# A guide to PPE during COVID-19

Personal protective equipment (PPE) has an important role to play in controlling the risks presented by COVID-19. But before we consider its uses, it's important to first understand how the disease is spread.

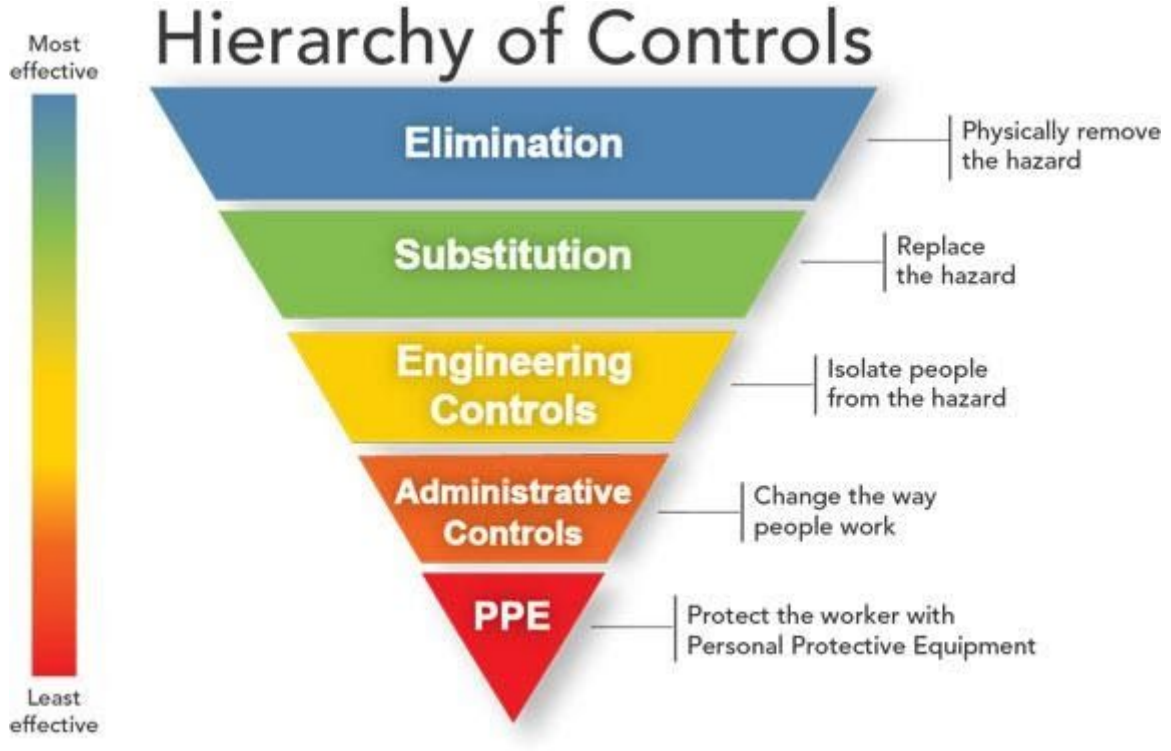
COVID-19 (coronavirus disease 2019) is a respiratory illness caused by a novel coronavirus. It is a viral disease believed to spread largely through respiratory droplets from coughing and sneezing, and it seems to spread easily.

The routes of entry into a person's body are through the eyes, nose and mouth. This could be by breathing in droplets containing the virus or by touching a contaminated surface or object and then touching one's nose or mouth. The virus is not known to enter via other routes.

## Is PPE more effective than other control measures?

When we risk assess, our primary aim is to eliminate the hazard where it is possible to do so. This is the most effective way of dealing with anything with the potential to cause harm. Unfortunately, this isn't always possible, such as in the case of COVID-19, and so we turn our attention to putting control measures in place to reduce the risk of this hazard causing harm.

The control measures available to us are categorised in a 'hierarchy of control', with the most effective being at the top. For example, if it is possible to introduce an engineering solution, such as a localised extraction system to remove harmful respirable substances, then this would be preferred before exploring other less effective control measures lower down the hierarchy such as PPE.



PPE appears at the bottom of the hierarchy of control because its effectiveness is dependent on the person wearing it properly.

The same hierarchy of control can be applied to controlling the risks of contracting COVID-19. PPE appears at the bottom. That's not to say it cannot provide effective protection, it's just there are other more effective control measures that can be followed, including:

- Staying at home if you have respiratory symptoms (coughing, sneezing, shortness of breath) and/or a temperature above 38C (100.4 F).
- Shield coughs and sneezes with a tissue, elbow, or shoulder (not bare hands).
- Washing your hands often with soap and water for at least 20 seconds or using a 60% alcohol-based hand sanitiser.
- Routinely disinfecting any frequently-touched surfaces, such as workstations, countertops and doorknobs.
- Increased cleaning of common areas using standard cleaning agents.
- Adhering to social distancing of two metres between yourself and other people.

### Where should PPE be used?

PPE has been recommended for workers who are coming into close contact with persons with the virus. These include doctors, nurses, and healthcare professionals/staff.

The government has stated that the control measures listed above are far more effective and should be used in conjunction with PPE.

The government guidance states where and when it should be used.

### What is meant by aerosol-generating procedures?

An aerosol-generating procedure (AGP) is one that results in the release of airborne particles or respiratory droplets. As COVID-19 is spread through air droplets, these procedures could result in a high level of exposure, therefore the highest level of PPE must be worn.

### What is RPE and how is it different from other face masks?

Respiratory protective equipment (RPE) is a PPE which is designed to protect the wearer from breathing in harmful substances or from oxygen-deficient atmospheres.

The two main types of RPE are respirators and breathing apparatus.

Respirators (filtering devices) use filters to remove contaminants from the air being breathed in. They can be either:

- Non-powered respirators – where breathing draws air through a filter; or
- Powered respirators – where a motor is used to pass air through a filter to give a supply of clean air.

RPE needs to be face-fitted. This a method of checking that the seal around the mask prevents air from entering. If the air enters, it will undermine the integrity of the mask. More information can be found on the HSE website.

Other facemasks do not always offer the same level of filtration or protection. They also differ with respect to their intended use and their application.

### Why is there a debate regarding face mask use?

As the virus is spread through breathing in air droplets containing the virus, there is an argument for whether face masks should be worn by everyone in society. The argument being that droplets are less likely to be spread from one person to another.

The current stance from the World Health Organisation and Public Health England is that there is no evidence to support that wearing face masks makes the wider public any safer. There are also studies to suggest that wearing a face mask may increase your likelihood of contracting the virus as a droplet enters the space between your face and mask.

There is evidence, however, to prove that when carrying out close health practises such as aerosol-generating procedures, a non-powered respirator offers a higher level of protection.

### Can it be dangerous to take PPE off?

PPE potentially could be contaminated when it is removed. There should therefore be a system in place for it to be put on and removed safely (known as donning and doffing). Guidance can be found following the below links:

- COVID-19: personal protective equipment use for aerosol generating procedures
- COVID-19: personal protective equipment use for non-aerosol generating procedures

### PPE and its use regarding COVID-19 protection

| Type of PPE | Guidance |
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| **Surgical masks**<br>  | **What is it?**<br>A surgical mask is an item of PPE worn over the nose and mouth.<br><br>**What does it protect against?**<br>The mask acts as a physical barrier to prevent droplets and splashes reaching the wearer's nose, mouth and respiratory tract.<br><br>Surgical face masks should be close-fitting in order to prevent venting (exhaled air 'escaping' at the sides of the mask).<br><br>**What are its limitations?**<br>Surgical masks do not provide protection against airborne (aerosol) particles and are not classified as respiratory protective devices.<br><br>Under the European Directive 89/686/EEC (PPE Regulation 2002 SI 2002 No.1144,) they are not regarded as respiratory protective equipment (RPE). |

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| **Fluid-resistant (type IIR) surgical mask (FRSM)**<br>  | **What is it?**<br>The terms 'fluid-resistant' and 'fluid-repellent' are often used interchangeably to denote a type IIR surgical mask.<br><br>Surgical masks are tested against the safety standard BS EN 14683; type II and type IIR surgical masks are both tested against this standard, which measures the performance of a surgical mask in bacterial filtration efficiency, breathing resistance and splash resistance.<br><br>**What does it protect against?**<br>Fluid-resistant (type IIR) surgical masks (FRSM) provide barrier protection against respiratory droplets reaching the mucosa of the mouth and nose.<br><br>These masks are not classed as RPE and do not need to be face-fitted. It is, however, recommended that masks should fully cover the nose and mouth of the wearer. It has also been advised that FRSMs should be well fitting and fit for purpose, covering the mouth and nose in order to prevent air escaping through the sides.<br><br>**What are its limitations?**<br>It has been observed that surgical face masks are not designed specifically to protect the wearer from infection but to protect the wearer during any activities/procedures where there is a risk of splashing or spraying of blood, bodily fluids, secretions or excretions. |
| **FPP3 masks** | **What is it?**<br>FFP stands for filtering face piece. The 3 is short for class 3. These are non-powered respirators.<br>FFP3 respirators form a tight seal around the user's face.<br><br>**What does it protect against?** |

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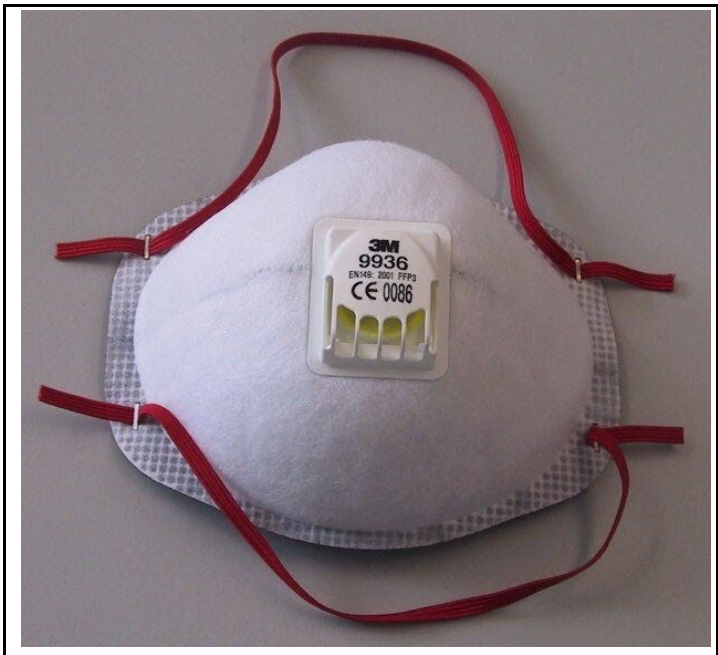
|  | FFP3 masks filter at least 99% of airborne particles.<br><br>**What are its limitations?**<br>FFP2 masks need to be face-fitted. More information can be found on the HSE website.<br><br>There is no evidence that respirators add value over FRSMs for droplet protection when both are used with recommended wider PPE measures in clinical care, except in the context of AGPs.<br><br>Facial hair should not cross the respirator sealing surface or the filtration system. |
| **FFP2 masks**<br><br>  | **What is it?**<br>FFP stands for filtering face piece. The 2 is short for class 2. These are non-powered respirators. FFP2 respirators form a tight seal around the user's face.<br><br>**What does it protect against?**<br>FFP2 masks filter at least 94% of airborne particles and offer protection against air droplets containing COVID-19.<br><br>**What are its limitations?**<br>FFP2 masks need to be face-fitted. More information can be found on the HSE website.<br><br>There is no evidence that respirators add value over FRSMs for droplet protection when both are used with recommended wider PPE measures in clinical care, except in the context of AGPs.<br><br>Facial hair should not cross the respirator sealing surface or the filtration system. |
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| **Gloves**<br>  | **What is it?**<br>Disposable gloves.<br><br>**What does it protect against?**<br>Disposable gloves are worn when providing direct patient care and when exposure to blood and or other body fluids is anticipated or likely.<br><br>**What are its limitations?**<br>Disposable gloves are subject to single use and must be disposed of immediately after completion of a procedure or task and after each patient contact and require strict hygiene controls. Hands must be washed after using. |
| **Disposable aprons and gowns**<br>  | **What is it?**<br>Disposable plastic aprons and gowns.<br><br>**What does it protect against?**<br>Worn to protect staff uniform or clothes from contamination when providing direct patient care and during environmental and equipment decontamination.<br><br>Gowns are worn when a disposable plastic apron provides inadequate cover of staff uniform or clothes for the procedure or task being performed, and when there is a risk of splashing of body fluids such as during AGPs in higher risk areas or in operative procedures.<br><br>**What are its limitations?**<br>Usually single use and must be discarded after sessions. |
| **Eye protection** | **What is it?**<br>Polycarbonate safety spectacles or equivalent.<br><br>**What does it protect against?** |

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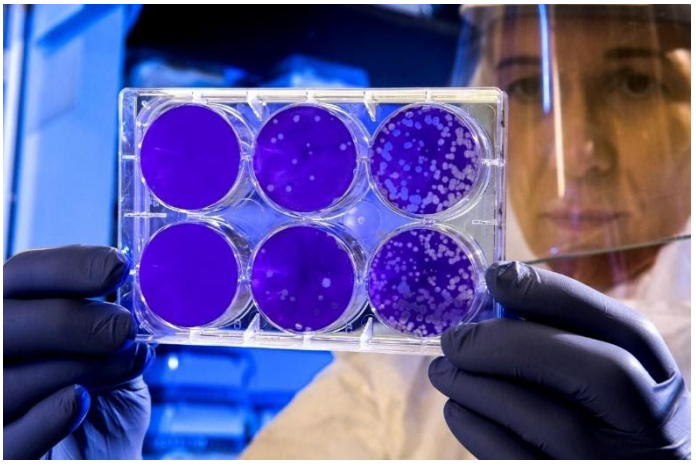
|  | May be worn in conjunction with face masks or RPE for protection against splash or spray to the eyes.<br><br>**What are its limitations?**<br>These can be very uncomfortable to wear with existing spectacles and can be easily steamed up. They can also get in the way when performing some medical practises. |
| **Face shield**<br><br>  | **What is it?**<br>A clear face shield that fully covers the front and sides of the face and surgical mask with integrated visor.<br><br>**What does it protect against?**<br>Maybe worn as an alternative or in conjunction with face masks or RPE for protection against splash or spray.<br><br>**What are its limitations?**<br>These can be very uncomfortable to wear with existing spectacles and can be easily steamed up. They can also get in the way when performing some medical practises. |

## References


- GOV.UK guidance: COVID-19 personal protective equipment (PPE)
- GOV.UK guidance: COVID-19: personal protective equipment use for aerosol generating procedures
- GOV.UK guidance: COVID-19: personal protective equipment use for non-aerosol generating procedures
- HSE: Fit testing basics
- HSE: Respiratory protective equipment (RPE)
- Health Protection Scotland: Transmission Based Precautions Literature Review: Surgical Masks