

# ECDC recommendations on donning and doffing personal protective equipment when caring for patients with suspected or confirmed SARS-CoV-2 virus (COVID-19) infection.

## Document content

The document was developed to provide substantive support to staff dealing with patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection. The main goals of the document are:

- presenting the minimum set of personal protective equipment (PPE) necessary for the safe care of patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection.
- making medical staff aware of critical aspects of the procedure for putting on and taking off PPE,
- increasing safety and minimizing risk among medical staff caring for patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection.

The content is based on current (February 2020) information on the COVID-19 disease and general rules for the use of PPE. ECDC will update the guidelines as new information becomes available.

## Recipients

These guidelines are intended for medical staff and sanitary and epidemiological services operating in the EU/EEA and Great Britain.

## What is SARS-CoV2 and COVID-19?

The etiological agent of COVID-19 disease is the SARS-CoV2 virus belonging to the Coronaviruses (family: Coronaviridae, genus: Betacoronavirus), i.e. a large family of enveloped, single-stranded RNA viruses.

Coronaviruses are transmitted mainly by droplets and direct contact, but it cannot be ruled out that other routes of infection are also possible (e.g. fecal-oral route, air route).

The average incubation time (from exposure to the appearance of symptoms) is approximately 5-6 days (from 0 to 14 days) [1]. Currently, no causal treatment or vaccine has been developed. The most reliable and up-to-date sources of information regarding COVID-19 are those published online by ECDC [1,4] and WHO.

## PPE kit

Below (Table 1, Figure 1) is the minimum set of PPE suggested by ECDC. It is sufficient for effective protection against infection through direct contact, droplets and air.

Type	Equipment
Respiratory protection	FFP2 or FFP3 half mask (with or without valve)*
Eye protection	Safety goggles/glasses or face shield
Body protection	Waterproof long-sleeved gown (e.g. surgical gown)
Hand protection	Gloves

\*In the absence of FFP2/FFP3 half masks, it is recommended to use regular surgical masks. In this case, the risk and adequacy of PPE should be assessed on an ongoing basis in the context of specific patients.

**Table 1. Minimum set of PPE intended for staff caring for patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection.**

### Respiratory protection

Masks protect the wearer against potential infection via droplets and air. Different models may have a variable degree of adaptation to the wearer's face - therefore they require individual adjustment.

ECDC suggests the use of FFP2 or FFP3 class respirators when caring for a patient with suspected or confirmed infection. During aerosol-generating procedures (e.g. induction and sputum collection, intubation), it is recommended to use FFP3 class half masks.

Surgical masks mainly protect against exhaled droplets [5]. Their use is recommended in the event of a shortage of half masks. Surgical masks do not require individual fitting.

**Eye protection** To protect the eye mucosa from exposure to virus particles, the use of safety goggles/glasses or face shields is recommended (Figure 2). Important: PPE used for eye protection should fit the user's face and be compatible with the half-mask/surgical mask used.

**Body protection** To protect the body against contamination, it is recommended to use waterproof long-sleeved aprons. They do not have to be sterile unless the conditions of a specific procedure require it (e.g. insertion of a central line, surgical procedures). If you don't have waterproof aprons, you can use disposable plastic aprons worn over work clothes.

**Hand protection** To protect your hands against contamination, the use of standard gloves is sufficient.

More detailed information on PPE in the context of caring for patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection is available (in English) at: <https://www.ecdc.europa.eu/sites/default/files/documents/novel-coronavirus-personal-protective-equipment-needs-healthcare-settings.pdf> [6].



**Figure 1.** Suggested PPE for use by staff caring for patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection: FFP2 and FFP3 half masks, safety goggles/glasses, waterproof long-sleeved apron.



**Figure 2.** Visor

Most PPE comes in a variety of sizes. It is important to remember that proper fitting of PPE to the user is necessary to obtain full protection. Improperly fitted PPE does not provide full protection to the user.

**There are different ways to put on and take off PPE. ECDC recommends the following procedure to ensure maximum safety for staff.**

## Putting on PPE

Before putting on PPE to care for a patient with suspected or confirmed SARS-CoV-2 (COVID-19) infection, a procedure for hygienic hand washing and hand disinfection with an alcohol-based agent should be used, in accordance with the manufacturer's recommendations and international guidelines [7]. This is a very important step that should not be skipped (Figure 3).



**Figure 3. Hand disinfection using an alcohol-based agent.**

Putting on PPE should start with the gown (Figure 4). There are different types of aprons (disposable and reusable). The instructions below apply to the use of a reusable long-sleeved apron. In the case of an apron that fastens/ties at the back, a third person should be assisted (Figure 5).



**Figure 4. Putting on a waterproof long-sleeved apron.**



**Figure 5. Assistant fastening the apron at the back.**

After putting on the apron, put on the appropriate half mask. ECDC recommends the use of FFP2 or FFP3 half-masks during all examinations, procedures and procedures involving patients with suspected or confirmed SARS-CoV-2 (COVID-19) infection. After putting on the half mask, check its fit according to the manufacturer's recommendations. There are different methods for checking the fit of PPE - these are described in a separate document available at: <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/safe-use-of-ppe.pdf> [5].



**Figure 6. Putting on the FFP2/FFP3 half mask.**

Adjust the metal strip so that the half mask fits snugly to the nose and tighten the straps to obtain a stable and comfortable fit of the half mask. If there is a problem with the proper fit of the mask, you can try crossing the straps (although this may be contrary to the manufacturer's recommendations).



**Figure 7. Adjusting the metal strip to the shape of the face.**

If half masks are not available, ordinary surgical masks may be used (Figure 8).

When putting on such a mask, make sure it is properly positioned on the face and closely adjusted to the curvature of the face using the built-in metal strip (Figure 9).



**Figure 8.** Putting on a surgical mask



**Figure 9.** Adjusting the surgical mask using the built-in metal strip.

After putting on and adjusting the half mask/mask, you should put on protective glasses/goggles or a face shield. Place them on the straps of the half mask/mask and make sure that it is stably and comfortably attached (Figures 10 and 11).



**Figure 10.** Putting on safety goggles with an elastic strap



**Figure 11.** Safety goggles with elastic strap - side view

If you have safety glasses/goggles with temples, make sure they are put on correctly and are the right size (Figure 12).



**Figure 12. Putting on safety goggles with temples**

After putting on eye protection, put on gloves. When putting on gloves, remember that they should overlap the apron sleeve (Figure 13). For people allergic to latex, gloves made of another material (e.g. vinyl or nitrile) should be available.



**Figure 13. Putting on gloves.**

# Removing PPE

Wearing PPE correctly provides sufficient protection against contamination. They should be removed after contact with the patient. This is an equally important procedure that must be carried out carefully to avoid accidental contamination.

First, remove the gloves, which are potentially the most contaminated element of the PPE. Before removing your gloves, you may consider disinfecting them with an alcohol-based hand sanitizer. The glove removal procedure consists of eight steps (Figure 14).

**Step 1.** The first glove should be grasped (using the other hand) between the wrist and the palm.

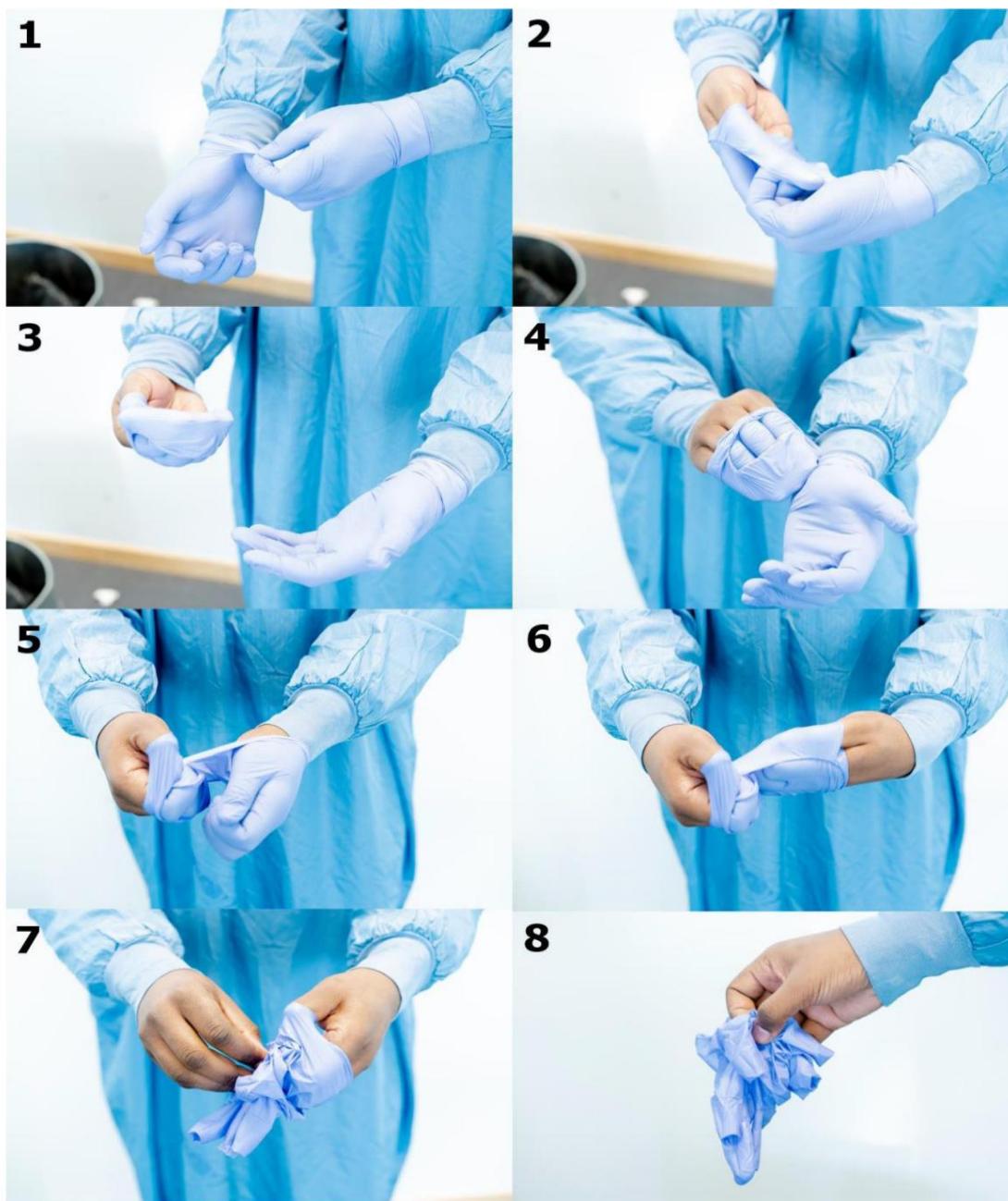
**Steps 2 and 3.** Pull the glove away from you so that it turns inside out and covers your fingers (3).

**Step 4.** Using the hand with the glove removed, now grab the other glove between your hand and wrist, similarly to the first step.

**Steps 5 and 6.** Then pull the second glove away from you so that it turns inside out and covers your fingers.

**Step 7.** At this point, both gloves should be halfway off. Remove the first glove completely by grabbing its inner part and pulling it off the fingers. Then, with your ungloved hand, grab the inner part of the remaining glove.

**Step 8.** Gloves should be thrown into the bag with infectious material (red bag).



**Figure 14. Glove removal procedure (steps 1 to 8).**

After removing the gloves, disinfect your hands with an alcohol-based agent and put on a clean pair of gloves to safely continue the PPE removal procedure.

After putting on a fresh pair of gloves, remove the apron. If you are using an apron that fastens at the back (as in this example), you should use an assistant to unfasten it (Figure 15). The assisting person should wear a surgical mask and gloves. After removing the gloves, she should disinfect her hands using an alcohol-based agent.

Then, remove the protective apron by grabbing it from the back (Figure 16) and pulling it away from you, turning it inside out so that the contaminated part folds inwards (Figure 17).



**Figure 15.** Unbuttoning the apron with the help of an assistant



**Figure 16.** Taking off the apron - grasp its back part



**Figure 17. Taking off the apron - pulling away from yourself.**

Disposable aprons should be thrown away. Reusable aprons should be submitted for disinfection. (Figure 18).



**Figure 18. Placing a reusable apron in a container intended for disinfection.**

After taking off the apron, take off the goggles. Then they should be thrown away - if they are single-use - or sent for disinfection.

When removing goggles with an elastic strap, start by placing your finger under the strap and then follow the instructions below (Figure 19). Avoid contact with the front of the goggles as it is potentially contaminated. The procedure for removing goggles with temples is presented in Figure 20.



**Figure 19.** Removing the goggle with the elastic strap (steps 1 to 4).



**Figure 20.** Removing goggles with temples (steps 1 and 2).

After wearing goggles, remove the half mask. To remove it, start by placing your thumb under the strap, then follow the instructions in Figure 21.

The half mask (or face mask) should be thrown away immediately after removal. It is important to avoid contact with the mask itself and only touch the strips when removing it.



**Figure 21. Removing the half mask (steps 1 to 4).**

The gloves used in the PPE removal procedure should then be removed and discarded. Before removing your gloves, you may consider disinfecting them with an alcohol-based hand sanitizer. Gloves should be removed according to the procedure presented in Figure 8. After removing the gloves, disinfect your hands.

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