

Transmission of COVID-19 and the role of face masks in health settings

14 APRIL 2020

Purpose of this document

The purpose of this document is to provide clarification on when and how health care workers should wear medical/surgical masks correctly. The correct and consistent use of medical/surgical masks will ensure they are available to protect frontline health care workers when they need it.

Background on SARS-CoV-2 and COVID-19

The World Health Organization (WHO) reports that based on available evidence, the SARS-CoV-2 virus is transmitted via droplets and fomites through close contact, not by airborne transmission.^{1, 2}

Droplet transmission occurs when respiratory droplets travel from the respiratory tract of the infectious individual to the susceptible mucosal surfaces of the recipient, generally over short distances (1-2 metres). Droplets are $>5 \mu\text{m}$ in size, and are generated when an infected person coughs, sneezes or talks. Respiratory droplets fall to the ground, under the effect of gravity, soon after being expelled and so only those people in close contact with the infected individual are at risk of exposure. Examples of other viruses transmitted by droplet spread diseases include influenza and rhinovirus.³

Airborne transmission occurs when airborne droplet nuclei containing infectious agents remain infective over time and distance. Droplet nuclei are $\leq 5 \mu\text{m}$ in size and can remain suspended in the air for longer periods of time. They can be dispersed over long distances via air currents, meaning susceptible individuals who have not been in close contact with the infected individual can be at risk of exposure. Examples of diseases spread by airborne transmission include measles and varicella.

There is evidence that some viruses which are generally spread by droplet transmission (such as influenza and rhinovirus) can be transmitted via small-particle aerosols within a defined space (e.g., patient room) when specific aerosol generating procedures such as endotracheal intubation, non-invasive ventilation, tracheostomy, bronchoscopy, manual ventilation, sputum induction, high flow nasal oxygen, cardiopulmonary resuscitation are undertaken.

Because SARS-CoV-2 is spread mainly through droplet transmission, medical/surgical masks are recommended for use in the care of patients when procedures without the risk of producing aerosols are performed. This includes taking nasopharyngeal and throat swabs, as these are not considered aerosol generating procedures.

If the patient with suspected, probable, or confirmed COVID-19 can tolerate wearing a mask, they may be asked to wear a mask when healthcare workers are providing care.

What a medical/surgical mask is used for

Medical/surgical masks are used as a physical barrier to protect the wearer from splashes or sprays of body fluids including respiratory droplets from coughing or sneezing. When someone talks, coughs, or sneezes they may release tiny drops into the air that can infect others. If someone is ill a mask can reduce the number of germs (bacteria and viruses) that the wearer releases and can protect other people from becoming sick.

Medical/surgical masks and other PPE are just one level of control used to prevent infections. Other more effective controls involve engineering controls, administrative controls and specific work practices (e.g. installing physical barriers, teleworking, grouping cares for a patient, practicing respiratory hygiene and cough etiquette, performing hand hygiene, and implementing physical distancing when possible). PPE is the least effective control because it is highly dependent on proper fit and correct, consistent use.

When a medical/surgical mask should be worn

Medical/surgical masks are used for different purposes, including:

- Placed on sick people to limit the spread of infectious respiratory secretions to others.
- Worn by health care providers to prevent accidental contamination of patients' wounds by the organisms normally present in mucous and saliva.
- Worn by health care workers to protect themselves from splashes or sprays of blood or body fluids. They also keep contaminated fingers/hands away from the mouth and nose.

Healthcare settings have specific rules for when people should wear medical/surgical masks based on standard and transmission-based precautions. To offer protection, masks need to be worn correctly and consistently.

Risks of wearing a medical/surgical mask incorrectly

The most significant risk is of contact transmission from touching the surface of the contaminated mask. If the mask is worn incorrectly, the wearer will tend to adjust it by touching it and potentially contaminate their hands. One study found that nurses averaged 25 touches per shift to their face, eyes, or mask during extended use.⁴

Contact transmission occurs through direct contact with others or through indirect contact by touching contaminated surfaces. Respiratory pathogens on the mask surface can potentially be transferred by touch to the wearer's hands and thus risk causing infection through subsequent touching of the mucous membranes of the face (e.g. mouth, nose, eyes) through self-inoculation. Masks may become contaminated with other pathogens acquired from patients who are co-infected with common healthcare pathogens such as MRSA, VRE, *Clostridioides difficile* or norovirus.

Other risks include a reduction in the mask's ability to protect the wearer caused by rough handling or excessive reuse.

How to put on and remove a medical/surgical mask

Disposable medical/surgical masks should be used once and then disposed of as clinical waste. If you are a healthcare professional working in the community, put used mask(s) into a separate bag that can be sealed or tied and then dispose into a general waste bin. You should also remove and replace masks when they become damp or at least every 4 hours.

Instructions for putting on and removing a mask safely are available below.

Videos available:

If using a mask with other PPE, [this video](#) providing PPE donning and doffing instructions from Auckland District Health Board may be helpful

If using a mask by itself with no other PPE, [this video](#) providing mask donning and doffing instructions from WHO may be helpful.

How to put on a mask safely:

1. Clean your hands with soap and water or hand sanitiser before touching the mask.
2. Remove a mask from the box and make sure there are no obvious tears or holes in either side of the mask.
3. Determine which side of the mask is the top. The side of the mask that has a stiff bendable (metallic strip) edge is the top and is meant to mold to the shape of your nose.
4. Determine which side of the mask is the front. The colored side of the mask is usually the front and should face away from you, while the white side touches your face. For example, if there is a blue side and a white side to the mask, think blue to the sky (blue will be the side that faces outward).
5. Follow the instructions below for the type of mask you are using.
 - a. *Face Mask with Ear loops*: Hold the mask by the ear loops. Place a loop around each ear.
 - b. *Face Mask with Ties*: Bring the mask to your nose level and place the ties over the crown of your head and secure with a bow.
 - c. *Face Mask with Bands*: Hold the mask in your hand with the nosepiece or top of the mask at fingertips, allowing the headbands to hang freely below hands. Bring the mask to your nose level and pull the top strap over your head so that it rests over the crown of your head. Pull the bottom strap over your head so that it rests at the nape of your neck.
6. Mold or pinch the stiff edge to the shape of your nose.
7. If using a *face mask with ties*: Take the bottom ties, one in each hand, and secure with a bow at the nape of your neck.
8. Pull the bottom of the mask over your mouth and chin. Ensure mask fully covers the nose, mouth and is stretched over the chin and fits snugly over the face. If fit properly, your eye protection or glasses should not fog.
9. Change mask if it becomes damp or damaged or at least every 4 hours.

How to remove a mask safely:

1. Clean your hands with soap and water or hand sanitiser before touching the mask. Avoid touching the front of the mask. The front of the mask is contaminated. Only touch the ear loops/ties/band.
2. Follow the instructions below for the type of mask you are using.
 - a) *Face Mask with Ear loops*: Hold both ear loops and gently lift and remove the mask.
 - b) *Face Mask with Ties*: Untie the bottom bow first then untie the top bow and pull the mask away from you as the ties are loosened.
 - c) *Face Mask with Bands*: Lift the bottom strap over your headfirst then pull the top strap over your head.
3. Dispose of mask in clinical waste or a sealed bag that goes into general waste.
4. Clean your hands with soap and water or hand sanitiser.

General reminders for safe usage of medical/surgical masks

- Always perform hand hygiene before putting on a mask.
- Always perform hand hygiene before and after removing a mask.
- Do not touch your mask or face while wearing a mask.
- Once mask is on, only touch loops, ties, or bands to remove.
- Replace a mask if it becomes damp, damaged, or has been worn for more than four hours.
- Do not re-use single-use masks and dispose of immediately upon removal.
- Practice other IPC measures, including the 5 moments for hand hygiene and physical distancing.

Other resources information or posters on correct use and disposal of masks

For information or posters on correct use and disposal of masks, please see the [WHO website](#).

References

1. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). Interim guidance. 27 February 2020. Geneva, World Health Organization. apps.who.int/iris/handle/10665/331215
2. Advice on the use of masks in the context of COVID-19. Interim guidance. 6 April 2020. Geneva. World Health Organization. [https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak)
3. Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (Updated July 2019). [cdc.gov/infectioncontrol/guidelines/isolation/index.html](https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html)
4. Rebmann, T., R. Carrico, and J. Wang: Physiologic and other effects and compliance with long-term respirator use among medical intensive care unit nurses. *American Journal of Infection Control* 41(12): 1218-1223 (2013).