

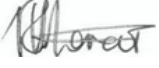


University of Cape Town
Faculty of Health Sciences



STANDARD OPERATING PROCEDURE
Infection Control Guidelines for laboratory
workers during the COVID-19 Pandemic
(This SOP only applies to laboratory work that does
not involve viral growth/propagation)












SOP Category: OHS	Review Date: May 2023 or as required
Compiled By: Prof Adrian Brink	
Approved By: Chair FHS OHS Committee	Signature: 
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Approved By: COO, UCT	Signature: 
Target Group: Laboratory Workers not involved in viral growth/propagation	Date and Version: 5 June 2020 (Version 1)
1. Scope and Purpose:	<ul style="list-style-type: none"> • Transmission of SARS-CoV-2 (the causative agent of COVID-19) is primarily via respiratory droplets which come into direct contact with mucosal surfaces, or are transferred to mucosal surfaces by hand. • Laboratory workers may be at risk of acquiring SARS-CoV-2 by working with respiratory samples in an unsafe manner. However the greater risk is acquisition of SARS-CoV-2 from infected co-workers. • All work with respiratory samples must take place in a class II biosafety cabinet (BSC). • This SOP only applies to laboratory work that does not involve viral growth/propagation, which can only be done in a BSL3 facility. <p>Refer to the following two documents:-</p> <ol style="list-style-type: none"> 1. World Health Organisation Interim guidance: Cleaning and disinfection of environmental surfaces in the context of COVID-19 (15 May 2020). 2. World Health Organisation Interim guidance: Laboratory biosafety guidance related to coronavirus disease (COVID-19) (13 May 2020).
2. Preventative measures for Covid-19 infection	Hand hygiene and environmental cleaning (i.e. behaviour) changes are critical measures for the prevention of COVID-19 infection.
	<p>Measures must be put in place to reduce the risk of transmission in the workplace. These include:</p> <ul style="list-style-type: none"> • Regular hand hygiene with soap and water or alcohol-based hand rub (ABHR), • Adequate provision of ABHR,

	<ul style="list-style-type: none"> • Wearing of surgical (medical) masks only when working with patient samples or other infectious material • Wearing of cloth mask when working in proximity (<1.5m) with others, doing laboratory work where historically it was not required to wear a mask. • Reducing the number of workers in the workplace where possible (e.g. shifts, work from home), • Improving ventilation by opening windows in shared spaces if possible, • Staggering lunch and tea times, • Coughing / sneezing into the elbow, • Regular cleaning and disinfection of high touch surfaces and equipment.
<p>3. Risk of acquiring infection in laboratory workers</p>	<p>Laboratory workers are at risk of acquiring infection following:</p> <ul style="list-style-type: none"> • Exposure to a case as a result of community transmission, • Interpersonal transmission within the work environment, • Accidental inoculation from a specimen as a result of non-adherence to recommended infection prevention control measures, • Direct inoculation onto mucosal membranes (eyes, mouth or nose) following contact from contaminated surfaces and following laboratory accidents and spills. <p>To date, there have been no cases of documented transmission of SARS-CoV-2 to laboratory workers from clinical samples, which suggests that most, if not all, cases in laboratory staff are a result of transmission in the community or transmission between colleagues in the workplace. It is therefore important to ensure that every effort is made to implement measures to limit transmission between staff members in the workplace, which is the focus of this guideline.</p>
<p>4. General principles</p>	<ol style="list-style-type: none"> 1. When arriving at work- <ul style="list-style-type: none"> • Decontaminate your hands using alcohol based hand rub (ABHR), • Wear the appropriate personal protective equipment (PPE) for the work you will be doing, if applicable. 2. When working- <ul style="list-style-type: none"> • Keep a safe distance (at least >1 meter, ideally >2 meters) between yourself and your colleagues while working if possible, • Wear a face mask when working in an area where others are present, • If you work alone in an office, you may elect not to wear the mask, • Meetings/mass gatherings during this time are strongly discouraged. Electronic meeting platforms are encouraged. If meetings are conducted, all present must wear face masks and maintain at least 1 meter separation. 3. When taking a tea or lunch break- <ul style="list-style-type: none"> • In this situation the PPE should be removed (you cannot eat or drink with a mask on) and hands decontaminated, • Tea room is a medium risk area as long as social distancing is maintained and ventilation is adequate, <ul style="list-style-type: none"> ○ Open all windows, ○ Stagger the number of persons taking a break at the same time,

	<ul style="list-style-type: none"> ○ Maintain a safe distance while eating and drinking, ○ Keep conversation and interaction to a minimum, ○ Wash or decontaminate your hands before entering the tea room and upon leaving, ○ Put on your PPE upon returning to the laboratory after decontaminating your hands. <p>4. Before leaving for home</p> <ul style="list-style-type: none"> ● Decontaminate your hands ● All staff and students are encouraged to leave the campus once laboratory-work is completed for the day. <p>5. Other:</p> <ul style="list-style-type: none"> ● Avoid touching your face, mouth or nose, ● Avoid persons who are sick and display respiratory symptoms, ● Stay at home if you are sick (see later), ● Tasks that can be done at home should be done at home, ● Take note of the laboratory signages and observe infection control notices, ● Cover your cough or sneeze with a flexed elbow or a tissue, throw the tissue in the bin. Immediately wash your hands with soap and water for at least 20 seconds, ● Other potential interventions include - <ul style="list-style-type: none"> ○ shift work if feasible, ○ conduct of duties from home, in line with UCT HR guidance and policies, ○ Utilisation of staff from other sections of the laboratory to facilitate shift work.
<p>5. Hand hygiene</p>	<ul style="list-style-type: none"> ● Employees should practise effective hand hygiene by washing hands with soap and water for at least twenty seconds, ● 70-80% alcohol-based hand rub (ABHR) may be used frequently as an alternative, ● There should be ABHR dispensers at the entrance and exit areas which must be used by all staff, ● A designated person must be responsible for ensuring the ABHR is replaced regularly, ● ABHR must also be easily accessible and available in laboratory working areas ABHR is only applied to bare hands as it is an antiseptic which works on skin, ● All staff must decontaminate their hands upon entering the laboratory before wearing personal protective equipment (PPE such as gloves or masks which follow a strict sequential routine as detailed below), ● Carry out hand hygiene before and after bathroom, kitchen and tearoom entry using ABHR, ● Before leaving the laboratory, after discarding gloves in dedicated waste bins, decontaminate hands using ABHR. ● Although practiced in the clinical setting in individual cases, it is recommended that alcohol is not applied to gloved hands in the laboratory setting over prolonged periods, as it might damage disposable gloves and increase the risk of contamination.
<p>6. Types of face masks</p>	<p>The current recommendation in the laboratory environment is:</p> <p>1. Surgical (medical mask):</p>

	<ul style="list-style-type: none"> • To be worn whenever working with patient samples or other infectious material in generally restricted access areas and not open laboratories, • These masks can be worn for 4-6 hours and should be disposed of appropriately, • At present, decontamination and reprocessing of surgical masks is not recommended as no effective and practical method for decontaminating surgical masks has been described, • If evidence emerges that allows for decontamination of surgical masks, this will be disseminated. <p>2. N95 respirators</p> <ul style="list-style-type: none"> • To be worn only under very specific circumstances, • N95 masks are not routinely recommended for laboratory staff working on procedures that are performed in a biosafety cabinet (BSC), • Some N95 masks are fitted with a valve to facilitate exhalation – while this makes the mask more comfortable to wear, it reduces the efficiency of the mask in preventing transmission from the wearer. <p>3. Face shields:</p> <ul style="list-style-type: none"> • Face shields have efficacy ranges of 68% to 96% in reducing droplet exposure, • These may be an alternative during limited supply of surgical masks and for persons who wear glasses, • Advantages include added barrier to touching one’s face, effective communication, durability and ease of cleaning. <p>4. Cloth masks</p> <ul style="list-style-type: none"> • Use of cloth masks has been recommended for reducing the risk of community transmissions in and outside of the workplace setting, • Commuters travelling in taxis and other forms of public transport, as well as people spending time in spaces where physical distancing is difficult to practise, are particularly encouraged to wear cloth face-masks, • Wearing of cloth masks is recommended when working in proximity (<1.5m) with others, doing laboratory work where historically it was not required to wear a mask, • The purpose of this mask is to reduce person to person transmission and environmental contamination of common spaces and laboratories, • These can be re-used following washing with soap and water, and ironed when dry, • Alternatively, they can be placed in boiling water for 5 minutes, allowed to cool and dry, • Cloth masks should be worn at all times when visiting public spaces such as the cafeteria.
<p>7. Use of laboratory coats</p>	<p>Ideally, a risk assessment should be conducted before an appropriate lab coat is chosen.</p> <p>It is recommended that disposable laboratory coats are used within highly restricted laboratories (e.g. BSL-2 laboratories):</p>

	<ul style="list-style-type: none"> • The use of disposable lab coats is required for work in all BSL-2 labs. • Lab coats with elastic cuffs are recommended to avoid contamination. • Snaps, vs buttons, are recommended for easy removal. • Never roll up or push up lab coat sleeves; it is important to cover the arms to the wrist. • If a laboratory coat becomes grossly contaminated, it should be handled as hazardous waste. <p>For the rest of the laboratory staff either 100% cotton, 100% polyester, or cotton/polyester laboratory coat blends are advised.</p>
<p>8. Washing of laboratory coats</p>	<p>Option 1: Laundered by Professional Healthcare Laundry Service (e.g. Hygiene Laundering Services)</p> <p>Option 2: In-House Laundry</p> <ul style="list-style-type: none"> • After wearing the laboratory coats are sprayed with 70% ETOH (recommended by DEFF auditors) and placed in a “linen bin” prior to washing. • Can use a domestic washing machine and tumble dryer. • Generally, use appropriate detergents and bleach based on the apparel manufacturer’s label instructions. • Both chlorine-based bleach and oxygen-based bleach products can be effective in the wash process for inactivating viruses. • Wash on the hottest water temperature setting recommended by the garment manufacturer and avoid short/rapid cycles. • After closing the washer, clean and disinfect according to directions of your chosen disinfectant product. • Wipe down the machine door, handles, and buttons, as well as door knobs and other surface areas that might have been touched in the laundry room during the process. • If the bag used to bring the apparel items to laundry room is disposable, discard the bag in the appropriate waste container. If the bag is not disposable, wipe the bag handle/straps and interior with an appropriate detergent-disinfectant. • Immediately wash your hands or use an alcohol-based hand sanitizer. • After the wash cycle is completed, remove the garments from the washer and place immediately into the dryer. • Dry the load completely on the warmest cycle recommended by the garment manufacturer.
<p>9. Correct use of masks and PPE</p>	<p>Practise appropriate precautions when donning and doffing a face mask and other PPE (if required), and follow the correct sequence as shown in the following figure:</p> <ul style="list-style-type: none"> • Always perform hand hygiene before putting on PPE • The order for putting on PPE is laboratory coat, apron or gown (where required), surgical mask, eye protection (where required) and then gloves last. • The order for removing PPE is gloves first, apron or gown, eye protection and the surgical mask last. • Appropriate use of PPE includes ensuring use of long-sleeved lab coats and gloves in designated sections.

	DONNING ORDER FOR PUTTING ON PPE	DOFFING ORDER FOR TAKING OFF PPE
	<p>hand hygiene (soap or alcohol handrub)</p>  <p>put on apron or gown</p>  <p>put on surgical mask or N95 respirator</p>  <p>put on eye cover</p>  <p>put on non-sterile gloves</p> 	<p>hand hygiene (soap or alcohol handrub)</p>  <p>remove gloves</p>  <p>remove gown / apron</p>  <p>remove eye cover</p>  <p>remove N95 respirator</p>  <p>hand hygiene (soap or alcohol handrub)</p> 
PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE		
	<p>Adhere to the following measures when using a face-mask:</p> <ul style="list-style-type: none"> • The face-mask must cover the nose and mouth completely. Face-masks should not be lowered when speaking, coughing or sneezing, • Only use a mask that has been washed and ironed (if using a cloth mask), • Wash your hands before putting the mask on, • Place the mask with the correct side facing your face, and ensure that it covers both your nose and mouth properly, • Tie the strings behind your head, or if you are using elastic bands, make sure these are tight, • Make sure it fits well. Move it around to get the best fit, • Once you have put on the mask, DO NOT TOUCH YOUR FACE again until the mask has been removed, • When you take it off, undo the ties, and carefully fold the mask inside out, hold it by the strings/elastic and discard it, or place the mask in a container for washing (if using a cloth mask), • Wash your hands thoroughly and dry before doing anything else. 	
<p>10. Guidance for disinfection of non-disposable items</p>	<p>70% ethanol is easily available, and no alternatives are advised. ABHR may contain emollients and these would leave a residual smell. Bleach will leave a residual smell that would make breathing uncomfortable.</p> <p>For disinfecting non-machine-washable items overnight (or over day for night staff), the following recommendations pertain.</p> <p>Preparation:</p>	

	<ol style="list-style-type: none"> a. Label mask with the owner's name neatly somewhere with a permanent marker. b. Label a brown paper bag similarly c. 70% ethanol spray bottles <p>Disinfection at the end of the day (before leaving work):</p> <ol style="list-style-type: none"> a. Take mask off, put on a flat disposable surface (e.g. paper) b. Spray liberally BOTH sides with 70% ethanol until soaked (not just damp) c. Place mask in brown paper packet; do not press closed or seal; allow good air flow d. Allow to dry overnight, e.g. on a clean shelf in the lab 																					
<p>11. Working with patient/research participant samples</p>	<p>All patient/research participant samples should be treated as potentially infectious, as part of standard good laboratory practice. Handling of any respiratory sample (whether for SARS-CoV-2 testing or for other testing) should be undertaken under a Class II biosafety cabinet. SARS-CoV-2 is a respiratory borne pathogen and is effectively transmitted through respiratory samples (NPA, OPA, nasal washes, sputum, tracheal aspirates and bronchoalveolar lavage samples).</p> <p>SARS-CoV-2 cell culture and isolation can ONLY be undertaken under Biosafety Level III conditions.</p> <p>The recommended practices for different specimen types are as follows:</p> <table border="1" data-bbox="544 1016 1533 1727"> <thead> <tr> <th data-bbox="544 1016 831 1093">Sample type</th> <th data-bbox="831 1016 1209 1093">Common tests/assays</th> <th data-bbox="1209 1016 1533 1093">Processing precautions</th> </tr> </thead> <tbody> <tr> <td data-bbox="544 1093 831 1240">Respiratory samples (NPA, sputum, tracheal aspirate etc)</td> <td data-bbox="831 1093 1209 1240">Viral PCR, MCS, TB culture,</td> <td data-bbox="1209 1093 1533 1240">Class II BSC</td> </tr> <tr> <td data-bbox="544 1240 831 1352">Serum / blood</td> <td data-bbox="831 1240 1209 1352">Antibody tests, antigen detection, chemistry, haematology</td> <td data-bbox="1209 1240 1533 1352">Standard precautions</td> </tr> <tr> <td data-bbox="544 1352 831 1429">Body fluids / aspirates</td> <td data-bbox="831 1352 1209 1429">MCS, Chemistry, cell counts, cytology</td> <td data-bbox="1209 1352 1533 1429">Standard precautions</td> </tr> <tr> <td data-bbox="544 1429 831 1615">Tissue</td> <td data-bbox="831 1429 1209 1615">MCS, histology</td> <td data-bbox="1209 1429 1533 1615">If formalin fixed – standard precautions If fresh and being crushed – Class II BSC</td> </tr> <tr> <td data-bbox="544 1615 831 1688">Stool</td> <td data-bbox="831 1615 1209 1688">MCS, antigen detection, faecal fat</td> <td data-bbox="1209 1615 1533 1688">Standard precautions</td> </tr> <tr> <td data-bbox="544 1688 831 1727">Urine</td> <td data-bbox="831 1688 1209 1727">MCS, chemistry</td> <td data-bbox="1209 1688 1533 1727">Standard precautions</td> </tr> </tbody> </table>	Sample type	Common tests/assays	Processing precautions	Respiratory samples (NPA, sputum, tracheal aspirate etc)	Viral PCR, MCS, TB culture,	Class II BSC	Serum / blood	Antibody tests, antigen detection, chemistry, haematology	Standard precautions	Body fluids / aspirates	MCS, Chemistry, cell counts, cytology	Standard precautions	Tissue	MCS, histology	If formalin fixed – standard precautions If fresh and being crushed – Class II BSC	Stool	MCS, antigen detection, faecal fat	Standard precautions	Urine	MCS, chemistry	Standard precautions
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<p>12. Use of the BSC</p>	<ul style="list-style-type: none"> • Turn off UV lamp and turn on blower, close sash, allow fan to run for 5 minutes to purge the air. • Disinfect BSC by wiping down interior surfaces. Wipe towards yourself, in straight horizontal lines. Each time, overlap the previous wipe by 10-25%. • Surface decontaminate all required items before placing in the BSC. • Place all items required (waste receptacles, discard pans containing appropriate disinfectant, pipettes and tips, reagents, media, and other necessary items) in rear of BSC. • Organise items away from air vents so as not to disrupt airflow, minimise movement within BSC. • Segregate clean and dirty items within BSC. 																					

- After placing hands inside the cabinet, allow the air flow to stabilise before beginning work.
- Minimise movements inside BSC. Exit BSC slowly. Upon re-entering, wait for air to again stabilise.
- When finished, remove all items slowly and decontaminate with appropriate disinfectant and place into the proper receptacle and disinfect all interior BSC surfaces as before.
- BSC maintenance: daily wiping, UV lamp, weekly smoke tests, 6-monthly servicing.

13. Environmental cleaning

Due to the potential survival of the virus on surfaces for several days in the absence of cleaning, all premises, surfaces, and areas potentially contaminated with SARS-CoV-2, either by droplet or touching, should be cleaned thoroughly at regular intervals and disinfected each time.

Environmental cleaning with water and the following household detergents & disinfectants are known to be effective.

Antimicrobial Agent	Concentration
Ethanol	70%
Sodium hypchlorite	0.1 – 0.5% 0.05-0.1%
Povidone-iodine	10% (1% iodine)
Glutaraldehyde	2%
Isopropanol	50%
Benzalkonium chloride	0.05%
Sodium chlorite	0.23%
Formaldehyde	0.7%

In the laboratory setting, the 2 most commonly used disinfectants are sodium hypochlorite and ethanol.

- 70% ethanol has been shown to have a stronger effect on two different coronaviruses (mouse hepatitis virus and transmissible gastroenteritis virus) after one-minute contact time on hard surfaces when compared with 0.06% sodium hypochlorite
- Tests carried out using SARS-CoV showed that sodium hypochlorite is effective at a concentration of 0.05 and 0.1% after five minutes
- An additional list of agents effective against SARS-CoV-2 is available at <https://echa.europa.eu/covid-19> or <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>.

The use of 0.1% sodium hypochlorite (dilution 1:50 if household bleach at an initial concentration of 5% is used) after cleaning with a neutral detergent is suggested for decontamination purposes. For surfaces that could be damaged by sodium hypochlorite, 70% ethanol is needed for decontamination after cleaning with a neutral detergent.

The following recommendations pertain:

- All frequently touched areas, such as all accessible surfaces of laboratory benchtops, door handles, the toilet and bathroom and kitchen, tea-room surfaces, should be carefully cleaned and disinfected at least twice daily (beginning and end of daytime work

	<p>shift) (Some guidelines suggest three times a day during the COVID-19 pandemic),</p> <ul style="list-style-type: none"> • Walls, floors and windows should be cleaned once a day as per current protocols, • Cleaning to be supervised by dedicated personnel and should be documented on a log sheet (Annexure A), <p>Where available, the use of invisible fluorescent pens on random surfaces to monitor cleaning by the managers should be carried out. The markers are placed on surfaces and the environment (may use a template) and detected using ultra-violet light when cleaning has been inadequate.</p>
<p>14. Cleaning staff</p>	<p>Staff engaged in environmental cleaning and waste management should:</p> <ul style="list-style-type: none"> • Wear appropriate PPE (disposable plastic apron, mask, protective glasses and domestic gloves) • Follow correct donning and doffing of PPE (Figure in Section 7) • Discard disposable PPE as potentially infectious material and in accordance with NHLS SOPs. • Decontaminate non-single use PPE such as domestic gloves using the available products (e.g. 0.1% sodium hypochlorite or 70% ethanol).
<p>15. Spills and Laboratory Accidents</p>	<p>All laboratory accidents should be reported to the laboratory manager. Restrict movement in that area. The spill should be effectively contained and decontamination undertaken. Spill kits available for effective decontamination at designated sites within the laboratory. Adhere to manufacturer recommended dilution concentration and contact time.</p> <p>The use of 0.1% sodium hypochlorite (bleach) is recommended for general disinfection and 1% sodium hypochlorite is recommended for disinfection of blood spills.</p>
<p>16. Waste management</p>	<p>Waste, including technologist and administrative staff's discarded gloves, phone wipes and surgical masks (if applicable) should be treated as infectious clinical waste and handled in accordance with existing UCT FHS policies and local regulations.</p>
<p>17. Mobile Phones</p>	<ul style="list-style-type: none"> • Mobile phones are extensively handled and can be a source of contact transmission. • The options for preventing acquisition and spread of the SARS-CoV2 virus are: <ul style="list-style-type: none"> ○ Leave your phone in a secure place outside the laboratory and use it when you are on break after decontaminating your hands both prior to and after using the phone ○ Wipe the surface of the phone with damp wipes until all marks are removed or according to manufacturer instructions <ul style="list-style-type: none"> ▪ When dry, place in a clean Ziploc bag and close it tightly. ▪ Wipe the Ziploc surface with an alcohol wipe after each use <p>Direct application of alcohol or other disinfectants to the phone is not advised</p>

18. Computers and peripherals	<ul style="list-style-type: none"> • Hand hygiene with soap and water or ABHR before and after using keyboards and mice • Ideally no gloves to be worn when using these devices. If use of gloves is unavoidable (e.g. computers in laboratory environments being used for result entry), consider marking computers as “gloves only” or “no gloves allowed”. • If physical dirt/dust present, disconnect the keyboard/mouse and turn it upside down and shake gently to remove dirt. Or use a keyboard brush to remove dirt • Wipe keyboards and mice using a wipe containing a hospital disinfectant (e.g. 70% ethanol) with a friction for 5 seconds at least once a day and when soiled. Studies have shown this has no effect on the mouse or keyboard. Do not spray/pour disinfectant onto the device or use cloths with excessive fluid as the fluid may enter the device and damage the electronics. • In high risk areas, if possible use keyboard and mouse covers for devices as these have less grooves and are easier to disinfect.
19. Instruments	<p>Instruments should be cleaned regularly according to the manufacturer’s instructions.</p>

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