

Infection prevention and control during health care for probable or confirmed cases of novel coronavirus (nCoV) infection

Interim guidance

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Background

WHO has developed this interim guidance to meet the urgent need for up-to-date information and evidence-based recommendations for the safe care of patients with probable or confirmed novel coronavirus (nCoV) infection. The interim recommendations are informed by evidence-based guidelines WHO has published, including the *Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care. WHO Interim Guidelines*¹; recent systematic reviews, and review of current evidence on nCoV infection. The recommendations have been reviewed by members of the WHO Global Infection Prevention and Control Network (GIPCN) and other experts (see Acknowledgements for names and affiliations).

These recommendations reflect current understanding of nCoV² related to infection prevention and control (IPC) and they use interim case definitions³. The guidance is intended for health-care workers (HCWs), health-care managers, and IPC teams. Specific WHO guidance on clinical management has already been published⁴. WHO continues to monitor the situation closely for any changes that may affect the recommendations contained in this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 12 months after the date of publication. Links are given here to additional sources and evidence. If you have further questions, send an e-mail message to: outbreak@who.int, with “Novel coronavirus IPC question” in the subject line.

To date, there is very limited information on transmission and other features of nCoV based on the small number of cases reported so far globally. There is now clear evidence of limited, not sustained, human-to-human transmission⁵, possibly involving different modes of transmission such as droplet and contact transmission, but further studies are required to better understand the risk of infection transmission.

The successful prevention of amplification of nCoV infections associated with health care depends on the full implementation of the core components for IPC programmes⁶. Most transmissions occur in the absence of basic IPC precautions and before a specific infection is suspected or confirmed; hence, the routine application of measures to prevent spread of acute respiratory infections (ARI)¹ when caring for symptomatic patients is essential to reduce spread of any ARI in health-care settings. Additional precautions when caring for patients with probable or confirmed infection with nCoV (see section II.4 in this publication) should be applied to further reduce the risk of transmission. Health-care institutions are advised to consider reinforcing a service for the overseeing of HCWs' health to ensure a safe environment for patients and health workers. It is crucial that HCWs are provided with the best locally available protection for caring for nCoV-infected patients and are followed up if exposure has occurred.

This guidance summarizes:

- Principles of IPC strategies associated with health care
- IPC precautions:
 - for providing care for all patients
 - for providing care for ARI patients, and
 - for providing care for patients with probable or confirmed nCoV infection.

I. Principles of infection prevention and control strategies associated with health care

Preventing or limiting infection transmission in health-care settings requires the application of procedures and protocols referred to as “controls”. These have been organized hierarchically in accordance with their IPC effectiveness, and include the following: administrative controls, environmental and engineering controls, and personal protective equipment (PPE).

Administrative controls. These are the first priority of IPC strategies. They provide the infrastructure of policies and procedures to prevent, detect, and control infections during health care. To be effective, IPC measures must anticipate the flow of patients from the first point of encounter until discharge from the facility.

Administrative controls and policies that apply to ARI include establishment of sustainable IPC infrastructures and activities; education of HCWs; prevention of overcrowding in waiting areas, providing dedicated waiting areas for the ill and placement of hospitalized patients; organization of health-care services for adequate provision and use of supplies; policies and procedures for all facets of occupational health, with emphasis on surveillance of ARIs among HCWs and the importance of seeking medical care; and monitoring of compliance, along with mechanisms for improvement as needed.

Important administrative control measures also include rapid identification of patients with ARI and patients suspected of nCoV infection, with prompt application of appropriate precautions, and implementation of source control. Clinical triage should be used for early identification of all patients with ARIs. Identified ARI patients should be placed in an area separate from other patients, and additional IPC precautions described in section II.2 promptly implemented. Clinical and epidemiological aspects of the cases should be evaluated as soon as possible (see WHO recommendations⁷) and the investigation should be complemented by laboratory evaluation.

Environmental and engineering controls. These include basic health-care facility infrastructures⁸ and are the next priority. These controls address ensuring adequate environmental ventilation⁹ in all areas within a health-care facility, as well as adequate environmental cleaning. Spatial separation of at least 1 m should be maintained between each ARI patient and others, including HCWs (when not using PPE). Both controls can help reduce the spread of some pathogens during health care¹⁰.

Personal Protective Equipment. Rational and consistent use of available PPE and appropriate hand hygiene¹¹ also help reduce the spread of infection. Although use of PPE is the most visible control used to prevent transmission, it is the last and weakest in the hierarchy of IPC measures and should not be relied upon as a primary prevention strategy. In the absence of effective administrative and engineering controls, PPE has limited benefit.

II. Infection prevention and control precautions

II.1 Standard Precautions

Standard Precautions¹², a cornerstone for providing safe health care and reducing the risk of further infection, should always be applied in all health-care settings for all patients. Standard Precautions include hand hygiene and use of 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.

HCWs should apply “My 5 moments for 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.
- 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.¹³

The use of PPE should be guided by a risk assessment concerning anticipated contact with blood, body fluids, secretions and non-intact skin for routine patient care. When procedures include a risk of splash to the face and/or body, PPE should include the use of:

- facial protection by means of either a medical mask¹⁴ and eye-visor or goggles, or a face shield; and
- a gown and clean gloves.

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

II.2. Additional infection prevention and control precautions when caring for patients with acute respiratory infection (ARI)

In addition to Standard Precautions, all individuals, including visitors and HCWs, in contact with patients with ARI should:

- wear a medical mask when in close contact (i.e. within approximately 1 m) and upon entering the room or cubicle of the patient;
- perform hand hygiene before and after contact with the patient and his or her surroundings and immediately after removal of a medical mask.

The detailed precautions are described in published WHO guidelines¹ and should be applied when providing care to patients with ARI.

II.3. Infection prevention and control precautions for aerosol-generating procedures

An aerosol-generating procedure is defined as any medical procedure that can induce the production of aerosols of various sizes, including small (< 5 µm) particles. Current evidence, the best of which comes from studies of the severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV), suggests a consistent association between pathogen transmission and tracheal intubation.¹⁵ In addition, a few studies have reported an increased risk of SARS-CoV infection associated with tracheotomy, non-invasive ventilation and manual ventilation before intubation. However, because these findings were identified from only a few studies of very low quality, interpretation and practical application are difficult. No other procedures were found to be significantly associated with any increased risk of ARI transmission.

Additional precautions should be observed when performing aerosol-generating procedures, which may be associated with an increased risk of infection transmission, in particular, tracheal intubation.

Additional precautions when performing aerosol-generating procedures:

- wear a particulate respirator¹⁶ --when putting on a disposable particulate respirator, always check the seal¹⁷;
- wear eye protection (i.e. goggles or a face shield);
- wear a clean, non-sterile, long-sleeved gown and gloves (some of these procedures require sterile gloves);

- wear an impermeable apron for some procedures with expected high fluid volumes that might penetrate the gown;
- perform procedures in an adequately ventilated room; i.e. minimum of 6 to 12 air changes per hour in facilities with a mechanically ventilated room and at least 60 liters/second/patient in facilities with natural ventilation⁷;
- limit the number of persons present in the room to the absolute minimum required for the patient's care and support;
- perform hand hygiene before and after contact with the patient and his or her surroundings and after PPE removal.

II.4. Infection prevention and control precautions when caring for patients with probable or confirmed nCoV infection

Limit the number of HCWs, family members and visitors in contact with a patient with probable or confirmed nCoV infection.

- To the extent possible, 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 trained on the risk of transmission and on the use of the same infection control precautions as HCWs who are providing routine care. Further training may be needed in settings where hospitalized patients are often cared for by family members.

In addition to Standard Precautions, 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 nCoV infection should always:

- wear a medical mask¹⁴;
- 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 before and after contact with the patient and his or her surroundings and immediately after removal of PPE.

If possible, 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 between each patient use. HCWs should refrain from touching their eyes, nose or mouth with potentially contaminated gloved or ungloved hands.

Place patients with probable or confirmed nCoV infection in adequately ventilated single rooms or Airborne Precaution rooms; if possible, situate the rooms used for isolation (i.e. single rooms) in an area that is clearly segregated from other patient-care areas. When single rooms are not available, put patients with the same diagnosis together. If this is not possible, place patient beds at least 1 m apart.

In addition, for patients with probable or confirmed nCoV infection:

- Avoid the movement and transport of patients out of the isolation 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 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.

- Clean and disinfect patient-contact surfaces (e.g. bed) after use¹⁸.
- Ensure that HCWs who are transporting patients wear appropriate PPE and perform hand hygiene afterwards.

In low-resource countries, not all suspected nCoV patients will be admitted to health-care facilities. They may prefer to stay in their homes to avoid the extra cost to their families of transportation and of living away from home. WHO publications are available for patient care at home and in the community.^{19,20,21}

II.5. Duration of isolation precautions for nCoV infection

The duration of infectivity for nCoV infection is unknown. While Standard Precautions should continue to be applied always, additional isolation precautions should be used during the duration of symptomatic illness²² and continued for 24 hours after the resolution of symptoms. Given that little information is currently available on viral shedding and the potential for transmission of nCoV, testing for viral shedding should assist the decision making when readily available. Patient information (e.g. age, immune status and medication) should also be considered in situations where there is concern that a patient may be shedding the virus for a prolonged period.

II.6. Collection and handling of laboratory 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.

- Ensure that HCWs who collect specimens wear appropriate PPE.
- 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 name of the (suspected) ARI of potential concern clearly on the accompanying request form. Notify the laboratory as soon as possible that the specimen is being transported.

For further information on specimen handling in the laboratory and laboratory testing for novel coronavirus, see *Laboratory biorisk management for laboratories handling human specimens suspected or confirmed to contain novel coronavirus: Interim recommendations*²³ and the *Laboratory testing for novel coronavirus - Interim recommendations*²⁴. For further information on laboratory biosafety guidelines, see the WHO *laboratory biosafety manual*, 3rd edition.²⁵

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- ² For the latest information, please consult the WHO coronavirus web page at http://www.who.int/csr/disease/coronavirus_infections/en/.
- ³ The WHO case definitions for reporting are available at http://www.who.int/csr/disease/coronavirus_infections/case_definition/en/
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- ¹¹ *WHO Guidelines on hand hygiene in health care*. Geneva, World Health Organization, 2009. Available at http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf.
- ¹² 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.
- ¹³ A visual aid on how to put on and take off PPE is available at <http://www.who.int/csr/resources/publications/putontakeoffPPE/en/>
- ¹⁴ In this document, the term "medical mask" refers to disposable surgical or procedure masks.
- ¹⁵ 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. Available at <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0035797>

¹⁶ Examples of acceptable, disposable particulate respirators in use in various parts of the world include: Australia/New Zealand: P2 (94%), P3 (99.95%); China: II (95%), I (99%); European Union: CE-certified filtering face-piece class 2 (FFP2) (95%), class 3 (FFP3) (99.7%); Japan: 2nd class (95%), 3rd class (99.9%); Republic of Korea: 1st class (94%), special (99.95%); United States: NIOSH-certified N95 (95%), N99 (99%), N100 (99.7%).

¹⁷ A visual aid on how to perform a particulate respirator seal check is available at

<http://www.who.int/csr/resources/publications/respiratorsealcheck/en/>

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