

Personal protective equipment (PPE) needs in healthcare settings for the care of patients with suspected or confirmed novel coronavirus (2019-nCoV)

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Scope of this document

To support public health preparedness planning with regard to personal protective equipment (PPE) needs in healthcare settings where patients suspected or confirmed to have been infected with the novel coronavirus 2019-nCoV are being treated.

Target audience

Public health authorities and hospital administrators in EU/EEA countries.

Background

The 2019 novel coronavirus (2019-nCoV) emerged in late 2019 in Wuhan, in the Hubei province of China. Since then thousands of human cases have been detected, mostly in China but also in many other countries around the world including a number of EU/EEA countries [1].

Information concerning the epidemiological and clinical characteristics of 2019-nCoV infection is rapidly evolving. The clinical presentation of 2019-nCoV infection ranges from asymptomatic to severe pneumonia with acute respiratory distress syndrome, septic shock and multi-organ failure, resulting in death. It is expected that more cases will occur and countries have been asked to review their pandemic influenza preparedness planning [2].

Healthcare services in the EU/EEA countries will need to be prepared to manage: (a) patients who have acquired 2019-nCoV while visiting the affected areas of China (imported cases); (b) patients infected with 2019-nCoV through contact with a confirmed case in the EU/EEA (secondary transmission in the EU/EEA) and (c) potential medically evacuated 2019-nCoV infected patients requiring specialised care.

Information on human-to-human transmission is still limited. Respiratory droplets are considered to be the main route of transmission. Other routes, such as contact with contaminated fomites and inhalation of aerosols produced during aerosol-generating procedures, seem to have been implicated [3]. The highest risk of healthcare-associated transmission is in the absence of standard precautions, when basic infection prevention and control measures for respiratory infections are not in place, and when caring for patients for whom 2019-nCoV infection has not yet been confirmed. Although airborne transmission is not considered the principal transmission route, we recommend a cautious approach due to possible transmission through aerosols [4].

PPE for preventing contact, droplet and airborne transmission

Due to the potential increase in the number of patients infected with 2019-nCoV, the public health authorities in EU/EEA countries are encouraged to plan for sufficient PPE supplies for their health professionals and ensure surge capacity procedures are also in place.

In view of the current uncertainty regarding transmission route(s) of the 2019-nCoV, the suggested minimal composition of PPE to be used in healthcare settings is described in Table 1. The prescribed set of PPE prevents contact, droplet and airborne transmission.

Table 1. Minimal composition for PPE set to manage suspected or confirmed cases of 2019-nCoV

Protection	Suggested PPE
Respiratory protection	FFP2 or FFP3 respirator
Eye protection	Goggles or face shield
Body protection	Long-sleeved water-resistant gown
Hand protection	Gloves

Respiratory protection

The respirator protects from the inhalation of droplets and particles. Given that the fitting of different types of respirator will vary for each user, the respirator will require a fitting test in order to find the best match of PPE to user.

In the event of the need to assess a suspected case or in the management of a confirmed case, ECDC suggests the use of filtering face piece (FFP) respirators class 2 or 3 (FFP2 or FFP3). An FFP3 respirator should always be used when performing aerosol-generating procedures.

Eye protection

To prevent exposure of the eye mucosa to the virus, goggles or a face shield should be considered. It is important that the goggles fit the contours of the user's face and are compatible with the respirator.

Body protection

Long-sleeved water-resistant gowns should be used. This PPE does not need to be sterile, unless used in a sterile environment (e.g. operating room).

If water-resistant gowns are not available, single-use plastic aprons can be used on top of the non-water-resistant gowns to prevent body contamination.

Hand protection

Gloves should be used when managing suspected or confirmed 2019-nCoV patients.

For more detailed information on the PPE for management of high consequence infectious diseases, please refer to the ECDC technical document [Safe use of personal protective equipment in the treatment of infectious diseases of high consequence \[5\]](#).

PPE estimated needs – 2019-nCoV

The needs assessments of PPE supplies per patient per day in this short guide are based on the following assumptions:

- depending on the clinical severity of their condition, patients require different levels of care, with increased care contact necessary for patients with more severe clinical presentation;
- there are three shifts per 24 hours for nursing staff, nursing assistants and cleaners;
- for critically ill patients there are dedicated nursing staff available on a one-to-one basis for each shift;
- contacts with patients should be limited to that which is strictly necessary for the care of the patient;
- when possible and if well-tolerated, the patient should wear a surgical mask (which mainly protects from exhaled droplets) in order to mitigate the risk of droplet spreading;
- patient transportation inside and outside the treatment facility should be kept to a minimum (e.g. laboratory and radiology testing, etc.);
- health professionals should inform/educate the patient about cough etiquette and respiratory hygiene;
- contact, droplet and airborne transmission precautions should be applied for all care of 2019-nCoV infection cases.

The amount of PPE used will ultimately depend on the total number of suspected and confirmed cases, the severity of the cases and the duration of hospitalisation (Table 2). The number of sets considered in the following scenarios represents the minimum amount required. In particular, for cases showing severe/critical symptoms, additional procedures may be required (e.g. intubation, central lines, haemodialysis, radiological procedures, etc.). In this case, an additional two to three sets per procedure should be considered.

- For the assessment of a suspected case, a minimum of three to six sets per case, distributed as follows:
 - 1–2 sets per patient for nursing staff;
 - one set per patient for medical staff;
 - one set per patient for cleaning staff;
 - 0–2 sets per patient for assistant nursing staff.
- For the care of a confirmed case with mild symptoms in a plain isolation room, minimum 14–15 sets per patient per day, distributed as follows:
 - six sets per patient per day for nursing staff, assuming two entries per shift for dedicated staff;
 - 2–3 sets per patient per day for medical staff, assuming one entry per shift and dedicated staff only;
 - three sets per patient per day for cleaning staff, assuming one entry per shift for cleaning;
 - 1–2 sets per patient per day for assistant nursing staff, assuming one entry per shift. Assistant nursing staff may not be required, depending on needs.
- For the care of a confirmed case with severe (and/or critical) symptoms a minimum of 15–24 sets per patient per day, distributed as follows:
 - 6–12 sets per patient per day for nursing staff, assuming 2–4 entries per shift for dedicated staff, maximum stay four hours;
 - 3–6 sets per patient per day for medical staff, assuming 1–2 entries per shift for examination and procedures;
 - three sets per patient per day for cleaning staff, assuming three entries per day for cleaning;
 - Three sets per patient per day for assistant nursing staff, assuming one entry per shift. This could also be a respiratory therapist or other service staff.

Table 2. Minimum number of sets for the different case scenarios

	Suspected case	Confirmed case <i>Mild symptoms</i>	Confirmed case <i>Severe symptoms</i>
Healthcare staff	Number of sets per case	Number of sets per day per patient	
Nursing	1–2	6	6–12
Medical	1	2–3	3–6
Cleaning	1	3	3
Assistant nursing and other services	0–2	3	3
Total	3–6	14–15	15–24

The correct procedure for donning and doffing of PPE should be followed. Further information on donning and doffing procedures can be found in the ECDC technical document [Safe use of personal protective equipment in the treatment of infectious diseases of high consequence](#).

Disposable PPE should be treated as potentially infectious material and disposed of in accordance with the relevant national rules. Non single-use PPE should be decontaminated in accordance with the manufacturer's instructions.

Other options

If FFP respirators are not available, the use of a surgical or procedural mask is recommended. When this type of PPE is used, the limitations and risks connected to its use should be assessed on a case-by-case basis [6].

Contributing ECDC experts (in alphabetical order)

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References

1. European Centre for Disease Prevention and Control (ECDC). Geographical distribution of 2019-nCoV cases globally 2020 [02 February 2020]. Available from: <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>
2. European Centre for Disease Prevention and Control (ECDC). Risk assessment: Outbreak of acute respiratory syndrome associated with a novel coronavirus, China: first local transmission in the EU/EEA – third update 2020 [02 February 2020]. Available from: <https://www.ecdc.europa.eu/en/publications-data/risk-assessment-outbreak-acute-respiratory-syndrome-associated-novel-1>
3. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *New England Journal of Medicine*. 2020.
4. World Health Organization (WHO). Infection prevention and control of epidemic-and pandemic prone acute respiratory infections in health care. WHO guidelines 2014 [17 January 2020]. Available from: https://www.who.int/csr/bioriskreduction/infection_control/publication/en/
5. European Centre for Disease Prevention and Control (ECDC). Safe use of personal protective equipment in the treatment of infectious diseases of high consequence Stockholm: ECDC; 2014. Available from: <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/safe-use-of-ppe.pdf>
6. World Health Organization (WHO). Advice on the use of masks the community, during home care and in health care settings in the context of the novel coronavirus (2019-nCoV) outbreak 2020 [updated 28 January 2020]. Available from: [https://www.who.int/publications-detail/advice-on-the-use-of-masks-the-community-during-home-care-and-in-health-care-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications-detail/advice-on-the-use-of-masks-the-community-during-home-care-and-in-health-care-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak).