Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected

Interim guidance

10 January 2020

World Health Organization

Introduction

This is the first edition of infection prevention and control (IPC) guidance when a novel coronavirus (nCoV) is suspected. It has been adapted from WHO's IPC recommendations for MERS-CoV (Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus [MERS-CoV] infection, interim guidance October 2019, WHO/MERS/IPC/15.1 Rev 1), based on our current knowledge of the situation in Wuhan, China and experiences with SARS-CoV and MERS-CoV.

WHO will update these recommendations as new information becomes available on the situation in Wuhan, China.

This guidance is intended for health-care workers (HCWs), health-care managers, and IPC teams. Full guidelines are available at *Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care – WHO*.

Principles of infection prevention and control strategies associated with health care with suspected nCoV

IPC strategies to prevent or limit infection transmission in health-care settings include the following:

1. Early recognition and source control
2. Application of Standard Precautions for all patients
3. Implementation of empiric additional precautions (droplet and contact and whenever applicable airborne precautions) for suspected cases
4. Administrative controls
5. Environmental and engineering controls

1. Early recognition and source control

Clinical triage including early recognition and immediate placement of patients in separate areas (source control) is an essential measure for rapid identification and appropriate isolation and care of patients with suspected nCoV infection. To facilitate early identification of suspect cases, healthcare facilities should: encourage HCWs to have a high level of suspicion, institute screening questionnaire and post signage reminding symptomatic patients to alert HCWs. Promotion of respiratory hygiene is an important preventative measure.

Suspected nCoV patients should be placed in an area separate from other patients, and additional IPC (droplet and contact) precautions promptly implemented.

2. Application of Standard Precautions for all patients

Standard Precautions include hand and respiratory hygiene; use of PPE depending on risk; prevention of needle-stick or sharps injury; safe waste management; environmental cleaning and sterilization of patient-care equipment and linen.

Ensure the following respiratory hygiene measures:

- Offer medical mask for suspected nCoV infection for those who can tolerate it
- Cover nose and mouth during coughing or sneezing with tissue or flexed elbow for others
- Perform hand hygiene after contact with respiratory secretions.

Personal protective equipment. Rational, correct, and consistent use of available PPE and appropriate hand hygiene[16] also help to reduce the spread of the pathogens. PPE effectiveness depends on adequate and regular supplies, adequate staff training, proper hand hygiene and in particular, appropriate human behaviour[1].

Ensure that cleaning and disinfection procedures are followed consistently and correctly. Cleaning environmental surfaces with water and detergent and applying commonly used hospital disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure. Manage laundry, food service utensils and medical waste in accordance with safe routine procedures[1].

3. Implementation of empiric additional precautions for suspected nCoV infections

3.1 In addition to **Standard Precautions**, all individuals, including family members, visitors and HCWs should apply **Contact and Droplet precautions:**

- Place patients in adequately ventilated single rooms. For naturally ventilated general ward rooms this is considered to be 60L/second per patient[21];
- When single rooms are not available, cohort nCoV patients together;
- Place patient beds at least 1m apart;
- Where possible, cohort HCWs to exclusively care for cases to reduce infection control breaches;
- Use a medical mask (for specifications please see[1,22]);
- Use eye protection (i.e. goggles or a face shield);

- Use a clean, non-sterile, long-sleeved fluid resistant gown;
- Use gloves;
- Use either single use 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 after each patient use (e.g. ethyl alcohol 70%);
- Refrain from touching their eyes, nose or mouth with potentially contaminated hands;
- Avoid the movement and transport of patients out of the room or area unless medically necessary. The use of designated portable X-ray equipment and other important diagnostic equipment may make this easier. If transport is required, use routes of transport that minimize exposures to staff, other patients and visitors and apply medical mask to patient;
- Ensure that HCWs who are transporting patients wear appropriate PPE as described in this section and perform hand hygiene;
- Notify the receiving area of necessary precautions as soon as possible before the patient's arrival;
- Routinely clean and disinfect patient-contact surfaces;
- Limit the number of HCWs, family members and visitors in contact with a patient with suspected nCoV infection;
- A record of all persons that enter the patient's room should be kept by hospital staff.

3.2 Airborne precautions for aerosol-generating procedures for suspected nCoV infection

Some aerosol generating procedures have been associated with increased risk of transmission of coronaviruses (SARS-CoV and MERS-CoV) such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation and bronchoscopy[8,20].

This includes the use of:

- A particulate respirator at least as protective as a NIOSH-certified N95, EU FFP2 or equivalent[1,22]; when putting on a disposable particulate respirator, always check the seal[23]. Note that if the wearer has facial hear (beard) this can prevent a proper respirator fit[26]
- Eye protection (i.e. goggles or a face shield);
- Clean, non-sterile, long-sleeved gown and gloves;
- If gowns are not fluid resistant, use a waterproof apron for some procedures with expected high fluid volumes that might penetrate the gown[1];
- Perform procedures in an adequately ventilated room; i.e. at least natural ventilation with at least 160l/s/patient air flow or negative pressure rooms with at least 12 air changes per hour and controlled direction of air flow when using mechanical ventilation
- Limit the number of persons present in the room to the absolute minimum required for the patient's care and support.

4. Administrative controls

Administrative controls and policies that apply to ARI include establishment of sustainable IPC infrastructures and activities; HCW training; patients' care givers education; clear policies on early recognition of ARIs of potential concern, access to prompt laboratory testing for identification of the etiologic agent; prevention of overcrowding especially in the Emergency department; provision of dedicated waiting areas for symptomatic patients and appropriate placement of hospitalized patients promoting an adequate patient-to-staff ratio; provision and use of regular supplies; IPC policies and procedures for all facets of healthcare provisions - with emphasis on surveillance of ARIs among HCWs and the importance of seeking medical care; and monitoring of HCW compliance, along with mechanisms for improvement as needed.

5. Environmental and engineering controls

These include basic health-care facility infrastructures[13]. These controls address ensuring adequate environmental ventilation[14] in all areas within a health-care facility, as well as adequate environmental cleaning. Spatial separation of at least 1m should be maintained between each suspect patient and others. Both controls can help reduce the spread of many pathogens during health care[15].

Duration of contact and droplet precautions for nCoV infection

Standard precautions should always be applied at all times. Additional contact and droplet precautions should continue until the patient is asymptomatic. More comprehensive information is required to define duration of additional precautions.

Collection and handling of laboratory specimens from patients with suspected nCoV

All specimens collected for laboratory investigations 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.

- Ensure that HCWs who collect specimens use appropriate PPE (eye protection, medical mask, gown, gloves). If the specimen is collected under aerosol generating procedure, personnel should wear a particulate respirator at least as protective as a NIOSH-certified N95, EU FFP2 or equivalent
- 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 according to the type of organism being handled.
- Deliver all specimens by hand whenever possible. Do not use pneumatic-tube systems to transport specimens.
- State the full name, date of birth of suspected nCoV of potential concern clearly on the accompanying request form. Notify the laboratory as soon as possible that the specimen is being transported.

Acknowledgements

The original version of the MERS-CoV IPC guidance was developed in consultation with the WHO Global Infection Prevention and Control Network and Emerging Disease Clinical Assessment and Response Network and other international experts. WHO thanks those who were involved in the development and updates of IPC documents for MERS-CoV.

References

1. *Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care - WHO Guidelines.* Geneva, World Health Organization, 2014. Available at http://apps.who.int/iris/bitstream/10665/112656/1/9789241507134_eng.pdf
2. For the latest information, please consult the WHO coronavirus web page at http://www.who.int/csr/disease/coronavirus_infections/en/.
3. *Middle East respiratory syndrome Case definition for reporting to WHO: Interim case definition*. Geneva, World Health Organization, 2017. Available at http://www.who.int/csr/disease/coronavirus_infections/case_definition/en/.
4. *Clinical management of severe acute respiratory infection when Middle East respiratory syndrome coronavirus (MERS-CoV) infection is suspected: Interim guidance.* Geneva, World Health Organization, 2019. Available at https://www.who.int/csr/disease/coronavirus_infections/case-management-ipc/en/
5. *Management of asymptomatic persons who are RT- PCR positive for Middle East respiratory syndrome coronavirus (MERS-CoV): Interim guidance*. Geneva, World Health Organization, 2018. Available at https://apps.who.int/iris/bitstream/handle/10665/180973/WHO_MERS_IPC_15.2_eng.pdf?sequence=1
6. *Middle East respiratory syndrome coronavirus (MERS-CoV): Key facts*. Geneva, World Health Organization, 2019. Available at https://www.who.int/en/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov)
7. Hunter JC, Nguyen D, Aden B, et al. *Transmission of Middle East Respiratory Syndrome Coronavirus Infections in Healthcare Settings, Abu Dhabi*. Emerg Infect Dis. 2016;22(4):647–656. doi:10.3201/eid2204.151615.
8. Hui DS. *Epidemic and Emerging Coronaviruses (Severe Acute Respiratory Syndrome and Middle East Respiratory Syndrome).* Clin Chest Med. 2017 Mar;38(1):71-86. doi: 10.1016/j.ccm.2016.11.007.
9. Alraddadi BM, Al-Salmi HS, Jacobs-Slifka K et al. *Risk Factors for Middle East Respiratory Syndrome Coronavirus Infection among Healthcare Personnel.* Emerg Infect Dis. 2016 Nov;22(11):1915-1920. doi: 10.3201/eid2211.160920.
10. Korea Centers for Disease Control and Prevention. Middle East Respiratory Syndrome Coronavirus Outbreak in the Republic of Korea, 2015. Osong Public Health Res Perspect. 2015 Aug; 6(4): 269–278.
11. *Core components of infection prevention and control programmes in health care. Aide-memoire.* Geneva, World Health Organization, 2011. Available at http://www.who.int/csr/resources/publications/AM_core_components_IPC/en/.
12. *Interim surveillance recommendations for human infection with Middle East respiratory syndrome coronavirus.* Geneva, World Health Organization, 2014. Available at http://www.who.int/csr/disease/coronavirus_infections/InterimRevisedSurveillanceRecommendations_nCoVinfection_14July2014.pdf
13. *Essential environmental health standards in health care.* Geneva, World Health Organization, 2008. Available at http://www.who.int/water_sanitation_health/hygiene/settings/ehs_hc/en/index.html.
14. *Natural ventilation for infection control in health-care settings.* Geneva, World Health Organization, 2009. Available at http://www.who.int/water_sanitation_health/publications/natural_ventilation/en/index.html.
15. Jefferson T, Del Mar CB, Dooley L et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. *Cochrane Database of Systematic Reviews,* 2011, 7:CD006207. Available at http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006207.pub4/abstract;jsessionid=074644E776469A4CFB54F28D01B82835.d03t02.
16. *WHO Guidelines on hand hygiene in health care.* Geneva, World Health Organization, 2009. Available at http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf.
17. *Infection-control measures for health care of patients with acute respiratory diseases in community settings. Trainee's Guide.* Geneva, World Health Organization, 2009. Available at http://www.who.int/csr/resources/publications/WHO_HSE_GAR_BDP_2009_1a/en/index.html.
18. *Standard Precautions are basic precautions designed to minimize direct, unprotected exposure to potentially infected blood, body fluids or secretions applicable to all patients.* See also *Standard precautions in health care.* Geneva, World Health Organization, 2007. Available at

http://www.who.int/csr/resources/publications/EPR_AM2_E7.pdf.

19. *How to put on and take off Personal Protective Equipment (PPE).* Geneva, World Health Organization 2008. Available at http://www.who.int/csr/resources/publications/putontakeoffPPE/en/.
20. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PloS One* 2012;7:e35797.
21. Natural Ventilation for Infection Control in Health-Care Settings. Geneva, World Health Organization, 2009. Available at https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857_eng.pdf?sequence=1:
22. *How to perform a particulate respirator seal check*. Geneva, World Health Organization 2008. http://www.who.int/csr/resources/publications/respiratorsealcheck/en/.
23. *Community case management during an influenza outbreak. A training package for community health workers. Geneva*, World Health Organization, 2011. Available at http://www.who.int/influenza/resources/documents/community_case_management_flipbook/en/index.html.
24. Lai MY, Cheng PK, Lim WW. Survival of severe acute respiratory syndrome coronavirus. *Clinical Infectious Diseases,* 2005, 41(7):67–71.
25. Chan KH, Poon LL, Cheng VC et al. Detection of SARS coronavirus in patients with suspected SARS. *Emerging Infectious Diseases,* 2004, 10(2):294–299.
26. *Laboratory biorisk management for laboratories handling human specimens suspected or confirmed to contain novel coronavirus: Interim recommendations*. Geneva, World Health Organization, 2013. Available at http://www.who.int/csr/disease/coronavirus_infections/NovelCoronavirus_InterimRecommendationsLaboratoryBiorisk_190213/en/index.html
27. *Implementing the WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households.* Available at http://www.stoptb.org/wg/tb_hiv/assets/documents/tbicimplementationframework1288971813.pdf
28. Kim SH, Ko JH, Park GE et al. Atypical presentations of MERS-CoV infection in immunocompromised hosts. *J Infect Chemother*. 2017 Nov;23(11):769-773. doi: 10.1016/j.jiac.2017.04.004.
29. Corman VM, Albarrak AM, Omrani AS, et al. Viral Shedding and Antibody Response in 37 Patients With Middle East Respiratory Syndrome Coronavirus Infection. *Clin Infect Dis*. 2016; 62(4):477-483.
30. Al Hosani FI, Pringle K, Al Mulla M, et al. Response to Emergence of Middle East Respiratory Syndrome Coronavirus, Abu Dhabi, United Arab Emirates, 2013-2014. *Emerg Infect Dis.* 2016;22(7):1162–1168.
31. Laboratory Testing for Middle East Respiratory Syndrome Coronavirus: Interim guidance. Geneva, World Health Organization, 2018. Available at http://apps.who.int/iris/bitstream/handle/10665/259952/WHO-MERS-LAB-15.1-Rev1-2018-eng.pdf?sequence=1
32. Middle East Respiratory Syndrome Coronovirus Guidelines for Healthcare Professionals. Saudi Arabia, Ministry of Health. Version 5. April 1, 2018. Available at: https://www.moh.gov.sa/CCC/StaffRegulations/Corona/Documents/MERS-CoV%20Guidelines%20for%20Healthcare%20Professionals%20-%20April%202018%20-%20v5.pdf
33. *WHO laboratory biosafety manual, third edition.* Geneva, World Health Organization, 2004. Available at http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/

WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

WHO reference number: WHO/2019-nCoV/IPC/2020.1