

**Interim Guideline
Prevention and Control of
Middle East Respiratory Syndrome Coronavirus
(MERS-CoV)**



Ethiopian Public Health Institute (EPHI)

*July 2014
Addis Ababa
Ethiopia*

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Center for Public Health Emergency Management

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1 FOREWORD

Middle East Respiratory Syndrome (MERS-CoV) was first identified in September 2012 among individuals with severe acute respiratory illness in Kingdom of Saudi Arabia. The infected individuals developed severe acute respiratory illness with symptoms of fever, cough, and shortness of breath.

Based on the mandate given by the Federal Ministry of Health to prepare and distribute health and health related guidelines and standards, this guideline is prepared by Public Health Emergency Management (PHEM) Center of Ethiopian Public Health Institute (EPHI) with technical support from stakeholders.

This guideline will guide health authorities, medical officers, and other health personnel involved in MERS-Coronavirus prevention and control at national, regional, woreda and local levels on how to detect, report, investigate and respond.

To develop this first edition of the guideline, technical documents and similar guidelines prepared by World Health Organisation, Center for Disease Control and Prevention (CDC) and Middle East countries were referenced and contextualized to our setting. EPHI will revise the guideline continuously based on the available information.

2 ACKNOWLEDGMENT

Ethiopian Public Health Institute (EPHI) would like to acknowledge and recognize with appreciation all who have actively contributed to the development of this interim guideline for the prevention, control and management of Middle East Respiratory Syndrome-Coronavirus (MERS-Cov). EPHI would also like to thank the Centers for Disease Control and Prevention Country Office, World Health Organization (WHO) and UNICEF for their technical contribution

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1. INTRODUCTION

Coronaviruses are found worldwide and causing a range of illnesses in humans, animals and rodents. In humans, coronaviruses can cause mild to severe illness like common cold as well as severe acute respiratory syndrome (SARS). The new strain of Coronavirus MERS-CoV (formerly called “novel coronavirus”) was first identified in September 2012 among individuals with severe acute respiratory illness in Kingdom of Saudi Arabia. The infected individuals developed severe acute respiratory illness with symptoms of fever, cough, and shortness of breath. A small number of the reported cases however also had a mild respiratory illness.

The MERS-CoV appears similar to coronaviruses found in bats however; genetic sequence analyses have shown that the new virus is different from other known human coronaviruses, including SARS. No vaccines and specific antivirals have been developed as yet and therefore, the supportive treatment remains the mainstay of case management.

The available evidence suggests that the virus is capable of limited human to human transmission. Besides spread among close family contacts and healthcare workers, MERS has also been transmitted to other countries through travelers infected in Arabian Peninsula and neighboring countries. The WHO however, neither recommends any travel restrictions to the affected countries nor any special screening at the airports. The current global efforts are accordingly aimed at strengthening Severe Acute Respiratory Infection (SARI) surveillance especially among people traveling to Arabian Peninsula. Considering the large number of travelers visiting the identified high risk countries and the large number of Umrah attendees during Ramadan and the subsequent Hajj, necessary preparations need to be undertaken by all stakeholders.

1.1. Global Epidemiological Update

Globally as of 4th July 2014, there have been 827 confirmed cases of MERS in several countries resulting in 287 deaths. Currently confirmed cases are reported from:

Countries in or near the Arabian Peninsula with Cases

- Saudi Arabia
- United Arab Emirates (UAE)
- Qatar
- Oman
- Jordan
- Kuwait

- Yemen
- Lebanon
- Iran

Countries with travel-associated Cases

- United Kingdom (UK)
- France
- Tunisia
- Italy
- Malaysia
- Philippines
- Greece
- Egypt
- United States of America (USA)
- Netherlands
- Algeria

Saudi Arabia remains the most affected country. All cases reported globally have either occurred in the Middle East or have direct links to a primary case infected in the Middle East. Among cases reported so far, males are predominant (ratio of 2:1). Moreover, with mean and median age of 49 and 50 years (range 1-94 years) respectively, the disease is mainly affecting old people.

1.2. Infectious agent

This is a new strain of coronavirus that has not been previously identified in humans. Coronaviruses are a large family of viruses that are known to cause illness in humans and animals. In humans, this large family of viruses is known to cause illness ranging from the common cold to Severe Acute Respiratory Syndrome (SARS).

The new virus is a beta coronavirus. The novel coronavirus is not the same virus that caused severe acute respiratory syndrome (SARS) in 2003. However, like the SARS virus, the novel coronavirus is most similar to those found in bats.

1.3. Mode of transmission

The original source(s), route(s) of transmission to humans, and the mode(s) of human-to-human transmission have not been determined; however there is clear evidence of person-to-person transmission. The efficiency of person-to-person transmission of MERS-CoV is not well characterized but appears to be low, given the small number of confirmed cases since the discovery of the virus. As of July 2014, no evidence of sustained community transmission

beyond small clusters has been reported in any country. Transmission has occurred between patients and healthcare personnel in a hospital setting.

Investigations are underway to determine the source of the virus, the types of exposure that lead to infection, the mode of transmission, and the clinical pattern and course of disease. The MERS-CoV has been detected in camels from multiple countries including Qatar, Egypt and Saudi Arabia. More study is needed to know whether the virus is actually identical to that found in humans.

The most critical question remains to be answered, that is, the type of human exposures that result in infection. Most human cases do not have a history of direct contact with camels; if camels or other animals are the source, the route of transmission to humans may be indirect.

1.4. Incubation Period

Although the exact timing and nature of exposures that result in infection is usually unknown, for those cases for which exposure is known or strongly suspected, the incubation period for laboratory confirmed cases of MERS-CoV is generally less than one week. However, in at least one case the known exposure occurred 9 to 12 days prior to onset of illness. Further evidence in cases exposed over a range of time suggests that, at least in a minority of cases, the incubation period may exceed one week but is less than two weeks.

1.5. Period of Communicability

The period of communicability for MERS-CoV is unknown at this time. Until further guidance is available, follow isolation recommendations used for SARS; persons with MERS should be isolated (for example, by not going to work or to school) until 10 days after fever has resolved, provided respiratory symptoms are absent or improving.

1.6. Clinical presentation

Common symptoms are

- Acute, serious respiratory illness with fever,
- Cough, and shortness of breath
- Breathing difficulties
- Most patients have had pneumonia. Many have also had gastrointestinal symptoms, including diarrhoea. Some patients have had kidney failure.

- In people with immune deficiencies, the disease may have an atypical presentation.

It is important to note that the current understanding of illness caused by this infection is based on a limited number of cases and may change as we learn more about the virus

1.7. Reservoirs

The reservoir(s) of MERS-CoV is still being investigated. The virus likely originated in an animal but has not yet been epidemiologically confirmed. Genetic sequencing to date has determined the virus is most closely related to coronaviruses detected in bats. MERS-CoV gene sequences and serologic evidence of past infection have been found in camels in several countries in or near the Middle East.

2. Surveillance and Reporting

2.1. Case Definition

2.1.1. Clinical Case Definitions

A person with fever ($\geq 38^{\circ}\text{C}$) and pneumonia or acute respiratory distress syndrome (based on clinical or radiological evidence) AND EITHER:

- History of travel from countries in or near the Arabian Peninsula within 14 days before symptom onset, OR
- Close contact with a symptomatic traveler who developed fever and acute respiratory illness (not necessarily pneumonia) within 14 days after traveling from countries in or near the Arabian Peninsula OR
- A member of a cluster of patients with severe acute respiratory illness (e.g. fever and pneumonia requiring hospitalization) of unknown etiology in which MERS-CoV is being evaluated

2.1.2. Case Classification

Probable case:

A probable case is a person who fulfils clinical case definition with absent or inconclusive laboratory results for MERS-CoV infection that is a close contact of a laboratory-confirmed MERS-CoV case.

Confirmed case:

A confirmed case is a person with laboratory confirmation (positive PCR) of MERS-CoV infection.

Close contact is defined as:

Any person who provided care for the patient, including a healthcare worker or family member, or had similarly close physical contact; OR Any person who stayed at the same place (e.g. lived with, visited) as the patient while the patient was ill.

2.2. Reporting

Health care providers working at health facilities should report all cases meeting clinical case definition immediately by telephone or other means of communication to the Health Offices at each levels followed by written reporting within 24 hours. Use detail case investigation report (Annex 1).

Healthcare professionals should evaluate suspected cases of MERS-CoV infection according to the case definition. Persons who meet the criteria should also be evaluated for common causes of community-acquired pneumonia. Positive results for another respiratory pathogen should not necessarily preclude testing for MERS-CoV.

3. Investigation of MERS-CoV

3.1. Preparation

A multi-disciplinary team should be assembled. Team members should have experience in field epidemiology, clinical assessment, laboratory specimen collection, infection control, and social mobilization and risk communication. Animal health specialists are also a critical part of the team. Designation of a team leader and attribution of roles and responsibilities is critical to the success of the investigation.

Before deploying, the team should gather preliminary background information, assemble the necessary materials and supplies (e.g. personal protective equipment, specimen collection and transport materials) and inform relevant local public health and animal health authorities.

3.2. Objectives

When setting up an investigation, it is critical to clearly define the objectives and use a standardized approach that addresses each of these. These objectives might be:

- Identify other cases and quickly detect any human-to-human transmission.
- Reduce onward transmission, morbidity and mortality through rapid identification, isolation, treatment and clinical management of cases and follow-up of contacts.
- Prevent future cases through identification of potential human, animal, and/or environmental sources of exposure, risk factors for infection, and implementation of appropriate prevention and control measures.
- Determine the size of geographic area where the virus is transmitting.
- Determine key epidemiological, clinical, and virological characteristics for cases including clinical presentation and natural history, the mode(s) of transmission and disease diagnosis, incubation period, period of transmissibility, and best practices for treatment.

3.3. Case Identification and Interview

Laboratory-confirmation of a MERS-CoV case is an immediate trigger to launch a thorough investigation. However, because collection, shipment, and testing of specimens often require several days or longer, the investigation may need to begin before laboratory test results are available for suspected cases. Even if laboratory-confirmation is not possible, an investigation should still be launched if a patient is strongly suspected to have MERS-CoV infection (e.g. patient with severe acute respiratory infection [SARI] who has a history of travel to Middle East or has been in contact with cases who have died).

The patient and/or family members (if the patient is too ill to be interviewed or has died) should be interviewed within the first 24–48 hours of the investigation to collect basic demographic, clinical, and epidemiological information. Customize and use the investigation format (Annex 1)

3.4. Essential basic information

The following basic information should be collected, including:

- Patient ID number/cluster number (if applicable)
- Relationship between the person answering questions on behalf of the case patient (in the case that the patient is too ill for interview or has died)
- Date of symptom onset (by symptom, if possible)
- Date of initial admission/ visit to health care facility

- Patient contact details (e.g. name, home address, and home/mobile telephone numbers).
- Demographic information (e.g. date of birth/age, sex)
- Occupation (including specific classification such as healthcare worker, laboratory worker, and farm worker etc.)
- Date of sample collection, laboratory testing and specimen type (e.g. nasopharyngeal swab, sputum, etc.)

3.5. Exposure Information and travel history

Possible exposures in the 14 days before the onset of symptoms should be thoroughly explored and described, with special focus on:

3.5.1. Animal exposures

- Presence of animals in or around household area where the case patient lives or works (e.g. pets, rats, other rodents, bats, camels, birds, etc.).
- Activities that result in animal exposures and type of animals exposed to (e.g. keeping livestock, visiting farms, visiting live animal markets racetracks, or practicing falconry, participating in the slaughter or sacrifice of animals etc.)
- Exposures to animal products or products potentially contaminated by animal excreta or body fluids.

3.5.2. Human exposures:

- Recent contact with individuals with respiratory illness and/or gastrointestinal symptoms, including people who have been severely ill or have died (indicate the type(s) of contact, frequency, and duration of exposure, and location).
- Recent admission in hospital.
- Recent visit to outpatient treatment facility.
- Recent visit to traditional healer.

3.5.3. Food exposures:

- Recent consumption of unprocessed, raw foods or drinks.
- Recent consumption of raw or undercooked meat, or uncooked blood products.
- Recent preparation of fresh meat for consumption.

3.5.4. Travel history:

- Dates, destinations and details mode of transport for recent travel (local and international).
- Activities during the period of travel (including information on animal, human and food exposures as listed above).

3.6. Clinical Information

Data on the presentation of illness, pre-existing medical conditions, clinical course of illness, and occurrence of complications are critical for refining case definitions and informing clinical management recommendations. As such, detailed clinical data should be collected on each confirmed case and systematically summarized.

3.6.1. Clinical data

- Date of illness onset.
- Signs and symptoms at initial presentation.
- Time course of illness including time from illness onset to: care-seeking, first hospital admission, deterioration requiring advanced clinical management, and final outcome.
- Presence of pneumonia and progression to respiratory failure, development of the acute respiratory distress syndrome (ARDS).
- Occurrence of other complications such as renal failure or other organ system compromise, coagulopathies, secondary infections, sepsis, etc.
- Presence of pre-existing chronic conditions (immunosuppression, cancer, renal insufficiency, hemoglobinopathies, liver disease, neurological disease, endocrine and metabolic disorders, etc.).
- Dates and results of any ancillary tests performed (X-Ray, CT scan, etc.).
- Use of respiratory support (supplemental oxygen and FiO₂; non-invasive and invasive mechanical ventilation, prone positioning, use of inhaled nitric oxide, oscillatory ventilation,
- Use of other organ support modalities (renal replacement therapy, vasopressors, etc.).
- Use of antibiotics, corticosteroids, other medical therapies.
- Documentation of co-infections (viral, bacterial, fungal).

- Clinical outcomes (recovered, ill, critically ill, duration of intensive care unit admission, duration of hospitalization, deceased).
- Virological outcomes (if available), including duration of MER-CoV shedding in respiratory tract specimens, and extrapulmonary clinical specimens.

3.6.2. Infection control related

- Where patient was located in health care facility. Which other places (e.g. radiology) may have been visited.
- Infection control precautions that were used in relation to patient including type of masks, etc.

3.6.3. Laboratory data (haematology, biochemistry, and virology)

- Date specimen taken.
- Type of test, type of specimen.
- Test results and date of results.
- Name of laboratory performing test.
- Name of national laboratory.
- Name of reference laboratory (if applicable).

3.7. Case finding

3.7.1. Develop a case definition

An additional first step in the investigation is to identify other cases among contacts of the known case and in the community. To do this, the investigation team must first identify the types of clinical presentations or syndromes that will be sought as part of the case finding activity. Definitions for additional case finding must be developed locally and may be shaped by information obtained from the interview with the first case.

These definitions are used to identify patients in the community who should be tested for MERS-CoV infection and should incorporate time periods, localities, illness characteristics, exposure and other information. The criteria used should be those that clinicians will find simple, easily understandable, and memorable. The case definition should be sensitive enough during the initial

stages of the investigation to capture the majority of cases. An example of a case definition to use for this purpose might include features such as:

- **Location:** the local community where the case occurred. This will be defined according to the local situation but should include an area that incorporates other individuals who may have exposures to the same source of virus to which the patient was exposed. As the relevant exposures are currently unknown, they should include the population area that generally includes local markets, places of worship, and health care facilities that the case may have recently visited.
- **Time frame:** some retrospective case finding should be conducted and therefore the time period should cover at least two weeks before the onset of symptoms of the case.
- While finding for a case use broad definitions so that those patients with the following characteristics will be encompassed:
 - ✓ A patient with SARI who presents with fever and cough, requires admission to hospital, and whose disease is not completely explained by another pathogen.
 - ✓ A patient with SARI whose clinical course is unexpectedly severe even if another pathogen was initially identified and the patient did not respond to appropriate treatment.
 - ✓ A patient with SARI with recent exposure to animals.
 - ✓ An immunocompromised patient who presents with an acute illness that is not fully explained by another pathogen.

3.7.2. Contact Case Tracing

Close contacts of confirmed or probable cases should be identified and monitored for the appearance of respiratory symptoms for 14 days after last exposure to the confirmed or suspected case, while the case was symptomatic. Any contact that becomes ill in that period of time should be tested for MERS-CoV.

A line-listing of all contacts and co-exposed persons that records demographic information, date of first and last common exposure or date of contact with the confirmed or probable case, and date of onset if fever or respiratory symptoms develop should be maintained. The common

exposures and type of contact with the confirmed or suspected MERS-CoV patients should be thoroughly documented for any contacts that become infected with MERS-CoV.

Initiate active monitoring (e.g. daily visits or telephone calls) for the development of fever and acute respiratory illness or any other symptoms in close contacts for 14 days after the last exposure to the initial case. Contacts should also be advised to contact health care workers as soon as they develop above symptoms. If any of the contacts are confirmed to have MERS-CoV infection, their close contacts should also be monitored.

Collect appropriate clinical specimens on any close contacts with an acute respiratory illness regardless of severity, and test for MERS-CoV. While under investigation, symptomatic contacts should limit their contact with well individuals and practice good respiratory hygiene to prevent onward transmission. If symptomatic individuals are managed at home, they should be monitored closely for progression of their illness.

Investigators should collect oropharyngeal and nasopharyngeal swab on all close contacts immediately after the confirmed or suspected case is identified. This should be repeated in close contacts 3–4 weeks later, regardless of whether contacts have developed symptoms. Symptomatic contacts should also have appropriate respiratory specimens collected for PCR testing. In addition for each contact collect information regarding:

- Any illness that may have occurred during the intervening time period, including all signs and symptoms, and their severity.
- Specific exposures to the confirmed or suspected case including providing care, exposure to body fluids and other physical contact, duration and proximity of exposure, eating with and sleeping in the same room as the case.
- Exposures to animals, unprocessed food and beverages, and other social and environmental contacts.

Use the protocol for contact investigation (Annex 3)

3.7.3. Active search for additional cases

Efforts to identify additional cases beyond close contacts are critical for prevention and control of infection, and to determine the total extent of transmission in the community. Active case finding in the area under investigation should focus on:

- Patients currently admitted to health care facilities in the community where the confirmed MERS-CoV case was discovered. Any patients currently in the hospital with unexplained SARI should be considered for testing for MERS-CoV.
- Health care providers in the community; health workers should be interviewed about recent cases of unexplained pneumonia and notified to immediately report any patients who have signs and symptoms that meet the case definition.
- Patients who recently died of an unexplained illness consistent with the case definition developed for the investigation should be tested for MERS-CoV infection if appropriate clinical specimens are available.

3.7.4. Initiate enhanced surveillance

Addition to case finding activities, surveillance in the area under investigation should be enhanced to detect cases that might arise subsequent to the discovery of the index case. The geographical area targeted will need to be assessed on a case-by-case basis and is defined by the suspected exposures of the case under investigation. The duration of the enhanced surveillance will depend on the findings of the investigation and whether there is evidence indicating that sustained transmission may be occurring in the area. A minimum of one month of enhanced surveillance is a reasonable starting point.

Enhancements include:

- Introduction of laboratory capacity for MERS-CoV testing in the local health care facility, if feasible, or establishment of mechanisms for rapid transfer of specimens to a capable laboratory.
- Inform clinicians in the community of the need for vigilance and the case definition for case finding.
- If SARI surveillance is in place, expand to other facilities in the area. If it is not, initiate SARI surveillance at health care facilities in the community of the case.
- Increase the testing for MERS-CoV of SARI cases at local health care facilities in the area under investigation.
- If resources allow, consider some testing of milder cases of influenza-like illness presenting to surveillance sites.

3.8. Laboratory Diagnosis

Before collecting and handling specimens for MERS-CoV testing, determine whether the person meets the current clinical case definition for MERS-CoV infection.

3.8.1. Specimen Type and Collection

To increase the likelihood of detecting the virus, multiple samples from multiple sites should be collected over the course of the illness.

Lower respiratory specimens are preferred, but collecting nasopharyngeal and oropharyngeal specimens, as well as stool and serum, are strongly recommended depending upon the length of time between symptom onset and specimen collection. For example, if symptom onset for a patient under investigation with ongoing lower respiratory tract infection was 14 or more days ago, a single serum specimen for serologic testing in addition to a lower respiratory specimen and nasopharyngeal and oropharyngeal are recommended.

Respiratory specimens should be collected as soon as possible after symptoms begin, ideally within 7 days. However, if more than a week has passed since symptom onset and the patient is still symptomatic, respiratory samples should still be collected, especially lower respiratory specimens since respiratory viruses can still be detected by rRT-PCR. Use the attached format to send laboratory specimen to EPHI (Annex 4).

1. Respiratory Specimens

A. Upper respiratory tract: - Nasopharyngeal AND oropharyngeal swabs (NP/OP swabs):

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 can be combined, placing both swabs in the same vial. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

B. Lower respiratory tract - Sputum:

Have the patient rinse the mouth with water and 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 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

2. Blood Components

Serum (for rRT-PCR testing)

For rRT-PCR testing (i.e., detection of the virus and not antibodies), a single serum specimen collected optimally during the first week after symptom onset, preferably within 3-4 days, after symptom onset, may be also be beneficial.

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 200 μ L. Refrigerate the specimen at 2-8°C and ship on ice- pack; freezing and shipment on dry ice is permissible.

Infants: A minimum of 1 mL of whole blood is needed for testing of pediatric patients. If possible, collect 1 mL in an EDTA tube and in a serum separator tube. If only 1 mL can be obtained, use a serum separator tube.

3. Stool

Collect 2-5 grams of stool specimen (formed or liquid) in sterile, leak-proof, screw-cap sputum collection cup or sterile dry container. Refrigerate specimen at 2-8°C up to 72 hours; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

3.8.2. Specimen Storage

For short periods (\leq 72 hours), most specimens should be held at 2 -8°C rather than frozen. For delays exceeding 72 hours, freeze specimens at -70°C as soon as possible after collection (with exceptions noted above).

3.8.3. Specimen Transportation

Clearly label each specimen container with the patient's ID number, specimen type and the date the sample was collected. Package all specimens to prevent breakage and spillage. Specimens from suspected MERS cases must be packaged in triple packaging. The primary container (containing specimen) must be leak-proof and sealed securely with either tape or Parafilm and placed in zip-sealing, leak-proof bags with enough absorbent material to capture the contents of the primary container. Each requisition form should be attached to the zip-sealing bag with the primary container. Multiple primary containers (each in a zip-sealing bag with requisition slip attaches) may be placed in a secondary leak-proof container. The secondary container is then

placed in an outer certified box. For frozen specimens shipment use a combination of dry ice and frozen gel ice-packs, not wet ice, to maintain temperatures over several days.

Specimens should be shipped at the temperatures indicated above to Ethiopian Public Health Institute. If samples are unable to be shipped within 72 hours of collection, they should be stored at -70°C and shipped on dry ice.

3.9. Data Analysis

At a minimum, descriptive analysis of cases should be performed in terms of person, place, and time. For investigations that yield multiple cases, graphical and/or tabular descriptions of cases by date of onset (i.e. epidemic curve), geographical location (e.g. maps of the locale, case patients' homes), and relationship (i.e. transmission or family trees) and demographic characteristics (e.g. distribution by age and sex) should be developed. Key epidemiological (e.g. estimation of an incubation period, description of transmission patterns, attack rates by age, occupation, exposure history etc.) and clinical (e.g. spectrum of illness severity, proportion of cases who develop pneumonia, require hospitalization, die) parameters should be characterized to enhance understanding of the spectrum and dynamics of disease associated with MERS-CoV infection.

4. Control and Prevention

4.1. Case Management

A suspected patient should be managed as potentially infected by following recommended bio-safety (infection prevention and control) precautions. Currently there is no vaccine or antiviral for the treatment of the disease. Only supportive treatment is given and these include:

- Supplemental oxygen
- Empiric antimicrobials for community-acquired pathogens
- Conservative fluid management

Use of systemic high-dose corticosteroids can result in serious adverse events in patients with SARI, including opportunistic infection, avascular necrosis, new health-care-associated bacterial infection and possibly prolonged viral replication. Therefore, corticosteroids should be avoided unless they are indicated for another reason.

4.2. Infection Prevention and Control

4.2.1. Standard Precautions

Standard Precautions should always be applied in all health-care settings for all patients. Standard Precautions include hand hygiene and use of Personal Protective Equipment (PPE) to avoid direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Standard Precautions also include: prevention of needle-stick or sharps injury; safe waste management; cleaning, disinfection and, where applicable, sterilization of patient-care equipment and linen, and cleaning and disinfection of the environment.

Use of respiratory hygiene in anyone with respiratory symptoms should be encouraged.

- Health care workers should apply hand hygiene: before touching a patient, before any clean or aseptic procedure, after body fluid exposure risk, after touching a patient, and after touching a patient's surroundings, including contaminated items or surfaces.
- Hand hygiene includes either washing hands with soap and water or the use of an alcohol-based hand rub.
- Wash hands with soap and water when they are visibly soiled.
- Use PPE such as medical mask, eye goggles, gown and clean gloves while providing care in close contact with a patient with respiratory symptoms e.g. coughing or sneezing because sprays of secretions may occur.
- The use of PPE does not eliminate the need for hand hygiene. Hand hygiene may also be necessary while putting on and especially when taking off PPE.

4.2.2. Infection prevention and control precautions for aerosol-generating procedures

- Wear a particulate respirator when putting on a disposable particulate respirator (e.g. N95 mask),
- Wear eye protection (i.e. Goggles or a face shield);
- Wear a clean, non-sterile, long-sleeved gown and
- Wear an impermeable apron with expected high fluid volumes that might penetrate the gown;
- Perform procedures in an adequately ventilated room

- Limit the number of persons present in the room to the absolute minimum required for the patient's care and support;
- Perform hand hygiene (hand washing or antiseptic hand rub) before and after contact with the patient and his or her surroundings and after PPE removal.

4.2.3. Infection prevention and control precautions when caring for patients

- All individuals, including visitors and HCWs, when in close contact (within 1 m) or upon entering the room or cubicle of patients with probable or confirmed cases should always:
 - Wear a medical mask;
 - Wear eye protection (i.e. Goggles or a face shield);
 - Wear a clean, non-sterile, long-sleeved gown; and gloves (some procedures may require sterile gloves);
 - Perform hand hygiene (hand washing or antiseptic hand rub) before and after contact with the patient and his or her surroundings and immediately after removal of PPE.
- Place patients in single room, or group together those with the same etiological diagnosis. If an etiological diagnosis is not possible, group patients with similar clinical diagnosis and based on epidemiological risk factors, with a spatial separation of at least one meter.
- Limit patient movement and ensure that patients wear medical masks when outside their rooms.
- Assign probable or confirmed cases to be cared for exclusively by a group of skilled HCWs both for continuity of care and to reduce opportunities for inadvertent infection control breaches that could result in unprotected exposure.
- Family members and visitors in contact with a patient should be limited to those essential for patient support and should be oriented on the risk of transmission and on the use of the infection control precautions.
- Use either disposable equipment or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared among patients, clean, and disinfect it before using for other patients.
- HCWs should refrain from touching their eyes, nose or mouth with potentially contaminated gloved or ungloved hands.

- Clean and disinfect patient-contact surfaces (e.g. bed) after use.
- **Wear appropriate PPE while transporting patients and perform hand hygiene afterwards.**

4.2.4. Infection prevention and control precautions while Collection and handling of specimens

- All specimens should be regarded as potentially infectious, and HCWs who collect or transport clinical specimens should adhere rigorously to Standard Precautions to minimize the possibility of exposure to pathogens.
- Wear appropriate PPE while collecting specimens.
- Ensure that personnel who transport specimens are trained in safe handling practices and spill decontamination procedures.
- 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.
- Ensure that health-care facility laboratories adhere to appropriate biosafety practices and transport requirements.

4.2.5. Environmental Decontamination:

- Daily clean and disinfect horizontal surfaces (e.g., over-bed table, nightstand), surfaces that are frequently touched by patients and healthcare personnel (e.g., bed rails, phone), and lavatory facilities.
- Terminal cleaning and disinfection following transfer or discharge should include the type of surfaces described above plus obviously soiled vertical surfaces, frequently touched surfaces (e.g. light cords and switches, door knobs), and durable patient equipment (e.g., bed, night stand, over bed table, wheelchair, commode).
- Patient care equipment such as pulse oximeters, and blood pressure cuff, should be cleaned and disinfected in accordance with manufacturer's instructions and facility procedures

- Rooms (examination rooms, emergency rooms) in outpatient areas where patients with suspected MERS are evaluated should be cleaned and disinfected before another patient is seen or cared for in that environment
- For cleaning and disinfecting use the following ratios:
 - For floor and non metal items use 2% hypochlorite (1,000 ppm) solution; then rinse and dry.
 - For blood spills, use 20% hypochlorite (10,000 ppm) solution, leave for 10 minutes and then rinse with water.
 - For metallic items use 70% alcohol.
 - Total Part of water = Available percentage concentration divided by desired concentration minus one
- Manage laundry, food service utensils and medical waste in accordance with routine procedures.
- All wastes related to the patient care should be considered as clinical waste using the red bags and be disposed properly following as per the national guideline.

5. Advocacy and Communication

5.1. Message for Middle East travelers

1. Before Travel

- Persons with pre-existing major medical conditions (e.g. chronic diseases such as diabetes, chronic lung disease, and immunodeficiency) are more likely to develop severe infection for MERS if they are exposed to the virus.
- Consult a health care provider before travelling to review the risk and assess whether making the traveling is advisable.

2. At Middle East (During your stay at Middle East countries)

- Avoid close contact with sick people, especially with those suffering from acute respiratory infections
- Avoid close contact with camels, do not visit farms.
- Adhere good food-safety practices, avoid undercooked meat, do not consume unpasteurized camel milk, and properly wash fruits and vegetables before eating them;
- Maintain good personal hygiene;

- If you develop a significant acute respiratory illness with fever and cough (severe enough to interfere with usual daily activities) during your stay at middle east countries you should:
 - ✓ Report to the local health facilities;
 - ✓ Cover your mouth and nose when coughing or sneezing, if this is not possible, cough or sneeze into upper sleeves of your clothe;
 - ✓ Wash your hands by water and soap regularly afterwards,
 - ✓ Avoid attending crowded places and preferably isolate yourself until the end of the respiratory symptoms and, if isolation is not possible, use a tissue for covering nose and mouth or a surgical mask when you are in crowded places.

3. After returning from Middle East to Ethiopia

- If you develop a significant acute respiratory illness with fever and cough (severe enough to interfere with usual daily activities) within two weeks after you return , you should:
 - ✓ Seek medical attention, inform health workers about your travel for Umra or Hajj;
 - ✓ Immediately notify your local health authority;
 - ✓ Take precautions when coughing or sneezing;
 - ✓ Minimize your contact with others to keep them from infection.

a. Message for MERS patients in Homes

If you develop sign and symptoms of the Middle East Respiratory syndrome coronavirus sign and symptoms carefully implement the following directions to prevent your family from the illness and limit further spread of the disease.

1. Stay at home
 - You should restrict activities outside your home, except for getting medical care.
 - Do not go to work, school, or public areas, and do not use public transportation.
2. Separate yourself from other people in your home
 - As much as possible, you should stay in a different room from other people in your home until you recovered from the illness
 - Use separate bed
 - Use a separate bathroom, if available.
3. Cover your mouth and nose by close
 - You should cover your mouth and nose when you are in the same room with other people and when you visit a healthcare provider. Cover your mouth and nose with a close while you cough or sneeze, or you can cough or sneeze into your sleeve.
 - Throw used tissues in a lined trash can, and immediately wash your hands with soap and water.
4. Wash your hands
 - Wash your hands often and thoroughly with water, soap or Ash. You can use an alcohol-based hand sanitizer if soap and water are not available and if your hands are not visibly

dirty.

- Avoid touching your eyes, nose, and mouth with unwashed hands.

5. Avoid sharing household items

- You should not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with other people in your home.
- After using these items, you should wash them thoroughly with soap and warm water.

b. Message for Caregivers and Household Members

If you live with or care for someone at home who is ill and being evaluated for MERS-CoV infection, you should:

1. Limit Care givers

- Have only people in the home who are essential for providing care for the ill person.
- If possible, other household members should stay in another room or place of residence.
- Restrict visitors who do not have an essential need to be in the home.
- Keep elderly people and those who have compromised immune systems or specific health conditions away from the ill person. This includes people with chronic heart, lung or kidney conditions, and diabetes.

2. Room Ventilation

- Make sure that shared spaces in the home have good air flow, such as by ventilator or an opened window, weather permitting.

3. Personal Protective Equipment

- Wear a disposable facemask, gown, and gloves when you touch or have contact with the ill person's blood, body fluids and/or secretions, such as sweat, saliva, sputum, nasal mucous, vomit, urine, or diarrhea.

4. Hand Washing

- Wash your hands immediately after removing your facemask, gown, and gloves.
- Wash your hands often and thoroughly with soap and water.
- You can use an alcohol-based hand rubs if soap and water are not available and if your hands are not visibly dirty.
- Avoid touching your eyes, nose, and mouth with unwashed hands.

5. Avoid sharing household items.

- You should not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with an ill person who is being evaluated for MERS-CoV infection.
- After the ill person uses these items, you should wash them thoroughly with soap and warm water.

6. Environment cleaning and disinfecting

- Clean all "high-touch" surfaces, such as counters, tabletops, doorknobs, bathroom fixtures, toilets, and bedside tables, every day.
- Also, clean any surfaces that may have blood, body fluids and/or secretions on them.
- Wear disposable gloves and gown while cleaning surfaces.
- Use a diluted bleach solution or a household disinfectant

7. Waste Management

- Do not reuse masks, gowns, and gloves after using them.
- Place all used gloves, gowns, masks, and other contaminated items in a lined container

- before disposing them with other household waste.
- Wash your hands immediately after handling these items.

c. Message for Aircraft Crew Members and Airport Authorities

If you encounter travelers with sign and symptoms of the MERS Coronavirus while you are in or out from middle east countries report the information to the airport health Authority at the ground. In Addition to protect yourself and other travelers follow the following directions.

1. Personal Protective Equipment

- Wear a disposable mask, gown, and gloves when you touch or have contact with the ill person’s blood, body fluids and/or secretions, such as sweat, saliva, sputum, nasal mucous, vomit, urine, or diarrhea.

2. Hand Washing

- Wash your hands immediately after removing your facemask, gown, and gloves.
- Wash your hands often and thoroughly with soap and water.
- You can use an alcohol-based hand rubs if soap and water are not available and if your hands are not visibly dirty.
- Avoid touching your eyes, nose, and mouth with unwashed hands.

3. Traveler Advise

- Advise the traveler to cover their mouth and nose if you observe travelers with MERS. Coronavirus
- The travelers should wash their hand with water and soap after using toilet
- Disinfect toilet after the travelers frequently

4. Reporting

- Fill the attached format (ANNEX 2) and submit to the airport health workers at the ground
- Airport
- At the aircraft landed the plane should be disinfected using recommended disinfectant chemicals.

6. Annexes

Annex 1: Case Investigation Form

Reporting Details			
Reporting date (dd/mm/yy) / /			
Name of reporting health facility	Woreda	Zone	Region
Name of PHEM Focal Person	Tel No:		Email:
Patient Demographic details			
Patient full name _____			
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Unknown		
Age (years) _____			
Usual country residence _____			

Nationality _____			
occupation _____			
Current Patent Address			
Region	Zone	Woreda	
Kebele	House No	Telephone No.	
Sign and symptoms			
Date of onset (dd/mm/yyyy) ____ / ____ / ____			
Body temperature higher than 38 C	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Cough	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Difficulty in breathing	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Clinical findings of Respiratory Distress Syndrome	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Other	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If other symptoms. Please specify			
Chest X-ray			
Chest X-ray performed	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, evidence of pneumonia or parenchymal involvement	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Hospital Admission History			
Has the case been admitted to a Hospital whilst symptomatic	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, Name of the hospital			
Date of admission to hospital (dd/mm/yyyy) ____ / ____ / ____			
Has the case been in isolation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Has the case been on mechanical ventilation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, is the case currently on mechanical ventilation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Has the case been admitted to an Intensive Care Unit	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If not hospitalized, has the case been in home isolation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Concurrent Risk factors	<input type="checkbox"/> Immunocopromized <input type="checkbox"/> Pregnant diabetes <input type="checkbox"/> cronic respiratory disease,		
History of exposure			
Prior to the onset on illness, did the patient have close contact with a known probable or suspect case of novel corona virus	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, in what country or City			
If yes, Date of contact (dd/mm/yyyy) ____ / ____ / ____			
In the 14 days preceding the onset of illness, did the case travel to middle east or other affected countries	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, to which area/country			
In the 14 days before symptom onset did the patient have close contact with animals?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, what animal _____			
During the 14 days prior to onset of illness, did the case had consume raw food	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, what kind of food			
For deceased patients ONLY			
Unexplained respiratory illness resulting in death	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Autopsy examination performed	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
If yes, did autopsy demonstrate pathology of Respiratory	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Distress Syndrome without an identifiable cause	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Contact tracing			

Has contact tracing been initiated	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
If yes, current location of the contact	_____
Is the health authority of the contact area informed?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Case Classification	
<input type="checkbox"/> Confirmed <input type="checkbox"/> Suspect <input type="checkbox"/> Probable <input type="checkbox"/> Discarded Date classified _____	
Final Outcome	
<input type="checkbox"/> Recovered, if the case was admitted to hospital Date of discharge (dd/mm/yyyy) ____ / ____ / ____	
<input type="checkbox"/> Died Date of death (dd/mm/yyyy) ____ / ____ / ____	
<input type="checkbox"/> Left country while symptomatic	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
If Yes: Date of departure (dd/mm/yyyy) ____ / ____ / ____	
Flight details _____	
Destination country _____	
Lost to follow-up Date of loss (dd/mm/yyyy) ____ / ____ / ____	
Name & Signature of reporting person: _____ Email _____	
Responsibility: _____	

Annex 2: Reporting format to be filled by crew members

Flight Details	
Name of airline _____ Flight Number _____	
Details of details	
Traveler full name _____	
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
Age (years) _____	
Usual country residence _____	
Nationality _____	
Occupation _____	
Traveling Information	
Depart _____	
Why you go there?	<input type="checkbox"/> Haji or Umra <input type="checkbox"/> Study <input type="checkbox"/> Conference <input type="checkbox"/> Residency <input type="checkbox"/> Vacation <input type="checkbox"/> Medical care <input type="checkbox"/> Business <input type="checkbox"/> Other _____
How long you stayed there? _____	
Date of Departure _____	
Date Arrived in Addis Ababa _____	
Contact and exposure Information	
Did you contact with ill person	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Contact with animal (Camel, Sheep)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Did you ate uncooked food (e.g. raw milk, meat and vegetables)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Did you share food utensils with patients?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Address in Ethiopia:	
Where will you stay for the next 14 days? Region _____ Zone _____ Woreda _____	
Kebele _____ House No _____ Telephone No. _____	
Health information	
Do you fill sick	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, Date of onset of initial symptoms (dd/mm/yyyy) ____ / ____ / ____	
Do you have the following sign and symptoms?	
Fever	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Cough	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Difficulty in breathing	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unknown
Name & Signature of Crew member: _____			
Telephone: _____			
For FMHACA/EPHI use only			
Based on the above information categorize the travelers,			
<input type="checkbox"/> Discarded (if the traveler has no sign and symptoms and contact history)			
<input type="checkbox"/> Transferred to designated health facilities (If the traveler full fill the above sign and symptoms)			
<input type="checkbox"/> Follow up with advice (If the patient has contact history and consume raw food)			

Annex 3: MERS-Corona Virus Contact Investigation Form

Name _____			
Nationality _____			
Date of last unprotected contact with confirmed case without full protection <input type="checkbox"/> _____			
Place of work _____			
Occupation _____			
Direct patient contact (e.g. hands-on clinical contact)		<input type="checkbox"/> Yes <input type="checkbox"/> No	
What type of protective equipment was used during contact with confirmed case and how often?			
Surgical mask	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, how often?	<input type="checkbox"/> Always (100% of time) <input type="checkbox"/> Often (>50% of time) <input type="checkbox"/> Infrequent(<50% of time) <input type="checkbox"/> Never
N95 mask	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, how often?	<input type="checkbox"/> Always (100% of time) <input type="checkbox"/> Often (>50% of time) <input type="checkbox"/> Infrequent(<50% of time) <input type="checkbox"/> Never
Eye protection	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, how often?	<input type="checkbox"/> Always (100% of time) <input type="checkbox"/> Often (>50% of time) <input type="checkbox"/> Infrequent(<50% of time) <input type="checkbox"/> Never
Gloves:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, how often?	<input type="checkbox"/> Always (100% of time) <input type="checkbox"/> Often (>50% of time) <input type="checkbox"/> Infrequent(<50% of time) <input type="checkbox"/> Never
Gown:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, how often?	<input type="checkbox"/> Always (100% of time) <input type="checkbox"/> Often (>50% of time) <input type="checkbox"/> Infrequent(<50% of time) <input type="checkbox"/> Never
Was the contact present while any aerosol prone procedures took place?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, what procedure were they present at? list and date if more than one		1)Date: / / 2)Date: / / 3)Date: / /	
Was the contact wearing any type of mask at these procedure (s)?		<input type="checkbox"/> Yes <input type="checkbox"/> No	

If date of onset in confirmed case is known, please tick below all days of contact with the confirmed case in relation to their date of illness onset e.g. +1 means contact the day after onset of illness:

Day	0	1	2	3	4	5	6
Date							
Day	7	8	9	10	11	12	13
Date							

If date of onset of the confirmed case is unknown, please give the total number of days you were in contact with the confirmed case: ____ days

Has the contact been ill in the period from 14 days before onset in the confirmed case until the present? Yes No

Is the contact currently ill Yes No

Respiratory symptoms:

History of Fever	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____
Cough	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____
Runny nose	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____
Sore Throat	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____
Sneezing	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____
Shortness of Breath	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date ____/____/____

Other symptoms

Muscle ach	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Nausea	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Diarrhoea	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Loss of appetite	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Fatigue	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Vomiting	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Seizures	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Headache	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Rash	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Nose bleed	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Joint ache	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	Altered consciousness	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Outcome / Status of Contac

Recovered	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes , date symptoms resolved ____/____/____
Still ill	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Dead	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date of death
Hospitalized	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	If yes, date of admission to hospital and date of discharge ____/____/____
If yes , still hospitalized	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	

Case classification of contact if appropriate:

Confirmed Possible Probable Discarded N/A

Medical History

Condition	Answer Option	Comment
Chronic heart disease	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Diabetes	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
HIV/ other immunodeficiency	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Chronic kidney disease	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Chronic Liver disease	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Chronic respiratory disease, excluding asthma requiring medication	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Malignancy	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	

Organ or bone marrow Recipient	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Seizure disorder	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Chronic neurological disease	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Pregnant	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	

Annex 4: MERS-Corona Virus Laboratory Investigation Form

Identification					
Patient name _____					
Id Number _____					
Demography					
Age _____	Years _____				
Sex _____	<input type="checkbox"/> Male <input type="checkbox"/> Female				
Permanent Address					
Country _____	Region/State _____	Zone/Subcity _____	Number _____		
Woreda/District _____	Kebele _____	Phone _____			
Did the patient receive influenza antiviral drugs for this illness?				<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
If yes, name of antiviral :				<input type="checkbox"/> Oseltamivir <input type="checkbox"/> Zanamivir <input type="checkbox"/> Other _____	
Clinical Pictures					
<input type="checkbox"/> Measured fever of ≥ 38 degrees		<input type="checkbox"/> Shortness of breath or difficulty breathing			
<input type="checkbox"/> Reported history of fever		<input type="checkbox"/> Requiring overnight hospitalization			
<input type="checkbox"/> Cough		<input type="checkbox"/> Other _____			
Patient outcome					
<input type="checkbox"/> Discharged alive		<input type="checkbox"/> Referred		<input type="checkbox"/> Died	
Was the patient admitted		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown			
Laboratory specimen collected					
NP/OP	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes, date sample collected ____/____/____		
Sputum	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes, date sample collected ____/____/____		
Stool	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes, date sample collected ____/____/____		
Serum	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes, date sample collected ____/____/____		
Name of health worker collecting the sample _____					
Signature _____					
Telephone number _____					
For National Laboratory Only					
Laboratory Test Performed	Laboratory Results				If positive, for which type if any
<input type="checkbox"/> Influenza	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> RSV	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Human metapneumovirus	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Parainfluenza 1-4	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Adenovirus	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Streptococcus pneumonia	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Legionella pneumophila	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
<input type="checkbox"/> Blood culture	<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Not done	
Laboratory test performed	ID	Laboratory Results			

for MERS					
NP/OP		<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Sent to Reference lab
Sputum		<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Sent to Reference lab
Stool		<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Sent to Reference lab
Serum		<input type="checkbox"/> +ve	<input type="checkbox"/> -ve	<input type="checkbox"/> pending	<input type="checkbox"/> Sent to Reference lab
Name and signature of laboratory personnel analysis the sample _____					
Name and signature of Supervisor _____					

Reference

1. Guidelines for the Prevention, Control and Management of Middle East Respiratory Syndrome-Coronavirus (MERS-CoV), Islamabad, May 2014)
2. Guideline On Middle East Respiratory Syndrome coronavirus (MERS-CoV), Ministry of Health of Kingdom of Bahrain, 28 November 2013
3. WHO guidelines for investigation of cases of human infection with Middle East Respiratory Syndrome Coronavirus (MERS-CoV), July 2013
4. Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infection: Reporting and Surveillance Guidelines, Washington State Department of Health, revised May 2014