEN TOGETHER. Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing. Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media. NP/OP specimens MUST BE combined, placing both swabs in the same vial. Refrigerate specimen at 2-8°C up to 48 hours; if exceeding 48 hours, freeze at - 70°C and ship on dry ice.

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

Appendix E (count..)

*Figure 1: Correct Technique for Taking a Nasopharyngeal swab*



For more information see NEJM Procedure: Collection of Nasopharyngeal Specimens with the Swab Technique: http://www.youtube.com/watch?v=DVJNWefmHIE https://youtu.be/CcvLv67U8-Y

2.7.2.3. Oropharyngeal swabs: Swab the posterior pharynx, avoiding the tongue.

2.7.2.4. Nasopharyngeal wash/aspirate or nasal aspirates: Collect 2-3 ml into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container (If highly mucoid, better collect in VTM container). Refrigerate specimen at 2-8°C up to 48 hours; if exceeding 48 hours, freeze at -70°C and ship on dry ice.

2.14. Blood Components

*2.14.1. Serum (for Serological testing)*

For serum antibody testing: Serum specimens should be collected during the acute stage of the disease, preferably during the first week after onset of illness, and again during convalescence ≥ 3 weeks after the acute sample was collected. However, a single serum sample collected 14 or more days after symptom onset may be beneficial. Serological testing is for research/surveillance purposes and not yet for diagnostic purposes. Currently it is NOT available at the MOH regional laboratories but will be implemented soon.

*2.14.2.* Serum / Plasma (for rRT-PCR testing) (Not recommended for routine testing):
For rRT-PCR testing (i.e., detection of the virus and not antibodies), a single serum or plasma specimen collected optimally during the first week after symptom onset, preferably within 3-4 days may be also beneficial but is not recommended for routine testing.

2.14.2.1. Serum Specimen:

*2.7.2.4.1. 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 500 µl. Refrigerate the specimen at 2-8°C and ship on ice- pack; freezing and shipment on dry ice is permissible.

2.7.2.4.2. *Infants.* A minimum of 1 ml of whole blood is needed for testing of pediatric patients. If only 1 ml can be obtained, use a serum separator tube to achieve a minimum of 400 µl serum sample.

2.14.2.2. EDTA blood (plasma):

Collect 1 tube (10 ml) of EDTA (purple-top) blood. Avoid using heparinized (green-top) blood as this will interfere with the test and inhibit PCR. Refrigerate specimen at 2-8°C and ship on ice pack; do not freeze.

3. Shipping:

3.1. Specimens from suspected MERS-CoV cases must be packed, shipped, and transported according to the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations prepared by IATA licensed laboratorypersonnel (9.4, 9.5).

3.2. At present MERS-CoV diagnostic specimens must be assigned to UN3373 and must be packaged as Category B infectious substances.

3.3. Packing responsibility is by the sample collection laboratory personnel and the shipment booking will be scheduled at the collection site in coordination with receiving laboratory.

3.4. Ensure that personnel who transport specimens are trained in safe handling practices and spill decontamination procedure.

3.5. Place specimens for transport in leak-proof specimen bags (secondary container) that have a separate sealable pocket for the specimen (i.e. a plastic biohazard specimen bag), with the patient's label on the specimen container (primary container), and a clearly written request form.

3.6. Ensure that health-care facility laboratories adhere to appropriate biosafety practices and transport requirements per the type of organism being handled.

3.7. Deliver all specimens by hand whenever possible. Do not use pneumatic tube systems to transport specimens.

3.8. State the name of the suspected ARI patient of potential concern clearly on the accompanying request form. Notify the laboratory as soon as possible that the specimen is being transported.

3.9. Shipment collection must be at Laboratory site. Time of shipment collection must be documented within AWB.

4. Labeling:

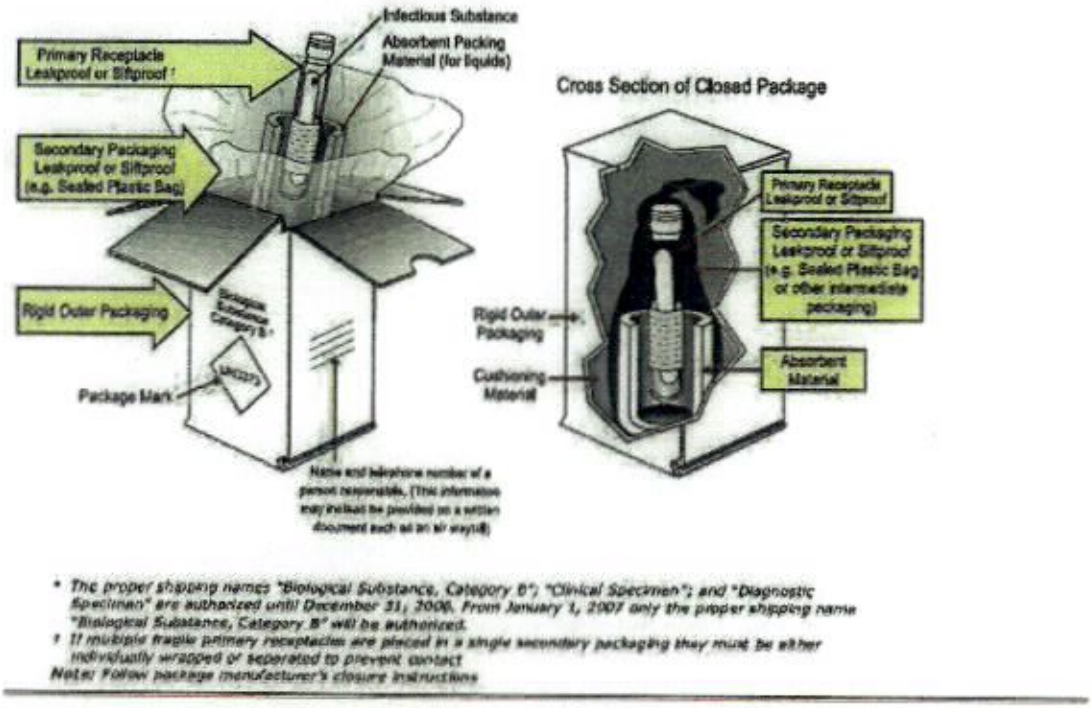
The outer container of all specimen packages must display the following on two opposite sides: o Sender's name and address. o Recipient's name and address.

- The words "Biological Substance, Category B".
- UN 3373 label.
- Class 9 label, including UN 1845, and net weight if packaged with dry ice.

5. Packaging:

Specimens must be triple-packaged and compliant with IATA Packing Instruction 650, which is detailed in Figure 1. The maximum quantity for a primary receptacle is 500 ml or 500g and outer packaging must not contain more than 4 L or 4 kg (9.5).

*Figure 2: Packing Instruction Biological Specimens Category B*




* The proper shipping names "Biological Substance, Category B"; "Clinical Specimen"; and "Diagnostic Specimen" are authorized until December 31, 2006. From January 1, 2007 only the proper shipping name "Biological Substance, Category B" will be authorized.
† If multiple fragile primary receptacles are placed in a single secondary packaging they must be either individually wrapped or separated to prevent contact.
Note: Follow package manufacturer's closure instructions

For more information on proper packaging for biological specimens "category B" see the technique on: https://youtu.be/GJK9FRT4IXM

5.1. Packing Containers

*5.1.1.* Packages must be of good quality, strong enough to withstand the rigors of transport.

*5.1.2.* Triple packaging consisting of leak proof primary receptacles (for liquid shipments), silt proof primary receptacles (for solid shipments), leak proof secondary packaging and outer packaging of sufficient strength to meet the design type test (1.2 meter drop test).

*5.1.3.* For liquid shipments, primary receptacle or secondary packaging capable of withstanding a 95Kpa internal pressure differential.

*5.1.4.* Absorbent material must be sufficient to absorb the entire contents of the shipment.

*5.1.5.* An itemized list of contents must be included between the secondary and outer packaging.

*5.1.6.* "Biological Substance, Category B" must appear on the package.

*5.1.7.* Minimum dimension is 100mm.

*5.1.8.* When large numbers of specimens are being shipped, they should be organized in a sequential manner in boxes (numerical order of patient hospital ID) with separate compartments for each specimen.

5.1.9. Patient Data Sheets and an Itemized List of Contents will accompany the package. The paperwork will be packaged inside the outer package NOT in the secondary container.

5.1.10. All specimens must be pre-packed to prevent breakage and spillage. Each specimen container should be sealed with Parafilm (after being crewed properly) and placed in a separate zip-lock bag.

5.1.11. Place enough absorbent material to absorb the entire contents of the Secondary Container (containing Primary Container) and separate the Primary Containers from each other (containing specimen) to prevent breakage.

5.1.12. Send specimens with cold packs or other refrigerant blocks that are selfcontained (do not use actual wet ice). This prevents the appearance of a spill due to thawed ice.

5.1.13. The courier will supply specimen transport container.

6. Rejection of packages and samples:

Apply universal rejection policy with emphasizes of the following:

6.1. All rejected samples will be discarded according waste management protocols in the laboratory, and immediate feedback will be given to the courier and treating physicians, the treating physician will decide if another sample is necessary).

6.2. Samples are not packaged according to packing instruction P650 as UN3373 Diagnostic Specimens.

6.3. An Itemized list of samples organized by Hospital Patient ID number is NOT included inside the outer package.

6.4. Any sample received without HESN investigations number printed clearly in request form will be rejected. In addition, results of samples received without filling MERSCoV F117 form will be held till F117 form filled by the sender and informed to the laboratory.

6.5. Any mismatch or missing data between the specimen and the request form.

6.6. The patient data sheets are incomplete, missing or incorrectly filled out.

6.7. Any leakage or spillage, inside or outside the primary or secondary containers.

6.8. If dry ice is placed in the "Primary Container" or "Secondary Container", foam envelopes, zip-lock bags, cryo-vial boxes, or hermetically sealed containers.

6.9. If the Primary Containers sideways or upside down in zip-lock bags.

6.10. Primary containers must be packaged securely in an upright position and in the numerical order used on the Itemized List of contents.

6.11. If red top Secondary Containers for Category A Infectious Substances are used.

6.12. If any paperwork in the Secondary Containers or zip-lock bags.

6.13. The quality of the shipment conditions specially the temperatures of the specimens (warm).

6.14. Wrong swab; the swabs should not be cotton with wooden shaft as cotton will absorb the testing material (VTM) and wood could inhibit PCR testing and give false negative result.

6.15. Expired VTM.

6.16. Delay in specimen's shipment.

6.17. Blood samples sent in wrong tube, e.g. heparinized (green-top) tube.

7. Turn Around Time (TAT) for Testing MERS CoV:

7.1. TAT up to 24 hours.

7.2. A minimum of 2 runs per day.

7.3. For urgent samples: (Prioritizing) immediately.