

Department of Health and Ageing:**"Safe Use of Personal Protective Equipment"**

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1: Testimonial: Professor Chris Baggoley

11min 16sec

- Pandemic Influenza or other novel respiratory virus is a real possibility in the future.
- Because it's "new" we will not have any natural immunity.
- Appropriate infection control precautions are the most important defence against transmission.
- Health Care Workers are more likely to have greater exposure than the wider community.
- Critical for Health Care Workers to be familiar with recommended personal protective equipment and its proper use. This includes selection of a P2 or equivalent respiratory mask that has been fit tested for your face.
- Confidence in the application of infection control precautions to protect against infection.
- Fit testing methods for P2 or N95 respirator masks.

2: Putting on Personal Protective Equipment

In the event of an influenza pandemic, specific personal protective equipment (PPE) will be indicated when providing care for those people with confirmed or suspected pandemic influenza.

In this situation you may be required to wear this equipment for extended periods of time. Therefore, it is imperative that you know how to put this equipment on in such a way that it remains in place, and is as comfortable as possible.

Key principles to be considered when putting on your PPE include:

- having a consistent sequence so that this can become routine;
- ensuring your equipment is correctly fitted to provide maximum protection;
- taking your time to adjust your equipment prior to entering the containment area; and
- at all times being mindful not to touch your mask, eyewear, or touch face whilst in the containment area.

The sequence for putting on PPE is as follows:

- Perform hand hygiene
- Put on your gown
- Put on your P2 or N95 respirator mask
- Fit check your mask
- Put on your protective eyewear. Prescriptive eyewear can be worn under your protective eyewear and should be put on at this time.
- Re-fit check your mask
- Put on your gloves
- Stop and check that everything is in place

Now watch as we demonstrate these steps in detail

Before putting on any personal protective equipment it is essential that you perform routine hand hygiene. This is considered to be the most important infection control measure in preventing the spread of infection, and should be performed before and after contact with patients and their immediate environment. The use of gloves does not remove the necessity for hand hygiene.

Effective hand hygiene can be performed by either washing with soap and water or, an alcohol based hand hygiene product when hands are not visibly soiled.

Hand hygiene protects you and the people to whom you provide care.

Prior to performing routine hand hygiene:

- Remove any jewellery from your wrists and hands. Some facilities may approve the wearing of a single plain metal ring therefore you should seek direction regarding this.
- Cover any cuts or abrasions with an occlusive dressing.

When washing hands, first wet hands, then apply a pH neutral soap and lather vigorously. Continue washing all surfaces of hands and fingers for 10 to 15 seconds. Rinse hands under running water and pat dry using a disposable towel.

When using an alcohol based product to perform hand hygiene, dispense the recommended amount onto your hand. Rub the product over hands and between fingers, ensuring all surfaces are covered. Allow the product to completely dry.

Protective gowns will prevent your clothes from being contaminated. The gown should be impervious, long sleeved with fitted cuffs, and be able to effectively cover your clothing.

When non-impervious gowns are used, such as cloth gowns, a disposable impervious apron should also be worn.

Put your gown on one sleeve at a time. Tie off at the neck. Now wrap the gown around your back, ensuring all clothing is covered. Tie off the gown securely so that it will not come undone whilst in use.

When airborne precautions are required a particulate filter respirator mask is indicated. The P2 mask is the Australian equivalent of the United States' N95 mask. Both masks are designed with a high filtration capacity and essentially provide the same level of protection.

These masks are significantly different to surgical or standard filter masks. Surgical or filter masks have not been designed to provide a close seal on the face, or high level particle filtration. Therefore, these masks will not provide effective protection of your airways from infectious airborne particles.

Although there are many brands, models and sizes available, there is no one mask that will fit all faces.

To ensure effective protection your mask must be selected for your face and a test performed to determine that the mask passes the "fit test".

Prior to putting on a P2 or N95 mask, check the mask for visible damage such as tears or holes in the filter material. If there is, discard and select a new mask.

When using a flat fold mask, identify the top of the mask - this usually has a flexible

bridge. Open the mask to form a round shape. Gently loosen and separate the straps before putting on the mask.

Leaning slightly forward push your chin out and bring the mask up to your face. Place the bottom section of the mask under your chin, then lift the straps over your head. Make sure that the top strap is at the crown of your head, and that the bottom strap is just below your ears.

Check that the mask is covering your face from under the chin to the bridge of your nose. Ensure the mask is not too high on the bridge of your nose, otherwise it could interfere with the wearing of protective eyewear.

Using your fingers mould the mask around your nose and cheek bones, making sure the edges are well sealed and fitted against your face.

At times there can be a remaining gap near the bridge of the nose. To remove this gap stretch your nose by dropping your jaw and pinch the mask around the bridge of your nose. Once this technique is used, the gap is sealed.

When fitting your mask it may be helpful to have a mirror nearby so you can visually check the placement on your face.

Every time you put a mask on you must perform a “fit check”. This is your way of ensuring your mask is correctly sealed around your face. If the mask is not correctly fitted there is a potential for exposure to infectious airborne particles.

To perform a fit check, take a deep breath in and breathe out. If the mask collapses when you inhale and puffs out when you exhale, and you don’t feel any large leaks of air around the edges of the mask, your mask is considered to have passed the “fit check”.

If your mask does not puff out or collapse, or you feel significant air leaking around the edge of the mask, your mask has failed the “fit check.”

You should then check the seals around the bridge of the nose are secure and firm, that the mask isn’t crooked, or that it is not bunched, or folded under the chin. Once you have done this, re fit check the mask.

Protective eyewear shields your eyes from direct contact with respiratory droplets and accidental contact from contaminated hands. There are a variety of protective eyewear which can be referred to as ‘goggles’, ‘protective glasses’, ‘visors’, or ‘face shields’.

If you wear prescription eyewear, put these on prior to the protective eyewear.

Whenever putting on any type of eyewear it is good practice to use the arms of the frame. This keeps your hands away from your eyes and reinforces safe practice for removal.

Make sure your protective eyewear is sitting securely, and is not affecting the fit of the mask.

You should re-fit check your mask to ensure that this has not changed during the application of your eyewear.

Wearing disposable protective gloves reduces the potential for skin contamination. Fit the first glove on your hand. Then pull the end of the glove over the cuff of your gown. This will make a tight seal reducing the potential for contamination of the wrists and forearms. Repeat this for the second glove.

You may initially experience difficulty doing this, but with practice it will become easier.

Remember, it is important that you do not adjust your mask or protective eyewear, or touch your face whilst in the containment area. For this reason you should stop, take time and check that everything is in place, and you are feeling reasonably comfortable.

When putting on PPE in practice, remember to be mindful, take your time fitting the equipment, and make sure it is comfortable prior to entering the containment area.

Remember the first rule of safety is that you do not put yourself at risk.

There will be many situations where staff will be required to wear their PPE, hospitals, general practice settings and dental surgeries to name just a few. The principles and sequence for the use of PPE remain the same.

3: Removing Personal Protective Equipment

6 min 8 sec

When it comes time to remove all your personal protective equipment it is important that you continue to be mindful of the task you are about to undertake. Your PPE may have been contaminated with respiratory droplets and infectious airborne particles and this is the most likely time when you could accidentally infect yourself.

The key principles are:

- Have a consistent sequence so that this can become routine.
- Take your time, don't rush.
- Minimise contact with contaminated surfaces of your PPE.
- Always perform hand hygiene prior to removing any PPE from your face.

The sequence for removing PPE is as follows:

- Remove gloves
- Perform hand hygiene
- Remove eyewear
- Next remove the gown
- Perform hand hygiene
- Remove mask, then finally
- Perform hand hygiene

These steps will now be demonstrated in detail.

Remove the first glove by holding the cuff and rolling it down. Twist your hand gently around as you roll it from your hand and into the palm of your gloved hand.

Remove the second glove by placing your fingers under the glove and rolling it from your hand and over the first glove cradled in your palm, disposing of the two gloves together.

You must now perform hand hygiene.

At this time the use of an alcohol based hand hygiene product is often more convenient and accessible, however hand washing with pH neutral soap and water is also an acceptable practice.

When using alcohol-based hand rubs, remember to allow the product to dry completely.

Using both hands, remove your protective eyewear by holding the arms of the frame only. Place them immediately in the “collection container” to avoid contamination of the environment and to facilitate cleaning and disinfection later.

If you wear additional prescriptive eyewear, you will need to perform hand hygiene prior to removal. Once removed place in a clean container.

Your gown has a large surface area of potential contamination, therefore you must take care and remove it in a controlled manner.

Starting at the top, undo the ties. If you are having difficulty doing this, seek assistance, or if the gown is disposable carefully tear the ties.

Once all ties are undone, take hold of the top *inside* surface of the gown. Leaning forward start to remove the gown by pulling it out and away from you.

As you remove it, fold it over so that the contaminated surface is on the inside. Continue doing this until the gown is a small folded parcel.

Place the disposable gown immediately in the waste container.

If using cloth gowns, place this immediately in the used linen receptacle.

After removing your gown, and before you remove your mask, it is essential that you perform hand hygiene as you will be bringing your hands up to your face.

When removing your mask, remember these principles

- Avoid touching the surface of the mask.
- Use the straps

Remove in a downward direction away from your face. Slip your fingers under the straps of your mask at the back of your head, lift them clear of your hair and draw straps together.

Lean forward and slowly lift the straps over your head, pulling the mask down and away from the face. Continue to hold the mask by the straps and drop into the waste container.

An alternative method is to slip your fingers under the straps just in front of your ears. Being careful not to touch the front of the mask.

Slide fingers under and around to the back of your head, drawing the straps together. Lean forward and slowly lift the straps over your head, pulling mask down and away from the face.

Continue to hold the mask by the straps and drop into the waste container.

Disposable masks can not be safely reused as this poses the risk of direct contact with contaminated surfaces and possible infection.

After removing your mask you must once again perform hand hygiene.

You may use an alcohol-based hand hygiene product or perform a routine hand wash.

In practice you can be under pressure, feel rushed or can be distracted. However, it is critical that you continue to take your time.

Remove your PPE carefully and immediately place in either receptacles for reprocessing, or waste containers for disposal.

The removal principles and sequence protect not only yourself from contamination, but also those around you, and your immediate environment.

This completes the presentation for the safe use of personal protective equipment in the event of an influenza pandemic.

4: P2 and N95 Respirator Mask Selection and Fit Testing

11mins 21sec

In the event of an influenza pandemic, health care and other ancillary workers, may be required to wear disposable high filtration masks, such as P2, or N95 respirators.

To ensure maximum safety and protection of the user, these masks must be:

- selected to suit the individual's facial structure;
- put on correctly;
- successfully fit checked; and
- fit tested for the individual.

A respirator mask may compromise a person's health, if they have a history of respiratory illness.

In this situation they should be medically assessed to ensure they are physically fit to wear this type of protective device.

Mask selection is determined by facial characteristics such as shape and size.

Remembering there is no one mask that will fit all faces.

Generally a small mask is selected for a small face, and a large mask for a larger face, however there can be exceptions to this basic rule.

Facial hair can make the wearing of a disposable P2 or N95 masks ineffective and unsafe. For this reason users should always be free of any facial hair that may affect the seal of the mask.

The Australian / New Zealand standard “Selection Use and Maintenance of Respiratory Protective Devices”, advises employers to provide a fit testing process.

Fit testing is a validated method of matching a specific respirator mask to an individual face.

A fit check is a quick check to ensure the mask is fitted correctly at the time of use. Fit checking does not negate the need for a fit test. A person may be able to achieve a successful fit check with a selected mask. However this may not translate to a passed fit test.

There are two fit testing methods identified by Standards Australia:

- Qualitative, often referred to as the “Hood Method”; and
- Quantitative, for example as used by the PortaCount Plus[®] with N95 companion[®] instrument.

When using either method you should comply with Australian Standards and the manufacturer’s instructions.

There are advantages and disadvantages for both fit testing methods.

Advantages of the qualitative method include:

- Relatively inexpensive to purchase.
- Able to be made with readily available materials.
- It is easily transportable.

Disadvantages include:

- It is a subjective test that relies on the ability of the person being tested to taste a solution that is aerosolised within the hood.
- The person being tested may provide inaccurate information to the fit tester.
- It can be an unpleasant and messy procedure.

Advantages of the quantitative method include:

- It is an objective test using an instrument to measure the particle count behind the mask.
- The results do not rely on responses from the person being tested.

- Provision of an electronic record that can be stored and printed.
- Can be used as an educational tool to demonstrate the effectiveness of the fit of the mask.

Disadvantages include:

- It is a relatively expensive instrument.
- It can be cumbersome to transport.

Regardless of the method used you can increase the chances of a successful fit test if the person being tested has had previous experience with using a disposable P2 or N95 mask. However, the lack of previous experience should not be a deterrent to performing a fit test.

The fit tester should always use the fit testing time to reinforce correct procedure for fitting and removing a mask.

Protective eyewear can affect the seal and/or fit of the mask. For this reason, protective eyewear should be worn when fit tests are performed, to ensure the protection provided by the mask is not compromised when wearing this equipment.

Both the qualitative and quantitative methods require the person being tested to perform a standard set of activities. Whilst this is being done the fit tester, or fit testing instrument, assesses if there is any indication of leaks around the seal of the mask.

There are total of eight activities:

- Normal Breathing
- Deep Breathing
- Head side to side
- Head up and down
- Talking out loud
- Grimacing
- Bending forward, and
- Normal Breathing

These simulate the facial movements and activities that may occur whilst performing your normal duties.

Quantitative fit testing requires an instrument that measures the concentration of microscopic particles found behind the respirator mask, and then compares this to the concentration in the ambient air. The calculation of this is called the fit factor.

A fit factor of equal to or greater than one hundred is required to pass a fit test.

An example of this instrument is the PortaCount[®] Plus with N95 Companion[®].

If the person has smoked within the previous thirty minutes the test should be delayed as recent smoking can interfere with the particle count behind the mask.

Once it is established that the test can proceed, employee details and the brand, model

and size of the mask to be tested are entered into the data base.

The selected mask is prepared for the test and connected to the instrument. The person being tested has a pendant placed around their neck, and then puts on a mask and protective eyewear. They then do a fit check of the mask.

If required, you can use the “real time” fit factor display. This is an educational component of the program that allows the person to experiment with strap and other mask adjustments whilst watching the effect of this on the fit factor.

This is an optional step and is not essential to the fit test procedure.

During the fit testing procedure the person is instructed to perform the standard activities as prompted by the program.

Whilst this is happening, the number of particles behind the mask are counted and compared with the ambient air particle count. From this a fit factor is determined as each activity is completed.

On completion, the fit factor results for all the activities, excluding the grimace, are averaged to determine the overall fit factor. If this fit factor is greater than or equal to one hundred the mask has passed the fit test for this individual.

If this has not been achieved, mask selection needs to be reassessed and a repeat fit test scheduled.

A record of the fit test result is provided to the employee, including details of the brand, model and size of mask fitted. They should also be given a sample of the mask successfully fitted, so they can practice the correct procedure for putting on and removing this type of mask.

In all, this procedure takes approximately twenty to thirty minutes.

More detailed instructions for the use of this instrument are available from the manufacturer.

Qualitative testing requires the use of an enclosed transparent hood, testing solutions and atomisers.

The effectiveness of this test relies upon the person’s ability to taste either a sweet or bitter solution. The person should abstain from eating, drinking and smoking for 30 minutes prior to the test as this may affect taste.

Contraindications for this method are:

- known allergies to the testing solution,
 - a history of claustrophobia.
- and / or
- an inability to taste either a sweet or bitter solution.

Prior to commencing the test, the ability of the person to taste the solution is determined. The hood is placed over the head and a low concentration solution is atomised into the hood via the access window.

The tester continues to spray the solution into the hood until the person being tested can taste it. The number of sprays required for this to occur is then documented, the result being rounded up to the nearest ten.

If the person is unable to taste the solution after 30 sprays, an alternate testing solution will be required.

On completion of this stage, the hood is removed and cleaned, and the person cleans their face and either rinses out their mouth, or has a drink of water.

The person now puts on the mask that has been selected for them, performs a fit check and the hood is placed over their head. A stronger concentration of solution is used to perform the fit test.

The tester now atomisers the same number of sprays into the hood that was recorded as the threshold. For example ten.

The person then performs the standard set of activities.

During this time the tester sprays the solution into the hood at six second intervals. To pass the fit test the person must be able to indicate that they have not tasted the solution.

If they have, mask selection needs to be reassessed and a repeat fit test scheduled.

Document the fit test result and place in the employee records.

The employee should be provided with a record of the fit test result including details of the brand, model and size of mask fitted, and a sample provided so they can practice the correct procedure for putting on and removing this type of mask.

This procedure takes approximately 20 minutes to complete.

More detailed instructions for this method are available from Australian, New Zealand Standard 1715, 1994 “Selection, use and maintenance of respiratory protective devices”, and manufacturers of commercially available kits.

This concludes the presentation of mask selection and fit testing.