

Rational use of personal protective equipment (PPE) for coronavirus disease (COVID-19).

Interim guidance
19 March 2020



Background

This document summarizes WHO's recommendations for the rational use of personal protective equipment (PPE) in health care and community settings, as well as during the handling of cargo; in this context, PPE includes gloves, medical masks, goggles or a face shield, and gowns, as well as for specific procedures, respirators (i.e. N95 or FFP2 standard or equivalent) and aprons. It is intended for those involved in distributing and managing PPE, as well as public health authorities and individuals in health care and community settings, and it provides information about when PPE use is most appropriate.

WHO will continue update these recommendations as new information becomes available.

Preventive measures for COVID-19 disease

Based on the available evidence, the COVID-19 virus is transmitted between people through close contact and droplets, not by airborne transmission. The people most at risk of infection are those who are in close contact with a COVID-19 patient or who care for COVID-19 patients.

Preventive and mitigation measures are key. The most effective preventive measures in the community include:

- performing hand hygiene frequently with an alcohol-based hand rub if your hands are not visibly dirty or with soap and water if hands are dirty;
- avoiding touching your eyes, nose, and mouth;
- practicing respiratory hygiene by coughing or sneezing into a bent elbow or tissue and then immediately disposing of the tissue;
- wearing a medical mask if you have respiratory symptoms and performing hand hygiene after disposing of the mask;
- maintaining social distance (a minimum of 1 metre) from persons with respiratory symptoms.

Additional precautions are required by health care workers to protect themselves and prevent transmission in the healthcare setting. Precautions to be implemented by health care workers caring for patients with COVID-19 include using PPE appropriately; this involves selecting proper PPE and being trained in how to put on, remove, and dispose of it.

PPE is only one effective measure within a package of administrative and environmental and engineering controls, as described in WHO's Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care.¹ These controls are summarized here.

- **Administrative controls** include ensuring resources for infection prevention and control (IPC) measures, such as appropriate infrastructure, the development of clear IPC policies, facilitated access to laboratory testing, appropriate triage and placement of patients, adequate staff-to-patient ratios, and training of staff.
- **Environmental and engineering controls** aim at reducing the spread of pathogens and the contamination of surfaces and inanimate objects. They include providing adequate space to allow social distance of at least 1 m to be maintained between patients and between patients and health care workers and ensuring the availability of well-ventilated isolation rooms for patients with suspected or confirmed COVID-19.

COVID-19 is a respiratory disease that is different from Ebola virus disease (EVD), which is transmitted through infected bodily fluids. Because of these differences in transmission, the PPE requirements for COVID-19 are different from those required for EVD. Specifically, coveralls (sometimes called Ebola PPE) are not required when managing COVID-19 patients.

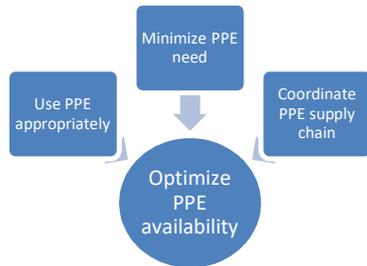
Disruptions in the global supply chain of PPE

The current global stockpile of PPE is insufficient, particularly for medical masks and respirators; the supply of gowns and goggles is soon expected to be insufficient also. Surging global demand – driven not only by the number of COVID-19 cases but also by misinformation, panic buying, and stockpiling – will result in further shortages of PPE globally. The capacity to expand PPE production is limited, and the current demand for respirators and masks cannot be met, especially if widespread inappropriate use of PPE continues.

Recommendations for optimizing the availability of PPE

In view of the global PPE shortage, the following strategies can facilitate optimal PPE availability (Figure 1).

Figure 1. Strategies to optimize the availability of personal protective equipment (PPE)



1. Minimize the need for PPE

The following interventions can minimize the need for PPE while protecting health care workers and others from exposure to the COVID-19 virus in health care settings.

- Consider using telemedicine to evaluate suspected cases of COVID-19², thus minimizing the need for these persons to go to health care facilities for evaluation.
- Use physical barriers to reduce exposure to the COVID-19 virus, such as glass or plastic windows. This approach can be implemented in areas of the health care setting where patients will first present, such as triage areas, the registration desk at the emergency department, or at the pharmacy window where medication is collected.
- Restrict health care workers from entering the rooms of COVID-19 patients if they are not involved in direct care. Consider bundling activities to minimize the number of times a room is entered (e.g. check vital signs during medication administration or have food delivered by health care workers while they are performing other care) and plan which activities will be performed at the bedside.

Ideally, visitors will not be allowed but if this is not possible, restrict the number of visitors to areas where COVID-19 patients are being isolated; restrict the amount of time visitors are allowed to spend in the area; and provide clear instructions about [how to put on and remove PPE](#) and perform hand hygiene to ensure that visitors avoid self-contamination.

2. Ensure PPE use is rational and appropriate

PPE should be used based on the risk of exposure (e.g. type of activity) and the transmission dynamics of the pathogen (e.g. contact, droplet or aerosol). The overuse of PPE will have a further impact on supply shortages. Observing the following recommendations will ensure rational use of PPE.

- The type of PPE used when caring for COVID-19 patients will vary according to the setting and type of personnel and activity (Table 1).
- Health care workers involved in the direct care of patients should use the following PPE: gowns,

gloves, medical mask, and eye protection (goggles or face shield).

- Specifically, for aerosol-generating procedures (e.g. tracheal intubation, non-invasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy) health care workers should use respirators, eye protection, gloves and gowns; aprons should also be used if gowns are not fluid resistant.¹
- Respirators (e.g. N95, FFP2 or equivalent standard) have been used for an extended time during previous public health emergencies involving acute respiratory illness when PPE was in short supply.³ This refers to wearing the same respirator while caring for multiple patients who have the same diagnosis without removing it, and evidence indicates that respirators maintain their protection when used for extended periods. However, using one respirator for longer than 4 hours can lead to discomfort and should be avoided.⁴⁻⁶
- Among the general public, persons with respiratory symptoms or those caring for COVID-19 patients at home should receive medical masks. For additional information, see Home care for patients with COVID-19 presenting with mild symptoms and management of their contacts.⁷
- For persons without symptoms, wearing a mask of any type is not recommended. Wearing medical masks when they are not indicated may cause unnecessary cost and a procurement burden and create a false sense of security that can lead to the neglect of other essential preventive measures. For additional information, see Advice on the use of masks in the community, during home care, and in health care settings in the context of COVID-19.⁸

3. Coordinate PPE supply chain management mechanisms.

The management of PPE should be coordinated through essential national and international supply chain management mechanisms that include but are not restricted to:

- Using PPE forecasts based on rational quantification models to ensure the rationalization of requested supplies;
- Monitoring and controlling PPE requests from countries and large responders;
- Promoting a centralized request management approach to avoid duplication of stock and ensuring strict adherence to essential stock management rules to limit wastage, overstock, and stock ruptures;
- Monitoring the end-to-end distribution of PPE;
- Monitoring and controlling the distribution of PPE from medical facilities stores.

Handling cargo from affected countries

The rationalized use and distribution of PPE when handling cargo from and to countries affected by the COVID-19 outbreak includes following these recommendations.

- Wearing a mask of any type is not recommended when handling cargo from an affected country.
- Gloves are not required unless they are used for protection against mechanical hazards, such as when manipulating rough surfaces.

- Importantly, the use of gloves does not replace the need for appropriate hand hygiene, which should be performed frequently, as described above.
- When disinfecting supplies or pallets, no additional PPE is required beyond what is routinely recommended. To date, there is no epidemiological information to suggest that contact with goods or products shipped from countries affected by the COVID-19 outbreak have been the source of COVID-19 disease in humans. WHO will continue to closely monitor the evolution of the COVID-19 outbreak and will update recommendations as needed.

Table 1. Recommended personal PPE during the outbreak of COVID-19 outbreak, according to the setting, personnel, and type of activity^a

| Setting | Target personnel or patients | Activity | Type of PPE or procedure |
|---|---|--|--|
| Health care facilities | | | |
| Inpatient facilities | | | |
| Patient room | Health care workers | Providing direct care to COVID-19 patients | Medical mask Gown Gloves Eye protection (goggles or face shield) |
| | | Aerosol-generating procedures performed on COVID-19 patients | Respirator N95 or FFP2 standard, or equivalent. Gown Gloves Eye protection Apron |
| | Cleaners | Entering the room of COVID-19 patients | Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals) Boots or closed work shoes |
| | Visitors ^b | Entering the room of a COVID-19 patient | Medical mask Gown Gloves |
| Other areas of patient transit (e.g. wards, corridors). | All staff, including health care workers. | Any activity that does not involve contact with COVID-19 patients | No PPE required |
| Triage | Health care workers | Preliminary screening not involving direct contact ^c | Maintain spatial distance of at least 1 metre. No PPE required |
| | Patients with respiratory symptoms | Any | Maintain spatial distance of at least 1 metre. Provide medical mask if tolerated by patient. |
| | Patients without respiratory symptoms | Any | No PPE required |
| Laboratory | Lab technician | Manipulation of respiratory samples | Medical mask Gown Gloves Eye protection (if risk of splash) |
| Administrative areas | All staff, including health care workers. | Administrative tasks that do not involve contact with COVID-19 patients. | No PPE required |

| Outpatient facilities | | | |
|--|--|---|--|
| Consultation room | Health care workers | Physical examination of patient with respiratory symptoms | Medical mask Gown Gloves Eye protection |
| | Health care workers | Physical examination of patients without respiratory symptoms | PPE according to standard precautions and risk assessment. |
| | Patients with respiratory symptoms | Any | Provide medical mask if tolerated. |
| | Patients without respiratory symptoms | Any | No PPE required |
| | Cleaners | After and between consultations with patients with respiratory symptoms. | Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals). Boots or closed work shoes |
| Waiting room | Patients with respiratory symptoms | Any | Provide medical mask if tolerated. Immediately move the patient to an isolation room or separate area away from others; if this is not feasible, ensure spatial distance of at least 1 metre from other patients. |
| | Patients without respiratory symptoms | Any | No PPE required |
| Administrative areas | All staff, including health care workers | Administrative tasks | No PPE required |
| Triage | Health care workers | Preliminary screening not involving direct contact ^c | Maintain spatial distance of at least 1 metre. No PPE required |
| | Patients with respiratory symptoms | Any | Maintain spatial distance of at least 1 metre. Provide medical mask if tolerated. |
| | Patients without respiratory symptoms | Any | No PPE required |
| Community | | | |
| Home | Patients with respiratory symptoms | Any | Maintain spatial distance of at least 1 metre. Provide medical mask if tolerated, except when sleeping. |
| | Caregiver | Entering the patient's room, but not providing direct care or assistance | Medical mask |
| | Caregiver | Providing direct care or when handling stool, urine, or waste from COVID-19 patient being cared for at home | Gloves Medical mask Apron (if risk of splash) |
| | Health care workers | Providing direct care or assistance to a COVID-19 patient at home | Medical mask Gown Gloves Eye protection |
| Public areas (e.g. schools, shopping malls, train stations). | Individuals without respiratory symptoms | Any | No PPE required |

| Points of entry | | | |
|-------------------------------|----------------------------------|--|---|
| Administrative areas | All staff | Any | No PPE required |
| Screening area | Staff | First screening (temperature measurement) not involving direct contact ^c | Maintain spatial distance of at least 1 metre. No PPE required |
| | Staff | Second screening (i.e. interviewing passengers with fever for clinical symptoms suggestive of COVID-19 disease and travel history) | Medical mask Gloves |
| | Cleaners | Cleaning the area where passengers with fever are being screened | Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals). Boots or closed work shoes |
| Temporary isolation area | Staff | Entering the isolation area, but not providing direct assistance | Maintain spatial distance of at least 1 metre. Medical mask Gloves |
| | Staff, health care workers | Assisting passenger being transported to a health care facility | Medical mask Gown Gloves Eye protection |
| | Cleaners | Cleaning isolation area | Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals). Boots or closed work shoes |
| Ambulance or transfer vehicle | Health care workers | Transporting suspected COVID-19 patients to the referral health care facility | Medical mask Gowns Gloves Eye protection |
| | Driver | Involved only in driving the patient with suspected COVID-19 disease and the driver's compartment is separated from the COVID-19 patient | Maintain spatial distance of at least 1 metre. No PPE required |
| | | Assisting with loading or unloading patient with suspected COVID-19 | Medical mask Gowns Gloves Eye protection |
| | | No direct contact with patient with suspected COVID-19, but no separation between driver's and patient's compartments | Medical mask |
| | Patient with suspected COVID-19. | Transport to the referral health care facility. | Medical mask if tolerated |
| | Cleaners | Cleaning after and between transport of patients with suspected COVID-19 to the referral health care facility. | Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals). Boots or closed work shoes |

| Special considerations for rapid-response teams assisting with public health investigations ^d | | | |
|--|-----------------------------------|--|---|
| Community | | | |
| Anywhere | Rapid-response team investigators | Interview suspected or confirmed COVID-19 patients or their contacts. | No PPE if done remotely (e.g. by telephone or video conference). Remote interview is the preferred method. |
| | | In-person interview of suspected or confirmed COVID-19 patients without direct contact | Medical mask Maintain spatial distance of at least 1 metre. The interview should be conducted outside the house or outdoors, and confirmed or suspected COVID-19 patients should wear a medical mask if tolerated. |
| | | In-person interview with asymptomatic contacts of COVID-19 patients | Maintain spatial distance of at least 1 metre. No PPE required The interview should be performed outside the house or outdoors. If it is necessary to enter the household environment, use a thermal imaging camera to confirm that the individual does not have a fever, maintain spatial distance of at least 1 metre and do not touch anything in the household environment. |

^a In addition to using the appropriate PPE, frequent hand hygiene and respiratory hygiene should always be performed. PPE should be discarded in an appropriate waste container after use, and hand hygiene should be performed before putting on and after taking off PPE.

^b The number of visitors should be restricted. If visitors must enter a COVID-19 patient's room, they should be provided with clear instructions about how to put on and remove PPE and about performing hand hygiene before putting on and after removing PPE; this should be supervised by a health care worker.

^c This category includes the use of no-touch thermometers, thermal imaging cameras, and limited observation and questioning, all while maintaining a spatial distance of at least 1 m.

^d All rapid-response team members must be trained in performing hand hygiene and how to put on and remove PPE to avoid self-contamination.

For PPE specifications, refer to WHO's [disease commodity package](#).

References

1. [Infection prevention and control of epidemic-and pandemic-prone acute respiratory infections in health care](#). Geneva: World Health Organization; 2014 (accessed 27 February 2020).
2. [Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth](#). Geneva: World Health Organization; 2009 (Global Observatory for eHealth Series, 2 (accessed 27 February 2020)).
3. Beckman S, Materna B, Goldmacher S, Zipprich J, D'Alessandro M, Novak D, et al. Evaluation of respiratory protection programs and practices in California hospitals during the 2009-2010 H1N1 influenza pandemic. *Am J Infect Control*. 2013;41(11):1024-31. doi:[10.1016/j.ajic.2013.05.006](#).
4. Janssen L, Zhuang Z, Shaffer R. Criteria for the collection of useful respirator performance data in the workplace. *J Occup Environ Hyg*. 2014;11(4):218–26. doi:[10.1080/15459624.2013.852282](#)
5. Janssen LL, Nelson TJ, Cuta KT. Workplace protection factors for an N95 filtering facepiece respirator. *J Occup Environ Hyg*. 2007;4(9):698–707. doi:[10.1080/15459620701517764](#).
6. Radonovich LJ Jr, Cheng J, Shenal BV, Hodgson M, Bender BS. Respirator tolerance in health care workers. *JAMA*. 2009;301(1):36–8. doi:[10.1001/jama.2008.894](#).

7. [Home care for patients with COVID-19 presenting with mild symptoms and management of their contacts: interim guidance](#). Geneva: World Health Organization; 2020 (accessed 27 February 2019).
8. [Advice on the use of masks in the community, during home care, and in health care settings in the context of COVID-19: interim guidance](#) (accessed 27 February 2020).

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.

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