



COVID-19 Disease: Infection Prevention and Control Guidelines

Version 3

July 2021

Foreword

The World Health Organization (WHO) declared Covid-19 a global pandemic on 11th March 2020. The first case was diagnosed in South Africa on 5th March 2020. South Africa faces a particular challenge given the large vulnerable immunocompromised population living in overcrowded conditions.

This IPC guideline provides evidence-based recommendation for health care facilities with specific reference to Covid-19. The guidance has been developed and will be updated regularly, based on the most recent scientific evidence and recommendations made by the World Health Organization (WHO) and where relevant, other international authorities such as Africa Centers of Disease Control (ACDC) and Centers for Disease Control and Prevention (Atlanta, USA).

The South African guidelines are contextually grounded in the national health and community structures recommending safe, practical application of sound IPC principles; it should be read in conjunction with the National Infection Prevention and Control Strategic Framework and the Practical Manual for the Implementation of the National Infection Prevention and Control Strategic Framework both of which were released in March 2020. The National IPC Framework provides practical and simplified practices that can be applied in any healthcare facility, to keep healthcare workers and visitors safe.

In light of new information since May 2020 when the South African Covid 19 guidelines were first approved, it is time to update Version 2. Version 3 is an update with the following amendments:

- Transmission of SARS CoV2- long- and short-range aerosol transmission
- Mask use in the clinical areas
- Ventilation and the built environment
- Pre and post vaccination IPC measures.

The Department would like to thank Prof Shaheen Mehtar who drafted the guideline on behalf of the Infection Prevention and Control Technical Working Group (Mrs Briette du Toit, Mrs Yolanda van Zyl, Ms Marina Aucamp).

Dr SSS Buthelezi ADirector-General: Health Date:

Table of Contents

1	Introduction
2	Strategic Framework
3	Characteristics of SARS CoV-2
 	5

Routes of Transmission **6**

4Administrative controls: IPC Precautions for COVID-19 containment in health care facilities	Z
4.1 Roles and responsibilities of managers and staff	Z
	•••••

4.1.1.	All staff	8	
4.1.2.	Laboratory sta	aff	9
4.1.3.	Clinical staff	9	
4.1.4.	Facility IPC tea	am	10
4.1.5.	Occupational	health	10
4.1.6	Visitors	10	
5. Environn Triage area	nental Controls 12	s for IPC	measures in COVID-19 11
5.1 Patient Place	ement 12		
5.1.1 Single roor	n 12		
5.1.2 Cohort isol	ation 12		
5.2 Intensive Ca	re 13		
5.3 The buil 5.3.1 Ventil 5.3.1.1 Hospital	t environment ation accommodatio	n 13	
5.3.1.2 Operatin	g Theatres	13	
5.3.1.3 Maternit	y-labour ward	14	
 6. IPC Contr 6.1 Standar 6.2 Transmi 6.3 Aerosol gene 	ols for COVID-2 d Precautions . ssion-based Pro erating procedu	19 conta ecaution Ires (AGI	inment
6.4 IPC Sign 7. Hand hyg	age giene		

7.2 Types of hand hygiene 17

8. Appropriate use of Personal Protective Equipment
8.2 Type of face covers
8.2.2 Respirators 21
8.2.3 Non-medial (Cotton/ fabric) masks for healthcare workers 22
8.3 Use of PPE during labour and breastfeeding
8.5 Donning and doffing of PPE248.6 Norms for PPE requirement259. Environmental cleaning2610. Healthcare waste Management27
11. Persistence in Sewerage 27
12. Bodies, burial and post mortem 28
12.1 Dead Bodies 28
12.2 Post mortem (autopsy) 28
12.3 Family member 29
13. Repatriation and subsequent quarantine2914. Vaccination3015. Summary30
Appendix A: Appropriate use of PPE 31
Appendix B: Detailed recommendation for use of PPE 32

1. Introduction

The World Health Organization (WHO) declared COVID-19 a global pandemic on 11th March 2020. SARS CoV-2 (a novel coronavirus) originated in Wuhan, China where the first cases were reported in late December 2019, and spread rapidly across the globe. The first case was diagnosed in South Africa on 5th March 2020 and by 27th March, more than 1000 people had tested positive for SARS-CoV-2. The rapidity of global spread, has demonstrated unprecedented transmission. Further, the virus has rapidly mutated producing many variants emerging from different parts of the globe resulting in a second and in some cases, a third wave of infection. The IPC relevance of these variants of concern (VOC) is increased transmissibility.

South Africa has a unique challenge of a large vulnerable immunocompromised population living in overcrowded conditions. Several variants have emerged in South Africa but the most dominant one has been 501YV2, first isolated in East London. Despite this, while the number of positive cases has exceeded 1.5m however, the mortality rate in South Africa remains low. The WHO has established that the VOC be named as Greek alphabets rather than by country of origin.1

The Ministerial Advisory Committee on Coronavirus Disease 2019 (MAC-COVID 19) was formally established on the 25th March, with its first Clinical Committee meeting on the 26th March 2020. The Infection Prevention and Control (IPC) subgroup was charged with advising the Department of Health on evidence-based guidance towards the reduction and prevention of transmission in both patients and staff at community and healthcare facility level. These IPC guidelines are aimed mainly at health care facilities but the principles may be applied to community health prevention strategies.

2. Strategic Framework

- The National Infection Prevention and Control Strategic Framework, March 20202
- Practical Manual for the Implementation of the National IPC Strategic Framework, March 20203
- WHO recommendations for COVID-19 (2020a). Deliberations of the COVID 19 Expert Committee will be used to update these guidelines.

3. Characteristics of SARS CoV-2

SARS-CoV-2, a novel coronavirus of zoonotic origin, likely originating from bats, with undefined intermediate animal host, has been recovered in humans to the end of 2019. Person to person transmission is rapid causing large community outbreaks across the globe. The virus attaches itself to ACE2 receptors present in several sites in the human body thereby infecting and colonizing the human nasopharynx and upper respiratory tract, later affecting the lower respiratory tract leading to pneumonia, respiratory failure and sometimes death (variable case fatality rates reported 1-5%).

¹ https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/

² National Department of Health. National Infection Prevention and Control Strategic Framework, March 2020. Available from: <u>https://www.nicd.ac.za/wp-content/uploads/2020/04/National-Infection-Prevention-and-Control-Strategic-Framework-March-2020-1.pdf</u>

³ National Department of Health. National Practical Manual for the Implementation of the National IPC Strategic Framework, March 2020, p 23. Available from: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents

SARS CoV2 is an enveloped virus which makes it fragile and vulnerable to heat, chemicals and ultraviolet sunlight. Recently, variants of concern (VOC) of the SARS CoV-2 virus have been reported from different parts of the world, including in South Africa, Brazil, India and the United Kingdom. These variants have been reported to be more transmissible, spread rapidly and sometimes cause more severe disease. Currently there is no clear evidence that the SARS CoV2 501Y.V2 variant identified in South Africa is more infectious or causing severe disease and worse outcomes.4 However, the mode of transmission of the virus variants has not changed and the same IPC preventive measures such as wearing a mask, social distancing, hand hygiene and improved ventilation continue to be effective and should continue to be implemented.

Routes of Transmission

Initially, the main routes of transmission were thought to be via droplets and less commonly through fomites. However recently, aerobiology and aerodynamic studies into respiratory transmission has provided new evidence demonstrating that when a person exhales through talking, singing and shouting, a cloud containing varying sizes of aerosols-containing viral particles, is released5. The heavier, short-range aerosol (droplets) fall to the ground by gravity, while the lighter long-range aerosols (can remain suspended on-air currents and can travel longer distances (ref. Yuguo Li Hk. And others) The persistence of such aerosols is dependent on closed, crowded areas with poor ventilation. Therefore, increasing rates of ventilation remove infectious aerosols and reduce the risk of transmission. The wearing of face covers, such as cloth or surgical masks reduce source dispersal and the number of infectious particles in the atmosphere and reduce transmission.

Based on this new evidence, this section has been revised, however, there have been no changes in the current IPC recommendations by the WHO. The main routes of transmission are as follows (Fig 1):

- Droplet: The main route of transmission for SARS COV2 is via respiratory droplets produced during any exhaling respiratory activity such as sneezing, coughing and singing. These larger droplets are weighed down by mucous and secretions and can enter a person standing close to the source (up to 1.5m without a mask) via inhalation, contamination of the eyes, nose and mouth.
- Contact: If infectious droplets land on surfaces surrounding the patient, accidental transfer via contact between these surfaces and hands and fingers may be another, but is a less common route of transmission. It must be noted that the virus is very sensitive to heat, drying and detergents so frequent cleaning and disinfection is necessary in the healthcare setting.
- Airborne: In a closed, poorly ventilated over crowded environment, aerosols can remain suspended over a long period of time and can be inhaled, resulting in airborne transmission. This route of transmission has been reported from funerals, closed institutions and gatherings often resulting in super spreading events.

⁴ World Health Organization. SARS-CoV-2 Variants, Disease Outbreak News. 31 December 2020. https://www.who.int/csr/don/31-december-2020-sars-cov2-variants/en/

⁵ Roadmap to improve and ensure good indoor ventilation in the context of COVID-19, WHO 2021. https://apps.who.int/iris/handle/10665/339857

Laboratory studies report the virus appears to remain viable for longer periods (one to seven days or more) on smooth hard surfaces such as stainless steel, hard plastic, glass, and ceramics and for shorter periods (several hours to two days) on porous materials such as paper, cardboard, and textiles, although viability may be dependent on other factors such as temperature and humidity. 95,100-107

Contact with contaminated surfaces (fomites) followed by touching of the eyes, mouth or nose is another possible mode of SARS-CoV-2 transmission, albeit a minor route of transmission. Surfaces that are frequently touched by many people (high-touch surfaces), such as door handles, or faucets may be more often, and more heavily, contaminated will require frequent cleaning and disinfection.

Observational studies have detected viral RNA on a wide range of surfaces in settings where persons with COVID-19 have been present, such as hospitals or quarantine rooms. However, successful attempts to culture the virus (viability) have been very few. Hand hygiene and routine cleaning and disinfection of surfaces reduces the likelihood of contact transmission.

This is crucial information for applying the correct IPC procedures and ensuring safety of you and your patients.



Figure 1 the various routes of transmission of SARS COV2 and the IPC interventions shown in yellow. Ventilation is the key to reducing transmission.

There are a number of IPC control measures that have to be implemented to contain the transmission of COVID-19 in health care facilities. These are the hierarchy of controls and are tiered according to the level of importance in interrupting transmission. For COVID-19, these are as follows:

- Administrative controls
- Environmental Controls
- Engineering controls
- •

4. Administrative controls: IPC Precautions for COVID-19 containment in health care facilities

The hierarchy of IPC measures are outlined here and should be read in conjunction with the National Practice IPC Manual for the Implementation of the National IPC Strategic Framework (2020).3

Every healthcare facility should have a copy of the South African COVID-19 recommendations which clearly outline what the IPC interventions are to reduce or prevent transmission. Supplies of PPE, hand hygiene, cleaning and disinfection materials must be provided. Vaccination must be offered to all HCWs.

Support for mental and physical wellbeing for healthcare workers must be considered.

4.1. Roles and responsibilities of managers and staff

Containment and management of suspected and confirmed COVID-19 patients within health facilities depends on all staff members and patients, learning, understanding and adhering to the relevant policies and procedures. The national IPC guidelines are based on evidence-based recommendations from WHO and CDC and have been adapted to South Africa and the African continent context. Uniformity of presenting a single message is important and therefore those involved in training HCW must use the National guidelines as training material for all HCWs.

Vaccination should be provided to all HCWs (both frontline and non-clinical) and should be rolled out as soon as possible. A clear record of immunization should be registered with Occupational Health. These records must be available for future reference, if HCW become infected post vaccination from a new variant of SARS COV 2.

COVID-19 has had a major impact on the mental health of overworked healthcare staff who worked tirelessly during the two waves of the disease. The loss of close colleagues, family members and the impact on their immediate communities has had a heavy toll. Managers and administration should ensure that the HCW are provided with sufficient and consistent support, both mental and physical, so that HCW feel confident to deliver healthcare to the highest standard of safety

4.1.1. All staff

Public Health Interventions (see section below on Standard Precautions)

- Frequent hand hygiene either by hand washing or the use of alcohol-based hand rub (ABHR) to prevent contact transmission
- Correct cough etiquette and respiratory hygiene to prevent droplet or airborne transmission

- Social distancing. Keep a distance of up to 1.5 to 2 m when in contact with other people to reduce airborne transmission
- Do not touch your face unless your hands are clean
- Always perform hand hygiene before and after touching the clinical notes (persistence on cardboard and paper has been reported) or any other surface in the patient or healthcare zone, to prevent contact transmission
- Cover the clinical notes with a plastic folder which can be easily cleaned and disinfected with alcohol in areas where aerosol generating procedures (AGPs) are performed
- Personal Protective Equipment (PPE) should be procedure based
- Do not write in the clinical notes while wearing gloves
- Never spray the gloves with alcohol
- Always remove gloves after contact with the patient and the environment and perform hand hygiene
- Environmental cleaning and disinfection should be carried out regularly and with increased frequency in clinical areas.

4.1.2. Laboratory staff

Laboratory staff should follow NHLS protocols laid out for the safe handling of samples.

- Take the correct required samples and send to the laboratory for processing
- Ensure nasopharyngeal and other samples are processed and reported timeously
- Ensure that the necessary precautions are taken during specimen collection and handling

4.1.3. Clinical staff

Specific precautions for clinical staff are laid out in the Clinical Management Guidelines which should be followed when dealing with suspected or confirmed COVID-19 patients.

4.1.3.1 Implement effective management of patients (triage, isolation, treat promptly, discharge) The public entering the healthcare facility should report to the triage area where their temperature is taken and a record of temperature and clinical symptoms is documented

If the person is suspected of COVID-19, s/he is referred to a designated area for further investigation or admission, to the healthcare facility. The person should be attended to promptly and a provisional diagnosis made, to be confirmed by laboratory tests.

4.1.3.2 IPC protocols

Triage area: there should be at least a 1.5 m distance between the HCW and the person presenting for triage. The area must be well ventilation.

It is recommended that the HCW wear a surgical mask, and eye cover. The use of gloves and aprons, is optional. Alcohol based hand rub must be available. Frequent cleaning of all surfaces is essential after each patient.

Isolation and COVID-19 areas: Patient stations, such as beds and accessories must have at least 1.5m between each station. The area should have good ventilation, either from open windows or mechanical ventilation. Provisions for respiratory support must be provided. Privacy curtains are recommended and should be changed with the bed linen, after each patient has been discharged.

HCW should wear a surgical mask, eye cover, gloves and apron when dealing with the patient. Meticulous hand hygiene before and after patient contact is essential (WHO)

High Care areas: These are areas where aerosol generating procedures are performed. The area should be laid out with at least 1.5m distance between beds, good ventilation, adequate IPC supplies including PPE and respiratory support is provided. Frequency of cleaning and disinfection is increased.

HCW should wear well fitted respirators, eye protection, gloves, aprons or body cover

4.1.3.3 IPC supplies

All healthcare facilities must have adequate IPC supplies:

- Alcohol based hand rub at each station
- Well-fitting surgical masks
- Well-fitting respirators
- Eye shield or goggles
- Gloves
- Aprons or gown (body cover)
- Environmental cleaning and disinfection products.

4.1.4. Facility IPC team

The IPC team may be made up of at least an IPC practitioner or focal person, a medical doctor, Occupational Health, but it is accepted that this is not always possible.

The role of the IPC person is to

- Train HCWs on evidence-based IPC measures and the appropriate use of PPE (using SA guidelines)
- Conduct regular IPC ward rounds to provide support to the staff and ensure compliance
- Carry out frequent audits on IPC practices and availability of supplies
- Report all IPC matters to the Infection Control Committee and other relevant management groups
- Support clinical teams in implementing IPC practices
- Ensure proper cleaning of equipment and the environment
- Monitor compliance with hand hygiene
- Ensure that appropriate signage for COVID-19 is in place
- Monitor COVID-19 admissions and identify, report and contain clusters and outbreaks amongst healthcare workers and patients

4.1.5. Occupational health

- Evaluate HCWs at risk for COVID-19
- Monitor and report occupationally acquired SARS-CoV-2
- Report clusters and outbreaks of COVID-19
- Follow-up and monitor contacts of COVID-19 patients
- Provide mental health and wellbeing support to all HCW

4.1.6 Visitors

During times of high community transmission

Ideally, no visitors should be allowed to visit patients who have been admitted (see IPC controls below) when there is a national surge and the numbers of COVID-19 admissions are high.

- Exceptions include the caregiver of an admitted child, and close family members of patients who are extremely ill. Only one or two visitors should be allowed. All visitors (who have been screened upon entry to the facility) should wear a surgical mask, and be instructed on hand and cough hygiene, as well as social distancing.6
- Visitors should not be allowed into areas where AGPs are commonly performed.

During times of low community transmission, and vaccination

• With the availability of vaccination, visiting of patients by up to two family members at a time is permitted provided the visitors have been screened at entry and carry out hand hygiene, wear a mask and maintain social distance.

5. Environmental Controls for IPC measures in COVID-19

New evidence in aerobiology suggests the environment plays a crucial role in transmission of SARS COV2(Y Li, Uni Hong Kong). The WHO Working Group on ventilation have put forward a simple yet comprehensive roadmap which can apply to high- and low-income countries alike.7 The virus is expelled from the mouth of a person and disperses as a cloud of varying size of infectious particles which are most dense at the point of exit. The heavier particles fall by gravity- these are also known as **short range aerosols**.



As the cloud travels towards the person in range, it becomes less dense, with the number of particles becoming lighter- these are **long range aerosols**, and can be inhaled into the respiratory tract. The number of particles entering the other person's airways reduce as the distance increases, and even less if the ventilation rates are good (6 air changes/ hour).

⁶ https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/hcf-visitors.html#visitorshealthcare-facilities

⁷ Roadmap to improve and ensure good indoor ventilation in the context of COVID-19, WHO 2021. https://apps.who.int/iris/handle/10665/339857

The reduction of number of particles being expelled can be reduced by wearing a mask, cloth or surgical, and inhalation can be reduced by also wearing a mask. While aerosol or airborne (IPC term) transmission is now recognised, it must be stated clearly that this is usually a route of transmission in overcrowded, poorly ventilated spaces (WHO) and is considered a minor route of transmission, the major route still being via droplets.

In light of these new findings this section has been revised accordingly.

Triage area

The triage area ideally should be located at the entrance of the health facility and should have good natural ventilation. There should be a table and chairs for the HCW and enough space for the public to be seen. All surfaces must be cleaned between each patient. The temperature probe and other medical devices must also be wiped regularly.

Masks, eye protection are recommended for the staff- aprons and gloves are optional. Meticulous hand hygiene is recommended. Staff must not touch their face, mask or glasses without first decontaminating their hands

The waiting area should have chairs spaced at 1.5m and hand rub available.

All persons coming to the triage area must wear a cloth mask.

5.1 Patient Placement

Confirmed patients with COVID-19 not requiring ICU care should be accommodated either in a single room or in cohort isolation. Suspected patients should preferably be accommodated in a single room until the diagnosis has been confirmed to prevent negative patients to become infected. There should be a hand wash basin, or provision for hand rub, and good natural ventilation should be provided.

5.1.1 Single room

- Single occupancy room with en suite toilet facilities
- Natural ventilation of 60l/sec per patient or 6 air changes per hour (ACH)
- Hand wash basin
- Medical waste bin

5.1.2 Cohort isolation

- Bed distance must be 2m from the foot of one bed to the foot of the opposite bed so that the head of each bed is further than 2 m.
- A distance of at least 2.5m between the centre of one bed to the centre of the next bed or 1.5m from edge of one bed to the next.
- Natural ventilation of 60l/sec per patient or 6 air changes per hour (ACH)
- Shared toilet facilities must be cleaned and disinfected regularly (2- 4 hourly).

5.2 Intensive Care

- Bed spacing- 3m or more to allow ease of movement of staff and equipment
- Good ventilation- 160L/sec/patient or 12 air changes per hour (ACH)
- Closed suctioning: use fresh sterile water each time to clean the suction catheter.
- Open suctioning **NOT RECOMMENDED** because in increases the risk of aerosolization of SARS-CoV-2 and the transmission of other pathogens transmitted via the airborne route, e.g. Pulmonary tuberculosis
- Dedicated ventilator equipment with single patient use circuit
- Bacterial/viral filter on expiratory limb of ventilator equipment
- Dedicated patient care equipment
- Perform hand hygiene and change gloves after each patient contact
- Do not touch face, front of apron, mask, goggles or face shield during a clinical ward round
- Keep patient charts far from the patient's bed (outside the room, if possible)
- Always perform hand hygiene before and after touching the clinical notes (persistence on cardboard and paper reported)

5.3 The built environment

Water, sanitation and hygiene have a major role to play in IPC particularly in remote health facilities and clinics.⁸ Environmental Health practitioners should be consulted regarding these areas.

5.3.1 Ventilation

The evidence for improved ventilation to reduce long range aerosol transmission is mounting particularly in closed, overcrowded and poorly ventilated areas. Improved ventilation across all healthcare facilities is highly recommended.

5.3.1.1 Hospital accommodation

- Where possible, natural ventilation is preferred giving air exchange of 60L/sec /patient.
- Mechanical ventilation, this must be checked by the engineers and records kept of airflow and air changes per hour (ACH) which should be a minimum of 6 ACH.
- IPC team to check airflow using a smoke test at regular intervals
- The hospital engineers should work with the IPC team to ensure ventilation is adequate particularly in the areas where AGPs are performed, including the operating theatres.

5.3.1.2 Operating Theatres

All elective surgery has been suspended during the pandemic. However, in case of an emergency operation, a PCR test for COVID-19 is required and must be negative.

- Patients who have been vaccinated in the past 28 days will also require a COVID-19 test before proceeding.
- Should a COVID-19 patient need surgery, the operating theatre ventilation must be checked for ACH and airflow. It is not necessary to convert the operating theatre into negative ventilation as long as there are sufficient air volume (160L/sec) changes (up to 24 ACH) to

⁸ National Practical Manual for the Implementation of the National Strategic Framework, March 2020, p 129. Available from: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents)

keep a high dilution factor particularly when carrying out AGP. The conversion to negative pressure from positive pressure is very expensive and difficult.

- Respiratory support equipment must be provided for and properly maintained.
- After the operation, the Operating Theatre should be cleaned and disinfected as normal.

5.3.1.3 Maternity-labour ward

- The delivery suites should have good bed spacing and ventilation.
- Operating rooms should be similar to conventional operating theatre environment
- Relatives' (spouses) attendance during labour is discouraged.
- After the baby is born, the mother and child can be housed together until discharge

6. IPC Controls for COVID-19 containment

Only the most salient features of IPC are described here. Please follow the IPC guidance in the Practical Manual for Implementation of the National Infection Prevention and Control Strategic Framework (2020).

IPC Precautions: In addition to Standard Precautions, Droplet and Contact Precautions are recommended for COVID-19.³ For aerosol generating procedures, airborne precautions (including use of a respirator for the HCW performing the procedure) should be instituted. Limit the number of HCW attending a patient who are involved in the procedure.

6.1 Standard Precautions⁹

Standard precautions are aimed at reducing the risk of transmission of microorganisms from recognized and unrecognized sources and must be applied at all times by all HCW. It includes the following:

- Hand hygiene
- Environmental cleaning
- Patient placement
- Appropriate use of personal protective equipment
- Decontamination of medical devices
- Respiratory Hygiene and cough etiquette
- Safe injection practices, prevention of injuries from sharp instruments, post-exposure prophylaxis and medical surveillance
- Safe handling of linen and laundry
- Appropriate use of antiseptics, disinfectants and detergents
- Healthcare waste management
- Principles of asepsis10

⁹ National Practical Manual for the Implementation of the National IPC Strategic Framework, March 2020, p 13. Available form: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents) 10 National Practical Manual for the Implementation of the National IPC Strategic Framework, March 2020, p 13. Available form: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents)

Patients and staff may serve as reservoirs for microorganisms, even if only colonised and not exhibiting any signs of infection.

6.2 Transmission-based Precautions for COVID-19¹¹

The type of transmission-based precautions (TBP) depends on the route of transmission of the pathogen. It is noteworthy, that while there may be one prominent TBP, usually there are secondary routes that have to be taken into account, for example, droplet and contact precautions. There are also other aspects such as environmental control and administrative control that must also be taken into account, thereby ensuring that the IPC practices are applied holistically.

Table 1 summarizes precautions for COVID-19 which are a combination of droplet and contact precautions.

Туре	Recommendations	Alternatives
Patient	See Sections 5.1 and 5.2	Shared toilet facilities to be cleaned
placement		regularly (2- 4 hr)
Hand Hygiene	Before and after each patient contact (5 Moments	Use ABHR between patients if hands
	of Hand Hygiene)	not visibly soiled
	Before donning (putting on) PPE	
	After removing PPE	
PPE - for contac	t and droplet precautions ¹²	
Gloves non-ster	ile, surgical mask, apron (or gown), goggles or face shie	eld;
respirator (whe	n performing aerosol generating procedures)	
Environmental	Frequent cleaning 2- 3 times/ day. Water,	Use universal wipes which is a
cleaning	detergent. Wipe over with disinfectant such as	combination of detergent and
	1:1000 ppm available chlorine or 70% alcohol	disinfectant.
Terminal	Remove all linen, healthcare waste and medical	Use universal wipes which is a
cleaning	equipment and send for disinfection or discard.	combination of detergent and
	Clean with water and detergent. Wipe with	disinfectant
	disinfectant such as 1:1000 ppm available chlorine	
	or 70% alcohol	
Patient care	Dedicated equipment.	None
equipment	Disposable where possible	
	Shared equipment to be heat or chemical	
	disinfected after cleaning.	
Linen	Change linen regularly.	Disposable linen not recommended
	Send to laundry marked as infectious	
	Temp 65- 70° C cycle	
Healthcare	Healthcare risk waste (HCRW) for secretions	
waste	(infectious)	
	Dispose of in a single-use box bagged with a red	
	liner, labelled as "Infectious waste"	
	PPE for handlers (see appendix A)	
Catering	Wash in automated dish washer.	Wash in hot water and allow to dry.
	No additional precautions required	
	Disposable cutlery and crockery not recommended	

11 National Practical Manual for the Implementation of National Strategic Framework, March 2020; p 115. Available form: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents)

12 Circular H25/20: Guidelines for PPE use during the coronavirus disease 2019 (covid-19) Western Cape Government: Health 25 March 2020

Туре	Recommendations	Alternatives
Patient transportation	Patient to wear surgical mask during transfer Advise Emergency Medical Staff (EMS) that patient has COVID-19 Transfer as a single case. Do not transport other patients at the same time. There is no need to cover the patient in plastic during transport.	Guidance for EMS and others when transporting patient
Visitors	Ideally <u>no visitors are allowed in the COVID-19</u> wards or treatment areas.	Mother of admitted child or close family members of extremely sick patients should be allowed in with a surgical mask. They should be instructed on hand hygiene and social distancing. Access control should apply and visitors have to be screened for COVID-19.
Duration of isolation	Patient should remain in COVID-19 isolation area until discharge; Once discharged, patient to self-isolate for 10 days after first symptoms began (mild diseases) and for 10 days after clinical stabilisation (off oxygen, for moderate to severe disease.)	In some countries, resolution of symptoms plus two negative RT-PCR tests for SARS-CoV-2 is required for de-isolation. Given the shortage of test kits, South Africa has adopted clinical criteria for disease resolution and de-isolation.

Table 1: Contact and Droplet precautions for COVID-19 patients

6.3 Aerosol generating procedures (AGP)

An aerosol generating procedure (AGP) is where a large number of droplets are generated during a medical procedure, usually relating to the mouth and respiratory tract. Evidence of transmission from other procedures where aerosols might be generated, such as orthopaedics, have no reported risk of transmission with SARS-CoV-2.

During AGP, a respirator should be worn with a gown and/ or plastic apron, **single** pair of non- sterile gloves and eye protection, either goggles or a face shield.

In high-risk areas where AGPs are being conducted (e.g., ICU); some examples

- Intubation, extubation and related procedures such as manual ventilation and open suctioning
- Tracheotomy/tracheostomy procedures (insertion/open suctioning/removal)
- Bronchoscopy
- Surgery and post-mortem procedures involving high-speed devices
- Some dental procedures (such as high-speed drilling)
- Non-Invasive Ventilation (NIV) such as Bi-level Positive Airway Pressure (BiPAP) and Continuous Positive Airway Pressure ventilation (CPAP)
- High-Frequency Oscillating Ventilation (HFOV)
- High Flow Nasal Oxygen (HFNO), also called High Flow Nasal Cannula
- Induction of sputum for laboratory test

In addition, the following are also considered AGP

- Collecting nasopharyngeal and oropharyngeal swabs;
- Chest physiotherapy;
- Reprocessing ventilator circuits and respiratory equipment;
- Cardiopulmonary resuscitation, including bag-mask ventilation;

Nebulization: to mitigate potential risk, a meter dose inhaler with a spacer should be used. The spacer can be washed and wipe with alcohol between each use.

6.4 IPC Signage

Clear signage should be posted at the entrance of all wards to inform all staff of IPC requirements and protocols (See Appendix with posters for COVID 19).

7. Hand hygiene

7.1 Why?

Hands are most frequently in touch with patients, surfaces and parts of the healthcare worker's body, such as the face, nose, and mouth (Fig 3). To remove microbes optimally, hands must be thoroughly and systematically washed paying speciall attention to the most contaminated areas, such as the fingers and thumbs. Follow the WHO 5 Moments of Hand Hygiene as outlined in the National IPC Implementation Manual.





7.2 Types of hand hygiene

- Hand washing with soap and water followed by drying.
- Use of alcohol-based hand rub (ABHR) containing 70% propyl or isopropyl alcohol with emollient. (See WHO guidance regarding local production¹⁴).

¹³ National Practical Manual for the Implementation of the National Strategic Framework, March 2020. Available from: (http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents)

Remember!!

- When washing hands, friction is necessary to remove transient microbes from the hands. (Fig 4)

- When using ABHR, make sure all surfaces are covered. Dip fingers in the ABHR in your palm and then move to the other surfaces (Fig 5)

- Gloves do not offer total protection. ALWAYS WASH HANDS AFTER REMOVING GLOVES

- Never apply ABHR to gloves. It damages them and increases the risk of contamination

- Do not write in the clinical notes while wearing gloves used on a patient.





Figure 3: Washing hands; start with palm-to-palm

Figure 4: Using (ABHR start with dipping fingers

8. Appropriate use of Personal Protective Equipment

Personal protective equipment (PPE) is specifically used to protect clinical and non-clinical health workers (including cleaners, ancillary staff and food service workers) from exposure to body fluids or from droplet or airborne pathogens, chemicals or heat. The use of PPE is based on risk assessment and evidence of the route of transmission for a given microbe.

14 Guide to local production: WHO recommended hand rub formulations (2009): available from https://www.who.int/gpsc/5may/Guide to Local Production.pdf

8.1 Types of PPE to use

Table 2 sets out the generic PPE principles to decide on the appropriate PPE to use. See poster for appropriate use of PPE (Appendix A). There is no **evidence that foot or head gear protects** against droplet and contact precautions and should be avoided.

It is now recommended that all clinical staff should wear surgical masks when consulting or examining patients, irrespective whether the patient is known to have COVID-19 or respiratory symptoms. It is essential that hand hygiene is carried out after each patient contact.

See Appendix B for detailed recommendation for PPE use for:

- Inpatient services (hospital wards, ICU, overnight/holding wards, step-down facilities)
- Services at PHC facilities, outpatients, emergency units and temporary facilities
- COVID-19 patients cared for at home (or in hostels)
- Emergency medical services (EMS)
- Community health worker (CHC) services
- Forensic pathology services (FPS) and mortuary services15

¹⁵ Circular H25/2020: Guidelines for PPE Use during the Coronavirus disease (COVID-19). Western Cape Government: Health. 25 March 2020

TYPE OF PPE	CLINICAL STAFF (nurses, doctors, EMS) Providing direct care to COVID-19 patients or patients with respiratory symptoms	NON-CLINICAL STAFF (admin staff, porters, catering staff) coming into distant contact with COVID-19 patients and contaminated surfaces	NON-CLINICAL STAFF (cleaners) coming into distant contact with COVID-19 patients and contaminated surfaces	PATIENTS with RESPIRATORY symptoms	PATIENTS <u>without</u> RESPIRATORY symptoms
Gloves	A single pair of non- sterile gloves Change between patients Double gloving not recommended	Change when leaving COVID-19 area	Reusable long rubber utility cleaning gloves (ideally up to elbow) Change after completed cleaning contaminated area	None	None
Face cover	Surgical Mask for general care of all patients Respirator (non valved) for aerosol generating procedures	Surgical mask (one per shift, if integrity maintained) If no patient contact is expected a cloth mask is acceptable	Surgical mask	Surgical mask	All patients should wear a cloth mask is part of the universal masking policy. If no cloth mask is available, then surgical mask may be used
Aprons	Change when visibly contaminated Change between patients. Discard after aerosol- generating procedure	Change when leaving COVID-19 area	After each work session (in absence of clinical contact)	None	None
Face shields, or visors, or goggles, or another eye covers	Wash clean, disinfect and reuse	None	Wash clean, disinfect and reuse	None	None

Table 2: Appropriate PPE use

8.2 Type of face covers16

Usually in healthcare only two types of face covers offer adequate protection to the healthcare worker, i.e., surgical mask and respirators.

¹⁶ National Department of Health. National Practical Manual for the Implementation of the National IPC Strategic Framework, March 2020. Available from: (<u>http://www.health.gov.za/index.php/antimicrobial-resistance/category/629-infection-prevention-and-control-documents</u>)

8.2.1 Surgical masks (medical)

Surgical masks (medical) are made of several layers of paper and protect against splashes and droplets. These are widely used in healthcare but should be reserved for HCW working in the clinical areas.

DOUBLE MASKING IS NOT INDICATED. USE A SINGLE WELL-FITTING SURGICAL MASK

Note the following guidelines:

- ✓ At any time if surgical masks are touched by unwashed hands, get wet, are soiled, or are removed from the face, they will become contaminated and will no longer provide effective protection. They should then be discarded.
- ✓ When going on break, the surgical mask must be discarded and a fresh one worn when returning to the clinical area
- ✓ Masks that are not wet, were not touched by unwashed hands and were not removed from the face, can be worn for up to 8 hours.
- ✓ COVID-19 patients when inside a dedicated COVID-19 ward, where staff are wearing PPE, do not need to wear masks.
- ✓ COVID-19 patients when outside a dedicated COVID-19 ward must always wear a surgical mask. The mask can be used for up to 8 hours.

8.2.2 Respirators

Respirators (N95, FFP2, FFP3) are specifically designed to filter out smaller particles and are recommended for use in airborne precautions such as when dealing with TB, measles or chickenpox. Non-valve respirators are recommended to prevent droplet transmission from the wearer and provide source control. The valve is designed to open during exhalation and close during inhalation, to prevent air from entering through the valve. Exhaled air from a pre-symptomatic or asymptomatic person can transmit the virus through the valve and should be avoided.

Note the following guidelines:

✓ Seal tests should be performed each time a respirator is used (i.e. when it is first put on)

- Negative seal check:

- Coned shape respirator: Cup hands over respirator without excessive pressure. Breathe in sharply. A light collapse of the respirator should be felt with no air leaking in around the face to-face piece seal.
 - Duck- bill and V-flex type respirator: Breathe in sharply. The respirator should collapse inwards.

+ Positive seal check:

- Coned shape respirator: Cup hands over respirator. Blow out. A build-up of air should be felt with no air leaking out around the face-to-face piece seal edges of the device.
- Duck-bill and V-flex type respirator: Breathe out forcefully; the respirator should expand on the exhale.

s

should ideally be used once only and should be discarded once safely removed. However, as there is a global shortage of Respirators, reuse is strongly encouraged and is preferable to having no respirator.

✓ If HCWs are performing aerosol-generating procedures (e.g., sample collection) on several COVID-19 patients sequentially, they may use the same respirator and eye protection for the session; they must however change apron and gloves between patients.

- ✓ If there is a shortage of respirators, a face shield over a surgical mask may be used.
- ✓ As the outer surface of the respirator will become heavily contaminated with the virus during aerosol-producing procedures, HCWs should take great care not to touch the outside surface and must perform careful hand hygiene after removing it.
- ✓ Do NOT attempt to disinfect the respirator as this destroys its integrity. There are tried and tested methods that allow disinfection for reuse but these are expensive and should only be considered if there is a serious shortage. However, the integrity of the respirator cannot be guaranteed and it might give a false sense of protection to the HCW.
- ✓ Note that obviously damaged and visibly contaminated respirators cannot be reused.



Without touching the respirator, slowly lift the bottom strap from around your neck up and over your head.



Lift off the top strap. Do not touch the respirator.



Store respirator in a paper bag with your name on it. Do not crush the respirator when storing it.

8.2.3 Non-medial (Cotton/ fabric) masks for healthcare workers

Cotton masks are not indicated for clinical healthcare work because of limited filtration and protection against droplets or splashes. There is also the "wicking effect" which increases the risk of mucous membrane contamination. Cloth masks manufactured in South Africa were tested in the USA along with other cloth masks from different countries. The control used was a surgical mask. The South African cloth mask offered 70% reduction at source which was considered highly effective.

As part of universal masking, all persons including patients, clinical and non-clinical staff are required to wear a cloth mask when in public and at the workplace travelling on public transport. 17 A cloth mask is recommended when non-clinical staff are interacting with the public within health facilities.

8.3 Use of PPE during labour and breastfeeding

The currently available evidence does not include the second stage of labour and delivery as an aerosol-generating event.18'19 In light of this, the recommended PPE for obstetric staff performing deliveries is as follows:

¹⁷ Department of Co-operative Governance and Traditional Affairs. Regulations issued in terms of section 27 (2) of the Disaster Management Act, 2002. 29 April 2020

¹⁸ Health protection Scotland. Aerosol generating procedures. National Services Scotland. Version 1. November 2019

¹⁹ Centre for disease control and prevention. Clinical Questions about COVID-19: Questions and Answers Updated April 16, 2020

- Labour and deliveries of all women: PPE as indicated to reduce exposure risk to blood and bodily fluids i.e. surgical mask, gloves, apron/gown and goggles/visor.
- Caesarean section under general anaesthetic or with regional anaesthesia and a high probability of requiring intubation: PPE as indicated for aerosol-generating procedure (AGP), respirator, gloves, apron/gown and goggles/visor. Limit the presence of non-essential staff in the operating theatre. Consider the use of larger screens to separate patient and operating team and the use of a clear box over the patient's head to minimise aerosol spread during intubation and suctioning. 20/21/22

Note: In keeping with the universal masking recommendation, all women admitted to obstetric wards should wear a cloth mask or surgical mask, and all women in labour and those undergoing a caesarean section under regional anaesthesia, should wear a surgical mask. All obstetric staff should wear a surgical mask during all clinical care, and a cloth mask (non-medical mask) in non-clinical areas of the healthcare facility e.g., tea rooms, meeting rooms, cafeteria.

For post-natal care of the infant, COVID-19 infected mothers should wear surgical masks when feeding their baby for 14 days after their symptoms have resolved as mother to baby transmission via respiratory droplets can occur. They should perform hand hygiene before handling their baby and before expressing breastmilk. There is no evidence of viral presence in breastmilk and breastfeeding is strongly encouraged.

8.4 Extended use of PPE

Usually, PPE is discarded after a single patient or procedure, however, because of an acute shortage of PPE during the COVID-19 outbreak, the WHO and CDC are considering extended use and/or reuse of certain PPE. For South Africa, it is recommended that the extended use of PPE is preferable to reprocessing, the latter being expensive, not validated and the integrity of the PPE cannot be guaranteed (Table 3).

Type of PPE	Extended use	Reprocess	
Gloves (non-sterile)	No	No	
Surgical masks	Yes. Until damp or torn, or to end of	No	
	shift. Change if contaminated		
Respirators	Yes. Up to 1 week for same HCW (as TB	Yes, can be reprocessed under	
	protocol), unless respirator integrity or	controlled conditions. Each cycle must	
	leak-proof seal is compromised	have be tested for integrity and seal	
Aprons	Yes, if not visibly contaminated	No	
Gown	Water resistant - yes if not visibly	Yes - launder cotton gown	
Cotton gowns and	contaminated	No- plastic aprons discarded	
aprons	Re-used during providing care to the		
	same patient or in the same cohort area		
Goggles	Yes, but do not contaminate hands	Yes - wash with soap and water. Dry.	
		Wipe over with alcohol	

²⁰ Royal College of Obstetricians and Gynaecologist. Coronavirus (COVID-19) Infection in Pregnancy. Information for healthcare professionals. Version 8. 17 April 2020

21 American College of Obstetricians and Gynaecologists Guidelines on COVID. 23 April 2020. Available from (https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/03/novelcoronavirus-2019)

22 Weil Cornell Medicine and Columbia. Interim Guidelines for Suspect and Confirmed COVID-19 for Obstetrics (Antepartum, Labor and Delivery, Post-partum, and Ambulatory Care), Neonatal ICUs, and Well-Baby Nurseries March 25, 2020.

Face shields Yes, but do not contaminate han		Yes - wash with soap and water. Dry.	
		Wipe over with alcohol wipes	

Table 3: Extended or reprocessing of PPE

8.5 Donning and doffing of PPE23

A video demonstrating the correct sequence to put on (Don) and remove (Doff) PPE can be downloaded from:

https://player.vimeo.com/external/400607941.hd.mp4?s=af075e8c9647a23114424834c1e73f866a7 3e5f7&profile_id=174&download=1_

Dispose of all PPE in an infectious waste container. The poster summarises the correct way to put on and take off PPE. (Fig 6)

WASH HANDS OR USE AN ABHR AFTER REMOVING GLOVES AND AFTER REMOVING ALL PPE

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (DONNING)	SEQUENCE FOR TAKING OFF PERSONAL PROTECTIVE EQUIPMENT (DOFFING)
Wash your hands before putting on the PPE. PPE should be put on in an order that minimises contamination. The apron, mask, goggles and gloves must be put on in that order. See guidance on each below.	Wash your hands before taking off the PPE. PPE should be removed in an order that minimises contamination. The gloves, apron, goggles/visor, and mask must be removed in that order.* Wash your hands after taking off the PPE. Discard PPE in infectious waste container. See guidance below.
 Apron Wash hands Slip it over the head and tie the stings behind the back 	 Gloves Securely grasp the outside of glove with the opposite gloved hand; peel off; discard as infectious waste Slide the fingers of the un-gloved hand under the remaining glove at the wrist; peel off; discard as infectious waste
 Surgical mask or Respirator Secure each tie or elastic at the middle of head and neck Fit flexible band to nose bridge Fit snug to face and below chin Fit-check respirator by blowing into it (air should not leak out) 	 Apron or Gown* (See Note) Wash hands Unfasten or break apron/gown ties Pull the apron away from the neck and shoulders, touching the inside of the apron only and bring it forward and over the head Turn the apron inside out, fold or roll into a bundle and discard as infectious waste
Goggles or Visor	Goggles or Visor* (See Note)

²³ Circular H25/20: Guidelines for PPE use during the coronavirus disease 2019 (covid-19) Western Cape Government: Health 25 March 2020

 Place over face and eyes Adjust band to fit comfortably 	 Remove goggles/visor from the back by lifting head band or ear pieces Place in designated receptacle for disinfecting 	
Gloves	Surgical mask or Respirator	
 Hold the edge of the glove as you pull it over your hand Extend to cover wrist Once gloved, do not touch other surfaces 	 Untie or break bottom ties, followed by top ties or elastic. Remove by handling the ties only and discard as infectious waste. Wash hands 	
*Note. When it is practically difficult to remove the apron/gown before the visor/goggles, then the		

visor/goggles may be removed before the apron/gown.

Figure 5: Poster for donning and doffing of PPE

8.6 Norms for PPE requirement

The amount of PPE and hand hygiene products needed per healthcare worker per shift is difficult to assess but should be calculated and adequate stocks must be available to ensure the safety of the staff. Table 4 illustrates a rough example of what might be needed as stock per healthcare worker per day or per 12-hour shift. Example: 10 patients allocated per HCW per 12-hour shift

Predicted PPE + consumable usage <u>per day</u> for a hypothetical 30-bed COVID-19 ward and a 30-bed COVID-19 ICU

Type of PPE or consumable	Calculation	Predicted usage per day (COVID-19 ward)	Predicted usage per day (COVID-19 ICU)
Hand hygiene			
Alcohol-based hand rub*	4-8 HH opportunities per	3 litres	6 litres
(3ml per time)	hour X 24 hrs x 30 pts		
Liquid hand soap	2-4 HH opportunities per	1.5 litres	3 litres
(3ml per time)	hour X 24 hrs x 30 pts		
Paper towels (after soap	2-4 HH opportunities per	1500 paper towels	3000 paper towels
and water)	hour X 24 hrs x 30 pts		
Disinfectants			
70% alcohol (for	30-bed ward vs ICU	2 litres	4 litres
disinfection of equipment)			
1:1000 ppm sodium	30-bed ward vs ICU	10 litres	15 litres
hypochlorite (for surface			
disinfection)			
PPE			
Non-sterile gloves (change	1-2 pairs per hour x 24 hrs	720 pairs	1440 pairs
between patient contact)	for care of 30 patients		
Goggles/visors	Clean + disinfect and	20 googles	40 goggles
	share between shifts		
Plastic aprons (change if	2-4 required for care of	60 aprons	120 aprons
contaminated + after AGP)	each patient x 30		
Cotton gowns with apron	Allocate 2 per HCW per	60 cotton gowns	120 cotton gowns

(alternative to apron alone	shift (1 extra for laundry)		
for ICUs)			
Surgical masks	Allocate 2 per HCW per	60	120
(for HCW use)	shift; replace when wet,		
	damaged or contaminated		
N95 respirator (for AGP	Allocate 1 per HCW per	30	60
only)	shift for AGP; N95 can be		
	reused if integrity ok		
Water resistant gowns (for	Disposable after AGP	30	60
AGP only)			
HH = hand hygiene, HH* use of alcohol-based hand rub is preferred to save time, unless hands are visibly			
soiled, AGP = aerosol-generating procedures; note: frequency of patient contact is much higher in ICU			

soiled, AGP = aerosol-generating procedures; note: frequency of patient contact is much higher in ICU settings with at least a doubling of usage for ABHR, gloves, aprons to be expected. Note 2: revision of PPE extended use and re-use guidance may reduce the predicted amount of PPE required.

Table 4: Example of what might be needed as stock per healthcare worker per day or per 12-hour shift

9. Environmental cleaning

Human coronaviruses can remain infectious on surfaces for up to 9 days. The SARS-CoV-2 virus has been detected after up to 72 hours in experimental conditions.²⁴ Therefore, cleaning the environment is paramount and is covered in detail in the National IPC Implementation Manual (2020).

To summarise, each area of the healthcare facility must be cleaned at least twice daily, with a proper schedule, checklist and programme. In high-risk areas (COVID-19 triage, isolation ward and ICU settings), the environment must be cleaned and disinfected <u>at least 3-4 times per day</u> and checked by the supervisor each time.

The cleaning can be **validated** using visual inspection and fluorescent markers and a record of cleaning must be kept.

Following thorough cleaning, <u>surfaces are wiped</u> (NOT SPRAYED) with disinfectants such as 1:1000 ppm chlorine or 70% alcohol, as recommended.25 Universal disinfectant wipes which combine cleaning and disinfection are impregnated with peracetic acid and or hydrogen peroxide and may be used but these are expensive. Hypochlorite must be used at the correct dilution of 1:1000 ppm to ensure maximum efficacy (Table 5).

Product	Chlorine available	How to dilute to 0.1% (1:1000ppm) (for COVID cleaning)
Sodium hypochlorite – liquid bleach	3.5%	1 part bleach to 32 parts water (e.g., 30ml bleach in 970ml water)
Sodium hypochlorite – liquid bleach	5%	1 part bleach to 47 parts water (e.g., 20ml bleach in 980ml water)

²⁴ Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. Journal of Hospital Infection. 2020;104(3):246-51 <u>https://doi.org/10.1016/j.jhin.2020.01.022</u> (accessed March 22, 2020).

²⁵ World Health Organization. Water, sanitation, hygiene, and waste management for the COVID-19 virus. 23 April 2020.

NaDCC (sodium dichloro- isocyanurate) – powder	60%	1.7 grams to 1 litre water
NaDCC (1.5g/tablet) – tablets	60%	1 tablet to 1 litre water
Chloramine – powder	25%	4 grams to 1 litre water

Table 5: Method for diluting hypochlorite required different concentrations

Environmental spraying of walls, floors, ceilings and passages in health care facilities with chlorine is not recommended. There is no evidence that transmission from these areas occurs

Body spraying of humans with any chemical or product in any situation including entrances to healthcare facilities, is not warranted. The chemicals used may be toxic to the skin, eyes and respiratory tract26 and may aggravate the acquisition of SARS-CoV 2.

10. Healthcare waste Management

SARS-CoV-2 is a fragile enveloped virus which is susceptible to heat, chemicals and UV light. There is no evidence of spread or infect humans from healthcare waste generated in the facilities if the existing healthcare waste management policies are followed where all HCRW will be handled as infectious waste.

HCRW includes all PPE used in triage, COVID-19 clinical areas for PUI and confirmed cases, and isolation facilities. It also includes disposable medical devices used for the care of such patients.

A single red bag placed inside a cardboard box marked "Infectious waste" is used to discard all HCRW. When ¾ full, the red bag is tied, HCRW container is labelled and transported to the point of collection for disposal.27^{,28}

11. Persistence in Sewerage

SARS CoV2 is a fragile virus that does not remain viable in sewerage. HCF without municipal sewerage systems that have chemical toilets or similar are safe to clean provided the usual PPE worn by the municipality workers affords adequate protection.

²⁶ Mehtar et al. Deliberate exposure of humans to chlorine- the aftermath of Ebola in West Africa. Antimicrobial Resistance and Infection Control (2016) 5:45 DOI 10.1186/s13756-016-0144-1

²⁷ South African National Standard (SANS) 10248-1- Management of Health Care Waste, Part 1: Management of healthcare risk waste from a healthcare facility

²⁸ World Health Organization. Water, sanitation, hygiene, and waste management for the COVID-19 virus. 23 April 2020.

12. Bodies, burial and post mortem

12.1 Dead Bodies

The WHO recommendations for a person dying of COVID-19 have been published²⁹

- The dignity of the dead, their cultural and religious traditions, and their families should be respected and protected throughout;
- To date there is no evidence of persons having become infected from exposure to the bodies of persons who died from COVID-19, therefore
- wrapping the body or the coffin in plastic is not recommended,
- Before attending to a body, ensure that the necessary hand hygiene and personal protective equipment (PPE) supplies are available for standard precautions including hand hygiene, appropriate use of PPE, and environmental cleaning,
- PPE for routine use will be gloves and apron, however if there is a risk of splashing, face protection, such a face mask, face shield or goggles may be worn
- After removing all medical devices, ensure that any leaking from orifices is contained
- Keep movement and handling of the body to a minimum
- Wrap body in cloth (shroud) or a body bag if leakage is expected and transfer it as soon as possible to the mortuary area;
 - There is no need to disinfect the body before transfer to the mortuary area;
 - Body bags are not necessary, although they may be used for other reasons (e.g., excessive body fluid leakage); and
 - No special transport equipment or vehicle is required.

Health care workers or mortuary staff preparing the body (e.g., washing the body, tidying hair) should wear appropriate PPE (gloves, water resistant disposable gown, face mask, eye protection);

If the family wishes to view the body, they may do so, using standard precautions. They are not allowed to touch or kiss the body. Embalming is not recommended to avoid excessive manipulation. Adults >60 years and immunosuppressed persons should not directly interact with the body.

Where a body has to be moved to private mortuaries/funeral undertakers or government/state mortuaries the process should be aligned with the existing guidelines issued by the National Department of Health.30

12.2 Post mortem (autopsy)

If a person died during the infectious period of COVID-19, the lungs and other organs may still contain live virus, and additional respiratory protection is needed during aerosol-generating procedures (e.g. procedures that generate small-particle aerosols, such as the use of power saws or washing of intestines);

²⁹ World Health Organization Infection Prevention and Control for the safe management of a dead body in the context of COVID-19. WHO interim guidance, 24th March 2020

³⁰ National Department of Health. Environmental Health Guidelines for management of human remains in the context of COVID-19, 27 March 2020.

- Perform autopsies in an adequately ventilated room, i.e. at least natural ventilation with at least 160 L /s/patient air flow or negative pressure rooms with at least 12 air changes per hour (ACH)
- Controlled direction of air flow when using mechanical ventilation
- Only a minimum number of staff should be involved in the autopsy;
- Appropriate PPE must be available as per departmental protocol, including a scrub suit, long sleeved fluid-resistant gown, gloves (either two pairs or one pair autopsy gloves), and face shield (preferably) or goggles, and boots. A respirator should be used in the case of aerosol-generating procedures.
- The mortuary must be kept clean and properly ventilated at all times;
- Lighting must be adequate. Surfaces and instruments should be made of materials that can be easily disinfected and maintained between autopsies;
- Instruments used during the autopsy should be cleaned and disinfected immediately after the autopsy, as part of the routine procedure;
- Environmental surfaces, where the body was prepared, should first be cleaned with soap and water, or a commercially prepared detergent solution; After cleaning, a disinfectant with a minimum concentration of 0.1% (1000 ppm) sodium hypochlorite (bleach), or 70% ethanol should be used.

12.3 Family member

- Any person (e.g. family member, religious leader) preparing the deceased in a community setting should wear gloves for any contact with the body. For any activity that may involve splashing of bodily fluids, eye and mouth protection (face shield or goggles and surgical mask) should be worn.
- Clothing worn to prepare the body should be immediately removed and washed after the procedure, or an apron or gown should be worn;
- The person preparing the body should not kiss the deceased.
- Family and friends may view the body after it has been prepared for burial, in accordance with customs.
- The belongings of the deceased person do not need to be burned or otherwise disposed of.
- Clothes can be laundered and reused.

THERE IS NO EVIDENCE OF POST MORTEM TRANSMISSION AND THEREFORE NEITHER THE BODY NOR THE COFFIN REQUIRES PLASTIC WRAPPING!

13. Repatriation and subsequent quarantine

A guideline on repatriation, quarantine of returning South African Citizens and others has already been developed and circulated and is beyond the remit of this guideline.31

To summarise

- Those who have been vaccinated (and have proof of vaccination) do not require quarantine but must comply with Public Health Interventions (masks, hand hygiene, distance etc)
- Those who have not been vaccinated or have been vaccinated in less than 28 days, should be quarantined for 10 days

³¹ National Department of Health. South African Guidelines for quarantine facilities and isolation in relation to COVID-19. March 2020

Vaccination

The vaccine roll-out for HCW and the public is underway. Guidelines on layout of the vaccine delivery areas has been clearly documented. The IPC guidelines are summarised below

- There must be a waiting area outside the vaccination clinic with 1.5m distance between those in the queue, awaiting vaccine documentation
- Vaccinee must wear a cloth or surgical mask
- Vaccinator must wear a surgical mask- gloves are not recommended
- There must be at least two metres between each station
- The vaccination area must be well ventilated
- Each station will have hand hygiene facilities
- Each station will have surface cleaning facilities
- Each station will have a sharps container which must be discarded when ¾ full.
- Frequent hand hygiene is essential.
- Clear documentation of the vaccination process is required.
- It is recommended that all HCW keep their vaccination certification code with them or at the Occupational Health Department.

14. Summary

These guidelines are subject to change as the situation with COVID-19 develops in South Africa. The guidelines will be updated regularly based on the most recent evidence and updated WHO recommendations.

Appendix A: Appropriate use of PPE



Appendix B: Detailed recommendation for use of PPE32

Inpatient Servi	Inpatient Services (hospital wards, ICU, overnight/holding wards, step-down facilities)			
Setting	Target Personnel	Activity	Type of PPE or Procedure	
Isolation cubicles, rooms, or wards	Patients with COVID-19	Any	Surgical Mask	
where COVID-19 patients are being cared for.	Clinical staff	Providing direct care to COVID-19 patients	Surgical Mask Apron Non-sterile Gloves Eye protection (goggles or visor)	
	Clinical staff	Aerosol-generating procedures* performed on COVID-19 patients (such as nasopharyngeal and oropharyngeal swabbing for testing for coronavirus infections) Respirators** are only worn when performing aerosol producing procedures	N95 Respirator Apron or gown Non-sterile Gloves Eye protection (goggles or visor)	
	Body of deceased	Death of COVID-19 patient	Wrap body with sheets as per usual or place in a body bag PLASTIC COVERING NOT INDICATED	
	Cleaners	Entering the cubicle or room or ward of COVID-19 patients	Surgical mask Apron Long rubber utility cleaning gloves (ideally up to elbow) that can be washed Eye protection (goggles or visor) Closed work shoes	
	Porters and nurses	Transport of COVID-19 patients	Surgical Mask Non-sterile gloves	
	Catering staff	Providing meals inside COVID-19 ward	Surgical Mask Non-sterile gloves	
	Administrative personnel	Administrative staff supporting COVID-19 ward services , who are not usually in direct contact with patients, but would enter the isolation ward.	Surgical mask Non-sterile gloves Maintain spatial distance of at least 1.5 metre, where possible	
	Security personnel	Any	Surgical mask	
	Laundry workers	Laundering of COVID-19 patient linen	Linen to be bagged separate from other linen Surgical mask	

³² Circular H25/20: Guidelines for PPE use during the coronavirus disease 2019 (COVID-19) Western Cape Government: Health 25 March 2020

			Apron Long rubber utility cleaning gloves (ideally up to elbow) that can be washed Eye protection (goggles or visor) Closed work shoes
All types of wards where non-COVID-19 Patients (i.e.,	Patients without COVID-19	Any	Cloth mask
patients who do NOT have COVID-19) are being cared for	Clinical staff	Aerosol-generating procedures* performed on non-COVID-19 patients*	Surgical mask Apron Non-sterile gloves Eye protection (goggles or visor)
	All staff	Any other activity besides Aerosol- generating procedures performed for non-COVID-19 patients	Cloth mask
	Visitors	Visiting patients without COVID-19	Cloth mask
Other areas of the hospital where COVID-19 patients transit (e.g. corridors) but are not directly attended to.	All staff	Any activity that does not involve contact with COVID-19 patients	Cloth mask

* Aerosol-generating procedures (see above)

**respirator must still be used for all other non-COVID-19 indications (e.g. when attend to a patient with confirmed or suspected TB)

PHC Fac	PHC Facilities, Outpatients, Emergency Units and Temporary facilities			
Setting	Target Personnel or	Activity	Type of PPE or	
_	Patients		Procedure	
Triage at Clinics, CHC, OPD. Emergency Units and temporary	Clinical staff	Triage: Preliminary screening of patients (via questions on symptoms and contact with COVID-19 cases) as they enter unit.	Maintain spatial distance of at least 1 metre Surgical mask	
entrances	Patients and escorts who screen positive	While waiting for testing	Move patient to isolation room Provide Surgical mask	
	Patients and escorts who screen negative but have respiratory symptoms	While waiting for consultation	Maintain spatial distance of at least 1 metre. Provide Surgical mask	
	Patients and escorts who screen negative but without respiratory symptoms	While waiting for consultation	Cloth mask	
Administrative areas	All staff including reception, clerical and clinical staff	Administrative tasks that do not involve contact with COVID-19 patients	Cloth mask	
Clinic, CHC, OPD, Emergency Unit and Temporary facility Consultation	Clinical staff	Physical examination of suspected COVID-19 patients	Surgical Mask Eye protection (goggles or visor) Apron Non-sterile gloves	
rooms	Clinical staff	Aerosol-generating procedures performed on suspected COVID-19 patients (such as nasopharyngeal and oropharyngeal swabbing for testing for coronavirus infections) Note that Respirators are only worn when performing aerosol-generating procedures	Respirator Apron or gown Non-sterile gloves Eye protection (goggles or visor)	
	Clinical staff	Physical examination of patients without respiratory symptoms.	Surgical mask Non-sterile gloves	
	Cleaners	Cleaning the vacated room and areas used by a COVID-19 patient	Surgical mask Apron Eye protection (goggles or visor) Long rubber utility cleaning gloves (ideally up to elbow) that can be washed Closed work shoes	
	Body of deceased	Death of COVID-19 patient	Wrap body with sheets or body bag as per protocol	
Entrance to COVID-19 Area	Security personnel.	Any	Surgical mask	

COVID-19 patients cared for at home (or in hostels)			
Setting	Target Personnel or Patients	Activity	Type of PPE or Procedure
Private home or hostel	Patient with COVID-19	When in contact with others	Surgical mask.
	Caregiver (family members and other caregivers)	Direct contact with COVID-19 patients.	Surgical mask Apron. Non-sterile gloves. Eye protection (goggles or visor)
	Contact tracers and medical response teams	Direct contact with COVID-19 and suspected COVID-19 patients	Surgical mask (ideally with visor) Apron. Non-sterile gloves.
	Body of deceased	Death of COVID-19 patient	Wrap body with sheets

Emergency Medical Services (EMS)			
Setting	Target Personnel or Patients	Activity	Type of PPE or Procedure
Ambulance/transfer vehicle/medical evacuation by air	Clinical staff	Care for and transport of suspected/confirmed COVID-19 patients to a referral health care facility	Surgical mask Clean gowns are recommended. Where possible cloth gowns should be used and exchanged at the hospital where the patient is being transferred. If the hospital does not have a cloth gown to exchange, a plastic apron must be used. Non-sterile gloves Eye protection (goggles or visor)
	Clinical staff	Intubation and suctioning of suspected/confirmed COVID-19 patients	Respirator Clean gowns and plastic apron are recommended. Where PPE is limited, cloth gowns should be used and exchanged at the hospital where the patient is taken to. If the hospital does not have a cloth gown to exchange, a plastic apron must be used. Non-sterile gloves Eye protection (goggles or visor)
	Clinical staff	Patients without respiratory symptoms	Surgical mask Goggles Apron (if required following IPC risk assessment) Gloves if dealing with body fluids

driver/pilot	suspected/confirmed COVID-19 patients to a referral health care facility	contract and driver's compartment is sealed. If driver's compartment not sealed, then wear a surgical mask. If assisting with loading or patient care, then surgical mask Gowns are recommended. Where PPE is limited, cloth gowns should be used and exchanged at the hospital where the patient is taken to. If the hospital does not have a cloth gown to exchange, a plastic apron must be used. Non-sterile gloves
Clinical staff	Preparing equipment for transportation	Remove all non-essential equipment. Place essential equipment in impervious bag, take out only if necessary.
Clinical staff	Interaction with health care facility- transporting a patient	Keep in contact with receiving facility regarding patient's clinical condition and expected time of arrival. Upon arrival at facility, keep patient in ambulance until facility staff give go ahead for patient to enter. Driver to liaise with facility staff. The path and route for transporting the patient must be clear. Wear surgical masks, gowns and non-sterile gloves If the hospital does not have a cloth gown to exchange, a plastic apron must be used
Clinical staff	Interaction with Port Health at ports of entry	Port Health will arrange access to EMS team, notify EMS of which gate to use to access patient from aircraft or holding area or isolation area.
Planned Patient Transport	Transporting non- emergency patients between health care facilities	Surgical mask
Suspected COVID- 19 patient	While being transported	Surgical mask
Cleaners	Cleaning the vehicle after transport of suspected COVID-19 patients to the referral facility	Surgical mask Apron Eye protection (goggles or visor) Long rubber utility cleaning gloves (ideally up to elbow) Closed work shoes

Community Health Worker (CHW) Services			
Setting	Activity	CHW PPE	People/Patient PPE
Field: Outdoor points (bus or taxi rank) and Indoor points (mall)	Distributing educational materials	Maintain at least 1m distance from people. Cloth mask Frequent hand hygiene	Maintain at least 1m distance from people. Cloth mask Frequent hand hygiene
Field: In communities but outside homes	Distributing educational materials	Maintain at least 1m distance from people. Cloth mask	Maintain at least 1m distance from people. Cloth mask Frequent hand hygiene
	Distributing chronic medication and general supplies	Maintain at least 1m distance from people Cloth mask	Maintain at least 1m distance from people. Cloth mask Frequent hand hygiene
Inside homes	Assisting patient who has COVID-19 with or without any other diseases (CVA, chronic ulcer, septic wound, etc.) except for TB	Surgical mask (single use; ideally with visor) Gloves (single use) Apron (single use) Alcohol-based hand rub (use before and after remove and discard gloves, apron and mask) Infectious waste disposal plastic bag	Surgical mask
	Assisting TB patient who does NOT have COVID-19	Respirator (single use) Alcohol-based hand rub Infectious waste plastic bag	Surgical mask
	Assisting TB patient who DOES have COVID-19	Respirator (single use) Gloves (single use) Apron (single use) Alcohol-based hand rub Infectious waste plastic bag	Surgical mask
	Assisting patient with respiratory symptoms	Surgical mask (single use) Gloves (single use) Alcohol-based hand rub Infectious waste plastic bag	Provide surgical mask to patient
	Assisting patient without respiratory symptoms	Maintain 1m distance from patient.	Cloth mask Frequent hand hygiene

Forensic Pathology Services (FPS) and Mortuary Services			
Setting	Target Personnel or Patients	Activity	Type of PPE or Procedure
Private home, hostel or hospital	Caregivers, hospital staff, mortuary staff transporting and preparing the body and Forensic Pathology staff transporting the body	Direct contact with deceased COVID-19 and suspected COVID-19 patients	Surgical Mask Apron or gown Non-sterile gloves Eye protection (goggles or visor)
	Body of Deceased COVID-19 patients	Deceased body being removed	Usual procedures for removing body NO PLASTIC COVERING
FPS vehicle used to transport deceased	Cleaner	Cleaning of vehicle	Surgical mask Apron Eye protection (goggles or visor) Long rubber utility cleaning gloves (ideally up to elbow) that can be washed Closed work shoes
Mortuary	Forensic pathology staff	Conducting autopsy (if required)	Respirator Gown Apron Eye protection (goggles or visor) Cut-proof synthetic mesh gloves Closed work shoes