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## SASA Recommendations on Personal Protective Equipment (PPE) for anaesthesia providers during the COVID-19 pandemic

Due to the rapidly changing nature of the pandemic, these recommendations may change with time. This version has been updated on **17 March 2020 at 23h00**. Corrections, updates and suggestions may be directed to [covid19@sasaweb.com](mailto:covid19@sasaweb.com)

### Summary of minimum recommended PPE for COVID-19

Routine patient care	High-risk procedures* (including intubation)
Surgical mask Disposable gloves Apron (Optional: Eye protection)	Fit-tested N95/FFP2 respirator** Impermeable long-sleeve gown Eye protection and/or full face shield Disposable cap Disposable gloves (ideally double gloves)

\*High-risk procedures are those that can generate aerosols (see below)

\*\*The term 'respirator' includes disposable N95 and other 'masks' which filter inspired air.



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## Introduction

Healthcare workers as a group are at high risk of infection with SARS-CoV-2 and the subsequent development of COVID-19 during the [current pandemic](#). Anaesthesia providers are frontline staff often involved in managing critically ill COVID-19 patients, and are at particularly high risk due to their likelihood of performing aerosol-generating procedures such as tracheal intubation. Furthermore, the training and skill sets of anaesthesiologists make them ideal candidates to expand the capacity for providing intensive care, as ICUs are overwhelmed. Protecting the practitioners to safeguard the workforce is therefore particularly important.

COVID-19 infections in South Africa are now demonstrating community transmission, so we need to focus on protection of staff, social isolation and “[flattening the curve](#)” of cases to prevent the healthcare system from being overwhelmed. We must therefore all be champions in our communities, and in promoting preparedness in every facility in which we work. Adequate quantities and training on the use of personal protective equipment is essential in this context.

Worldwide, supplies of PPE may be constrained by greatly increased usage, panic purchasing and hoarding by the general public, impact of border closures on distribution, and impact of the disease on production facilities. We must therefore educate the public and practitioners alike in the appropriate levels and use of PPE, and ensure that our recommendations allow for the constraints in resource-limited settings. See [WHO guidance on the rational use of PPE](#).

## SASA’s five key messages to enhance protection and reduce transmission

### **Personal interventions:**

1. Know how to protect yourself in clinical practice (see [WFSA guidelines](#)).
2. Apply social distancing and/or self-isolation to protect yourself and your family
3. Recognise and take steps if you are at higher risk of morbidity and mortality from COVID-19

### **Workspace interventions:**

4. Engage immediately at facility level to prepare for the surge of COVID-19, including ensuring adequate supplies and training in the use of PPE
5. Know what to do in the case of occupational exposure.

## General principles

### Administrative controls

All healthcare providers should be trained in infection control and prevention strategies, and in [procedures for donning and doffing PPE](#). Simulation is particularly useful; a clearly marked set of simulation items can be reused and thereby avoid depleting supplies.

Healthcare facilities should provide healthcare workers with adequate PPE and isolation facilities to meet the requirements for airborne, droplet and contact precautions.

Patient rooms with suspected or confirmed COVID-19 should be labelled with a sign, so that all healthcare workers and support staff are aware of the risk before entering the area. Although single isolation units are preferred, it is acceptable to triage people with possible COVID-19 together while awaiting diagnostic results.

### Environmental controls

This aims to reduce the contamination of surfaces and inanimate objects. Patients and health workers should wash their hands with soap and water or alcohol-based handrub. Rooms should provide adequate space to allow social distance of at least 1 m to be maintained between patients and between patients and healthcare workers.

### Measures directed towards patients

Patients should be instructed to wear a disposable face mask to limit droplets spread by coughing, and encouraged to practice good cough etiquette and hand hygiene through either regular washing with soap and water (preferred) or alcohol-based solutions (>70% alcohol required).

## PPE for general management of COVID-19 patients

SASA has been guided by the recommendations of the World Federation of Societies of Anaesthesiologists (WFSA), [World Health Organisation](#), [United States CDC](#) and other specialist organisations, and have drawn heavily on their expertise. A list of resources can be found at the end of this document.

To avoid depleting PPE supplies during the pandemic, routine personal protection (eg. regular hand-washing and non-sterile gloves) used for non-COVID-19 patients should **not** be supplemented by additional PPE. For routine care of confirmed or suspected COVID-19 patients, **contact and droplet precautions** should be used at all times. If sufficient resources exist and caseload is low, isolation rooms and additional application of **airborne precautions** may be possible, but is unlikely in low-resource settings or when caseload increases. Any high-risk or aerosol-generating procedures should make use of the enhanced level of PPE (See below).

## Recommended PPE for routine care of COVID-19

- Disposable gloves
- Disposable apron
- Face mask (disposable surgical mask)
- Eye protection (glasses, goggles or face shield) may be considered optional

Hand hygiene should be practiced as per the [WHO “5 moments”](#) campaign. Importantly, hands must be washed or have alcohol hand scrub decontamination **before and after removing gloves**, as well as after removal of other protection (apron, mask, etc).

This level of PPE is appropriate for clinical examination, preoperative assessment, transfer of patients between care areas, and post-operative visits. Importantly, **all** staff (including nursing staff and porters) must be adequately alerted and trained in the correct use of PPE. N95/ FFP2 respirators are **not** required for these tasks, and should be reserved for high-risk procedures (See below).

## Enhanced PPE for intubation and other high-risk aerosol-generating procedures












### Examples of aerosol-generating procedures (AGPs)

- Intubation
- Extubation
- Bronchoscopy
- Airway suctioning
- High frequency oscillatory or jet ventilation
- Tracheostomy
- Chest physiotherapy
- High-flow nasal oxygen therapy
- Nebulizer treatment

**Recommended PPE for AGPs:**

- A fit-tested N95/FFP2 respirator or alternative of equivalent standard
- Eye protection and/or full face shield
- Long-sleeved, preferably impermeable gown
- Disposable head covering/theatre cap
- Double gloves (preferably long gloves over gown)

A note on masks and respirators: N95/N99/FFP2/FFP3 devices are commonly referred to as masks, but these are in fact disposable respirators, as they are designed to filter inspired air and protect, rather than prevent droplet contamination from the user. Therefore in no circumstances should N95 respirators be provided to patients, as it will most likely exacerbate dyspnoea.

PUTTING ON PERSONAL PROTECTIVE EQUIPMENT			REMOVING PERSONAL PROTECTIVE EQUIPMENT		
<b>1</b>	<b>PERFORM HAND HYGIENE</b>		<b>1</b>	<b>REMOVE GLOVES</b>	
<b>2</b>	<b>PUT ON GOWN</b>		<b>2</b>	<b>REMOVE GOWN</b>	
<b>3</b>	<b>PUT ON MASK OR N95 RESPIRATOR</b>		<b>3</b>	<b>PERFORM HAND HYGIENE</b>	
<b>4</b>	<b>PUT ON EYE PROTECTION</b>		<b>4</b>	<b>REMOVE EYE PROTECTION</b>	
<b>5</b>	<b>PUT ON GLOVES</b>		<b>5</b>	<b>REMOVE MASK OR N95 RESPIRATOR</b>	
			<b>6</b>	<b>PERFORM HAND HYGIENE</b>	

Source: Ontario Public Health

## How to fit a respirator:

Respirators must be correctly fitted to be effective. This is done by conducting a fit-test using a test kit. In the absence of a test kit, health workers should 'don' the respirator, making sure it has a tight seal. Pinch the respirator over the bridge of your nose. Breathe out deeply against the resistance of the respirator and check for any air leaking from the sides. Breathe in deeply and again make sure there is not air entering the mask from the side. Facial hair like beards prevent a good seal and should be shaved off. The orange duckbill respirators expand and contract as you breathe through them. When removing 'doffing' the respirator, only touch the straps and not the respirator itself. In the absence of an adequately fitted respirator, powered air purifying respirator (PAPR) devices can be used.

## Recommendations for performing high-risk procedures:








- Use of a checklist for preparation and performance is advisable
- Enhanced PPE (as above) must be donned before entering the procedural area
- A "PPE-coach" to supervise donning and doffing PPE is advised
- Limit personnel in the room to the minimum required
- Negative-pressure rooms may confer a benefit in limiting aerosol spread, if available
- Use of disposable equipment is advisable
- The most experienced clinician should perform the procedure
- Video laryngoscopy, RSI and avoidance of awake tracheal intubation is recommended.
- Viral or at least heat and moisture exchange filters (HMEFs) should be used on all ventilatory devices to limit droplet and aerosol spread.
- Closed suction devices should be connected at the time of intubation to avoid unnecessary disconnections for suctioning.
- Consider avoiding high-flow nasal cannulae/CPAP/BiPAP to reduce aerosol generation.<sup>1</sup> If needed, negative-pressure rooms would be ideal.
- Disposable equipment should be bagged for disposal in the room. Placement of a cart with sterilisation solutions for reusable equipment in the anteroom or at the doorway to allow immersion for decontamination and disinfection is advisable.
- Correct doffing of PPE (including hand hygiene at each step) should be observed by the PPE coach to ensure compliance.

[A thorough resource for airway management of COVID-19 patients is available on OpenAirway.](#)

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<sup>1</sup> May be the best course of action if ventilators are in short supply. See PMID [30336170](#), [30705129](#), and [25392954](#)

## Guidance on the use of N95 respirators during the CoVID-19 pandemic

<p><b>Indications for use of N95 respirators</b></p> <ul style="list-style-type: none"> <li>✓ Used for protection of <b>healthcare workers only</b></li> <li>✓ Worn during care of patients with <b>airborne diseases</b> e.g. pulmonary TB, measles, varicella (chicken pox)</li> <li>✓ For droplet-transmitted diseases e.g. influenza, CoVID-19, N95's are worn for <b>aerosol producing procedures only</b>.</li> </ul>	<p><b>Types of N-95 respirators available:</b></p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>V-Flex</p>  </div> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>Cone-shaped</p>  </div> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>Duckbill</p>  </div> </div>
<p><b>Aerosol producing procedures are:</b></p> <p>manual bag-mask ventilation tracheal intubation non-invasive ventilation (BIPAP, CPAP and high flow) open suctioning tracheotomy bronchoscopy cardiopulmonary resuscitation</p>	<p><b>Priority areas for provision of N-95 respirators are:</b></p> <ul style="list-style-type: none"> <li>✓ CoVID-19 triage areas and isolation wards</li> <li>✓ Intensive care and high care units</li> <li>✓ Operating theatres with CoVID-19 cases</li> <li>✓ TB and other airborne isolation rooms</li> </ul>
<p style="text-align: center;"><b>Care of and re-use of N95 respirators for care of patients with pulmonary TB</b></p> <p>Can be re-used by the same healthcare worker for not more than one week provided that:</p> <ul style="list-style-type: none"> <li>- the respirator is not damp, damaged or loose.</li> <li>- a seal test is performed before each use</li> <li>- it is stored in a paper bag labelled with HCW's name</li> <li>- hand hygiene is done before &amp; after touching the N95.</li> </ul>	<p style="text-align: center;"><b>Disposal of N95 respirators used during aerosol-producing procedures for CoVID-19</b></p> <p>As the outside surface of the N95 respirator will become heavily contaminated with virus during aerosol-producing procedures:</p> <ul style="list-style-type: none"> <li>- the N95 respirator must be discarded in a red box in the patient's room immediately after use</li> <li>- hand hygiene must be performed after removing the N95 respirator and other PPE (goggles, gown and gloves).</li> </ul>
<p><b>How to wear a N-95 respirator:</b></p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>V-Flex</p>  </div> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>Cone-shaped</p>  </div> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>Duckbill</p>  </div> </div>	<p style="text-align: center;">  </p> <p><b>Perform the seal test with every use to ensure the respirator fits properly around the face and nose</b></p> <p><b>Negative seal check</b> Cone-shape: cup hands over respirator lightly. Breathe in sharply. No air should leak in around the face. to-Duck- bill + V-flex: Breathe in sharply. The respirator should collapse inwards</p> <p><b>Positive seal check</b> Cone-shape: Cup hands over respirator. Blow out. A build-up of air should be felt with no air leaks. Duck-bill + V-flex: Breathe out forcefully; the respirator should expand on the exhale.</p>

Source: Western Cape Government Guidance on the use of N95 respirators during the COVID-19 pandemic



## Recommendations for practitioners exposed to COVID-19

- If you have occupational exposure with appropriate PPE, you can continue to work with monitoring for symptoms for 14 days. If you become symptomatic, self-isolate.
- If you have occupational exposure without PPE, then you need to [self-isolate immediately](#). Do not visit your GP, but contact your GP or professional association (eg. SASA) regarding testing, and monitoring of symptoms. As a healthcare worker needing testing during this critical time, SASA believes it would be appropriate for you to ensure that your testing is expedited.

The testing space is particularly dynamic. As of today, in keeping with containment principles, labs will only test patients with a confirmed or reasonable contact or travel history, and with fever/ myalgia/ severe viral symptoms. However this situation is evolving daily, and we encourage practitioners to [check the latest guidance from the NICD](#). All other patients are referred home for self-isolation for 14 days or testing if symptoms change. This will likely evolve and change with new tests being developed (reported today that may enable a 10 minute identification test). An established NICD hotline for Covid-19 is 0800 029 999 or a WhatsApp connection at 0600 123 456.

## Concepts for dealing with PPE shortages in resource-limited settings

The following guidance is offered for dealing with shortages of PPE:

- Regular (surgical) face-masks are an acceptable alternative when respirators (N95 etc.) are not available in dire circumstances. Although not ideal, they are better than no mask for aerosol-generating procedures.
- If surgical mask supplies are severely limited, they should be utilised to protect health workers and not given to patients in an attempt to limit spread. Patients should be advised on cough hygiene.
- If there is a shortage of gowns, they should be limited to aerosol-generating procedures, activities where splashes or sprays are anticipated, and high-contact patient care activities. Disposable aprons can be used as an alternative in other situations
- Permeable, reusable surgical gowns are not ideal for providing protection, but are certainly better than nothing. Where used, they can be donned over a disposable apron, and removed after outer gloves are disposed of, bagged, and sent for washing/sterilisation.

- Pulmonary tuberculosis (PTB) is endemic to South Africa. Patients presenting with symptoms suggestive of PTB (cough for > 2 weeks, weight loss, fever, night sweats) should still be managed by health workers wearing N95 respirators. If a patient with confirmed drug sensitive PTB has been on treatment for two weeks with improving symptoms, it is not necessary to continue to use an N95 respirator. Patients with PTB start becoming less infectious as early as 24 - 48 hours on treatment. Patients with pleural TB or extra-pulmonary TB with no lung involvement do not pose a risk of infection. Ensuring good ventilation by opening windows is important for TB as it spreads through the air via droplet nuclei.
- While it is not recommended to reuse N95 respirators, guidance has been given on reuse by the same health worker in the setting of PTB prevention. The duration depends on the manufacturer, but can be between 6 and 12 cumulative hours. However, as SARS-CoV-2 is spread by contact as well as droplet/aerosol, repeated touching of the mask for doffing, storage and donning for reuse is a significant risk, and **N95 respirators should not be reused for COVID-19**. Wearing a mask for longer periods (until breathing becomes difficult due to moisture saturation) is safer than removal and re-use. In dire shortages, it would be preferable to alternate masks that are being reused to allow time for decontamination by [UV light](#) or other sterilisation. In this case, always inspect the respirator for signs of damage before reusing it. Steps to reduce risk of contamination could include: (1) Wash gloves while wearing respirator; (2) Remove the respirator after hand washing, touching only the straps, and avoiding touching the inside of the respirator; (3) Store the respirator under UV light or bright sunlight (not a plastic packet, as moisture can damage the filter); (4) Remove gloves and wash hands afterwards.
- Some authors have proposed methods for safe reuse of non-sterile gloves, gowns and respirators, through the use of immersion in hypochlorite solutions and exposure to steam treatment and/or ultraviolet radiation, respectively. Further evidence in the effectiveness of these methods for COVID-19 in severely resource-limited settings is being actively solicited.

## References and other resources

1. WFSA Coronavirus guidance for anaesthesia and perioperative providers (<https://www.wfsahq.org/resources/coronavirus>)
2. WHO guidelines on rational use of PPE during the COVID-19 pandemic (<https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPPE-use-2020.1-eng.pdf>)
3. CDC Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings



(<https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html>)

## Revision and Peer Review

This is a living document based on the best understanding of the available information reviewed as the pandemic evolves. If you have concerns or find errors, please contact the [South African Society of Anaesthesiologists](#). This document certainly plagiarises excellent material from others, and has been reviewed and edited by the following experts:

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