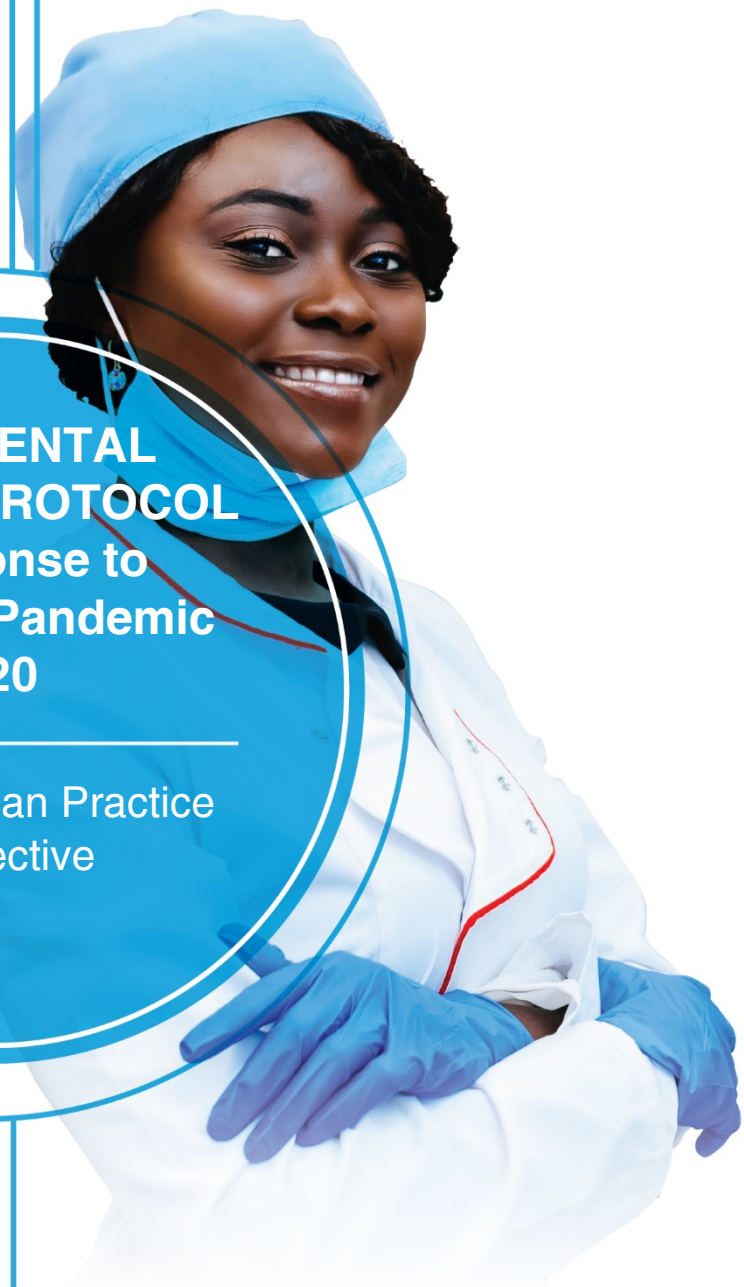


SADA DENTAL CLINICAL PROTOCOL in response to COVID-19 Pandemic 2020

A South African Practice Perspective

SADA

The South African Dental Association **(SADA)** NPC

Registration Number:
1935/0070/92/08

10th May 2020

SADA DENTAL CLINICAL PROTOCOL in response to the COVID-19 Pandemic 2020: A South African Private Practice Perspective

Dentistry Is Potentially Dangerous for Ourselves, Our Patients and Our Staff
Protocol—Covid-19—April 2020

Preamble

South African OHC providers must address the challenges of providing care during and after the COVID-19 pandemic. OHC has been identified as one of the occupations at highest risk for contracting the virus and/or becoming a node of transmission.

Purpose, Guidelines and Standards

The purpose of this clinical document is to guide OHC workers in South Africa by providing clinical and decontamination guidelines for daily procedures in response to the COVID-19 pandemic. The goal is to help reduce the opportunity for uncontrolled virus spread and the guidelines have been created with this sole purpose in mind.

Patients have differing levels of required dental care, and it is unrealistic to expect that all patients will **need** the same level of dental care during the COVID-19 pandemic. However, patients do have the right to expect that the level of care they receive is in line with the evidence of good practice and within their available resources (Steel, 2001). Clinical guidelines are systematically developed statements to assist dental practitioners and patients about appropriate healthcare for specific circumstances (Field and Lohr, 1990). Guidelines also provide recommendations in the management of clinical conditions where variations in practices occur and where effective care may not be delivered uniformly (https://www.fgdp.org.uk/SiD/1-introduction-second-edition). Standards are definable measures by which existing structures, processes and outcomes can be compared (Health Information and Quality Authority, 2011) and are used to describe the specific elements of care that need to be correct in order to optimise patient outcomes. In this document, we aim to provide the reader the most up-to-date (1 May 2020) clinical protocols (Aspirational), which **may not be achievable by every practitioner; therefore, we** will aim to provide the minimum standard of care in any OHC facility in South Africa.

Emergency Protocol Levels

The South African population is highly susceptible to this virus due to the high incidence of respiratory or immunocompromised comorbidities, such as HIV, TB, drug-resistant TB, and the elderly. In addition, many such patients have cardiovascular comorbidities and are malnourished.

Level 1- COVID-19 South African regulations will eventually end this emergency protocol, but our OHC environment will be irreversibly changed, requiring a change in our treatment protocols. There is a need for clear guidelines to define each level as announced by our president until we go back to a post-COVID-19 OHC service.

Some OHC workers in South Africa appear to lack the extensive knowledge needed to manage their practices during these extremely trying times. There is also a lack of advanced knowledge of aseptic procedures and sterility practices dealing with the scourge.

Some practitioners have mistakenly been using or are seeking to use protocols that have not been scientifically tested or devices that have not been accredited, as no well-defined South African document exists on how dentistry should respond to the COVID-19 pandemic. This has led to some OHC workers providing unsanctioned treatment against the law. Unscrupulous traders and business entities are also using this lack of guidance for monetary gain.

Many communications are not only lacking in professionalism but are leading to a dangerous and harmful arena of unproven claims. Therefore, there is an urgent need for a set of South African guidelines for the safety, both physical and financial, of dentistry professionals until a vaccine is available to achieve herd immunity.

The abundance of unscientific as well as inflammatory claims could damage the profession. It leads to poor choices like the purchase of unnecessary and expensive equipment, or implementation of protocols that are not scientifically based, in the pursuit of safety for our patients and staff.

The suggested guidelines should be suitable for reference and seen as the standard of care in dentistry in South Africa. This guideline will ultimately benefit our patients and our country. Many similar documents exist, and we should consult and refer to these when possible with the goal of sharing valuable information on practising dentistry safely in South Africa.

The general mode of transmission is via droplet spread, but in an area where AGP are routinely carried out, the possibility of airborne spread may be high. Under normal working conditions, AGP could lead to a vastly increased viral load per unit of air volume. This could increase the likelihood of aerosol transmission. At this stage, there is no scientific data to the contrary; therefore, it is imperative that maximum preventive measures be applied. The normal running of a dental practice should thus adhere to the recommendations for each level, as announced and published by our government.

The SADA guidelines for proper dental health care facility decontamination and sterilisation protocols, as before COVID-19, must now be expanded to include the full-office environment. Non-clinical office procedures, such as oral communications, payment of accounts, etc., should be treated with vigilance and care.

It is imperative that clear guidelines are put in place for each level as prescribed by the government, which will help identify risk factors and present clear clinical protocols in line with the COVID-19 laws. **The (80:20) rule will apply (Protocol: DHC worker professional judgement). In other words, it is expected that about 80% measures and methods will be guided by the defined protocols, and about 20% are expected to be drawn from the health practitioner's professional skills, experience and judgement. The DHC worker has an important role in following and advocating these rules; if we do so, we will contribute to a culture of resilience that is characterised by altruism and pragmatism.**

National lockdown measures are well defined. The related OHC document (SADA) defines the application of these measures in dentistry: It must be noted that these levels be considered in relationship to the appropriate national level announcement, as this might differ by region. These measurements can be expected to be applicable for an extended time. A realistic estimated timeframe for national Level 1 to be reached is May 2021 to November 2023, should herd immunisation not be achieved earlier). Complacency must be guarded against during easing measures, as this does not indicate lesser risk.

Level 5: High virus spread, and/or low health system readiness.

Dentistry implication: Only life-threatening and severe emergency procedures and necessary AGP allowed

Level 4: Moderate to high virus spread, with moderate readiness:

Dentistry implication: A slight easing of measures and a larger scope of work but still only essential AGP allowed, with recognition of additional safety to avoid spread of any droplet/vapour

Level 3: Moderate virus spread, with moderate readiness

Dentistry implication: AGP allowed with recognition of additional safety measures as per SADA recommendation protocol document to avoid spread of any droplet/vapour

Level 2: Moderate virus spread, with high readiness

Dentistry implication: The standard of OHC facility decontamination and sterilisation practices, occupational safety, including infection prevention and control, as part of the minimum standard of dental care in South Africa, should put these two categories at the same level, and DHCWs should be able to operate normally under the new realm of post-COVID-19 preparedness.

Level 1: Low virus spread, high health system readiness

Introduction

The governmental alert levels in response to the COVID-19 pandemic were announced in order to balance the economic and health risks. They are not designed to guide health policies and protocols.

Health care services include dental care and are allowable at all alert levels. What is not addressed is whether a dental visit constitutes unnecessary risk to the individual or the community. Taking public transport to the dental oral healthcare facility and waiting in a crowded waiting room already increase the risk of infection. This is further exacerbated when dental treatment encompasses aerosol generation.

What is important is that the epidemiologists recognise the prevalence (number of existing cases) and the population incidence (rate of new cases appearing) of COVID-19, which ranges from low to very high. This influences the probability that a patient walking into a dental clinic may be infectious. Although this does not radically influence our dental protocols, it does influence the availability of PPEs, infection control protocols and ventilation controls within our environment.

It must be noted that this is not a new problem for dentistry. Subclinical infected cases of TB, HBV and HIV have forced us to establish rigorous cross-infection control standards in dentistry, many years ago. This means we have to recognise every patient as a potential infected case, for whom all precautions must be in place before we do any treatment. If this protocol is ignored, it could invite litigation and ethical challenges. Although this is not something new, it does create an extra burden.

What is new with the COVID-19 pandemic is the potential for cross-infection and contamination via droplet spread and possible aerosols associated with AGPs generally performed by DHC workers that we have not faced before. We will need to address and alter our protocols where necessary to manage this new threat.

What is also new is the complicating factors of often encountered disease—comorbidities that increase the risk of death, therefore making adjustment of our protocols even more important.

Any new COVID-19 Dentistry protocol can really ignore the alert levels, but it should define what dentistry can do in two stages of the pandemic:

1. The first is the social risk to patients when attending a dental clinic or simply going into a public space, whilst COVID-19 incidence rates are still high. The treatment need has to be substantial to justify such a visit and probably constitutes a clear emergency case. This is probably what we are doing at Level 5.
2. When the epidemic rates of COVID-19 occurrence have subsided enough to allow reasonably safe access to dental facilities, the members of the community (including practising good social distancing, etc.), then routine dentistry might resume. However, this is only legally and ethically permissible if adequate conditions for its safe practice are in place. The safety of the patient and clinical staff must be ensured using evidence-based clinical protocols throughout. This is the focus of the document being prepared here.

General Implications of the Pandemic on Public Health and Dentistry

The recognition that COVID-19 spreads quickly via droplets between people in proximity has led to various strategies, from mask-wearing and education to lockdown regulations, all designed to increase social distancing. Decanting all health sector waiting rooms and queues was one such measure. This was based on the assumption that sick people come to clinics and hospitals and therefore health care centres are high-risk sites for contagion to spread. The advice to “phone your doctor; do not visit them” is still prominent in the media. Making appointments ahead of time still remains good advice for dentistry and medicine to sustain adequate social distancing.

In the private sector, patient volumes were already lower and more controlled by appointments, and this was further reduced to address only emergencies in the lockdown period (ironically, this early period will probably later be regarded as the lowest risk period of the pandemic).

In the public sector, where walk-in patients are the majority, patient flow was radically reduced to minimise waiting room volumes and also to reduce the consumption of precious PPE that was in short supply. A limited appointment-making process exists, which would need to be enhanced in the future.

Clinical Implications of a Return to Routine Dentistry

At Academic Oral Health Centres, we have a group continuously reviewing and discussing the current evidence to determine what is necessary to enable safe return to "routine" general and specialised dentistry and the news is not good (May 2020).

The gist of it is that there is a two-fold risk, since all dentistry procedures involve a **proximity of 15-25 cm** between operator and patient, and, of course, **80%+ also involve aerosols**. Any clinical area/zone where this is happening is de facto an aerosol risk area for patients, clinician and clinical assistants working there**.** Before COVID-19, the general distribution of procedures was mixed e.g. Aerosol procedure on one patient, immediately followed with e.g. a non-aerosol procedure. No grouping of procedures is practised in most private dental practices.

The implications are that N95 masks or equivalent, respirator and full PPE is required for anyone entering/working as well as patients, in that specific area, as long as there is a significant probability that a patient there might be COVID-19 positive. This needs to change for every patient.

Aerosol containment systems must also be in place, in addition to obligatory recommended pre-procedural mouth rinse, HVE and rubber dam use in every case, where it is feasible. This is required for every AGP in dental care.

One of the major problems in dental surgery is ventilation or air-conditioning systems. Each facility should be evaluated, and the risk profile known. Some could be very harmful whilst others have quite a few benefits.

The COVID-19 prevalence is expected to climb for some time, along with patient and clinician exposure risk. It is important to note, supported by COVID-19 publications, that a patient is infective and spreads SARS-CoV-2 two days prior to showing any symptoms. Additionally, some COVID-19 patients show no symptoms at all. This emphasises the urgency for the appropriate disinfection protocols; PPE and engineering controls should be in place for every DHC facility.

Advising elderly patients and those with comorbidities to postpone all clinical dentistry except real emergencies can also mitigate their risk.

Community-based Dentistry Activity

Whilst policy, protocol and health informatics may well continue, community dental surveys, outreach, brushing, varnish, sealant and educational programmes, which are the substance of dental public health at the community level, clearly cannot resume at this time.

Any community clinical activity must clearly adhere to the same guidelines indicated for general dentistry elsewhere in this document.

Any other community-based activity sadly has to remain suspended for now until community prevalence levels of COVID-19 have dropped too much lower levels, and even then, must meet the requirements of safe social distancing and personal hygiene practices.

In Closing

This means that we probably cannot restart "normal" dentistry until we can ensure all these safety requirements are in place, for now, Level 4, emergency care only can be offered, by DHC worker doing non-aerosol-generating procedures, but all must still be gowned and PPE protected, with N95 (or equivalent respirator), face shields, caps, gowns, goggles and gloves.

The risk factor of dental clinician proximity has perhaps not been adequately considered in previous PPE discussions. It has turned out to be critical, according to several studies.

Makes a return to "normal" dentistry look very remote indeed!

DENTAL PROTOCOL IN RESPONSE TO THE COVID-19 PANDEMIC 2020: A SOUTH AFRICAN PRIVATE PRACTICE PERSPECTIVE

Addendum A: Government Levels of Restrictions During the COVID-19 Pandemic and Their Implications on Oral Health Care in South Africa

COVID-19 Pandemic

LEVEL 5: GUIDELINES AND RESTRICTIONS

Definition

Dental Treatment Categories

1. General Dentistry
2. Orthodontics
3. Paediatric Dentistry
4. Periodontology, Implantology and Oral Hygiene
5. Endodontics
6. Prosthodontics
7. Maxillofacial and Oral Surgery

LEVEL 4: GUIDELINES AND RESTRICTIONS

1. General Dentistry
2. Paediatric Dentistry
3. Orthodontics
4. Periodontology, Implantology and Oral Hygiene
5. Prosthodontics
6. Maxillofacial and Oral Surgery
7. Surgery During Level 4

LEVEL 3: GUIDELINES AND RESTRICTIONS

Medical Pre-Assessment of Patients During COVID-19 Pandemic

1. General Dentistry
2. Orthodontics
3. Periodontology, Implantology and Oral Hygiene
4. Prosthodontics
5. Maxillofacial and Oral Surgery

LEVEL 2 and 1: GUIDELINES AND RESTRICTIONS

Level 1 Moderate virus spread, with high readiness

Level 2 Low virus spread, high health system readiness

Dentistry implication: The standard of OHC facility decontamination and sterilisation practices, occupational safety, including infection prevention and control, as part of the minimum standard of dental care in South Africa, should put these two categories at the same level, and DHCWs should be able to operate normally under the new realm of post-COVID-19 preparedness

Summary

Oral Healthcare Facility Preparedness Post-Lockdown Measures

Preamble

- National lockdown measures are well defined. The related Oral and Health Care document (SADA) defines the application of these measures in dentistry.
- These SADA defined levels must be considered in relation to the appropriate national-level announcements, as they might differ by region.
- These measurements are expected to be applicable for an extended time. A realistic estimated timeframe for national Level 1 to be reached is between May 2021 and November 2023, should herd immunisation not be achieved earlier).
- Complacency must be guarded against during easing measures, as this does not indicate lesser risk.

Pre-Procedural Patient Factors

- It is especially important for the oral health care (OHC) team to be well educated and informed on the COVID-19 pandemic.
- The goal is to help inform the patients with knowledge and all the precautions being taken to reduce the opportunity for uncontrolled virus spread at the facility.
- The front staff should be supplied by knowledge as well as all the appropriate forms to aid in the screening of patients, the management at entrance, waiting before the procedure as well as the exit of the patient, by adhering to governmental issued instructions and additional practice policies.
- No cure exists for COVID-19. The most effective way of treating COVID-19 is by preventing the spread of the virus. As part of the screening process, the patient's temperature should be known before entering the premises. No patients with any of the screening answers in the positive should be allowed inside the premises.
- The principal dental health care worker (DHCW) must assume responsibility and the ultimate outcomes of these measures.

Pre-appointment Screening Questions and Instructions

- Does the patient have flu-like symptoms: fever > 38°C, cough, sore throat or difficulty breathing?
- Has the patient or any member of their household tested positive for COVID-19? When was the diagnosis made and when did the patient experience their most recent symptoms, if any? See clinical symptoms below).
- Has the patient experienced any flu-like symptoms (see question 1) in the past fourteen (14) days?
- Has the patient been in contact with someone outside their household who has tested positive for COVID-19 or had flu-like symptoms?
- Has the patient been in contact with somebody with flu-like symptoms who has also received a negative or inconclusive COVID-19 test?
- Did the patient travel to areas marked by transmission of COVID-19?
- Has the patient worked in or attended a health care facility where COVID-19 patients were being treated?
- Has the patient been recently admitted with severe pneumonia?

- Other symptoms: chills, loss of taste, loss of smell, muscle pain, headache.

Emergency COVID-19 related attention: Know your local COVID-19 hotline number and have it posted in a prominent visual place for easy referral.

Emergency COVID-19 related symptoms that require immediate attention

- Persistent pain
- Pressure in the chest
- Uncharacteristic confusion
- Bluish face, lips and an inability to be aroused

Practice Management

- The risk potential area in each practice must be clearly defined by the principal dentist.
- Staff restrictions on entering certain areas should be clearly communicated with all knowing exactly where the red (danger) zone is located.
- The practice should be prepared in such a way that there would be no unforeseen areas where the virus can settle without the ability to sanitise these areas with ease and at regular intervals.
- A practice management plan should be drawn up to identify any risk areas and appropriate precautions taken and maintained.

Ventilation

- Aerosol-Generating Procedures (AGP) pose our biggest risk.
- The volume of air of the practice can easily be virus laden without our knowledge. No test exists to quantify the virus load in the air.
- Knowledge of air distribution is key to making informed decisions.
- It is imperative that air circulates with fresh air, replacing the air volume in the practice.
- Ventilation can be natural (windows) or artificial (a closed or open system). The importance of the aforementioned point is the connection to the neighbouring structures.
- The units can either be connected or unconnected to fresh air outside the building.
- If any circulation takes place, this air must pass through an appropriate HEPA filter (H13/14) or Hyper HEPA filter (or a similar) that can remove micro-elements from the air.
- SARS-CoV-2 is only 0.15 µm in size. Appropriate loose standing air filtration or purification units can help to reduce the viral load in the air.

Sterilisation and Disinfection Protocol (refer to SADA main document)

1. Reception Area Preparation (See diagram below)
    - Protection of staff and patients with this checklist below.
    - Emphasise hand hygiene, respiratory hygiene and cough etiquette for everyone.
    - Patient only OHCF, without guests unless assistance is absolutely required (wait outside OFHC until called in by staff member).

Oral Health Care Facility Entrance

- Hand sanitation, decontamination and PPE donning station upon entry into facility, with instruction to people to use it before entry into any clinical area.
- Screening and recording of history and capturing of temperature with hand held infrared device.

Waiting Area, Bathrooms and Clinical Areas

- Provide supplies such as tissues, alcohol-based hand sanitiser and soap at all the basins. Waste disposal containers - designated domestic and clearly identified Health Care Risk Waste containers.
- Seating arrangement - 2 meters apart, when possible (use barriers, like screens if possible).
- Remove items such as toys, reading materials, remote controls or other communal objects or decontaminate daily where possible.
- Routinely wipe all touchable surface areas with an approved surface cleaner. Include tables, chair arms, doorknobs, light switches, hangers, and anything else with which people come in contact with.
- Ideally, a disinfectant fogger should be used to decontaminate environment of all potential contaminated aerosols and droplets suspended in the air followed by waiting period as recommended by the company.

2. During and After Patient Treatment (See diagram below)

At Chairside in Clinical Areas - During Patient Treatment

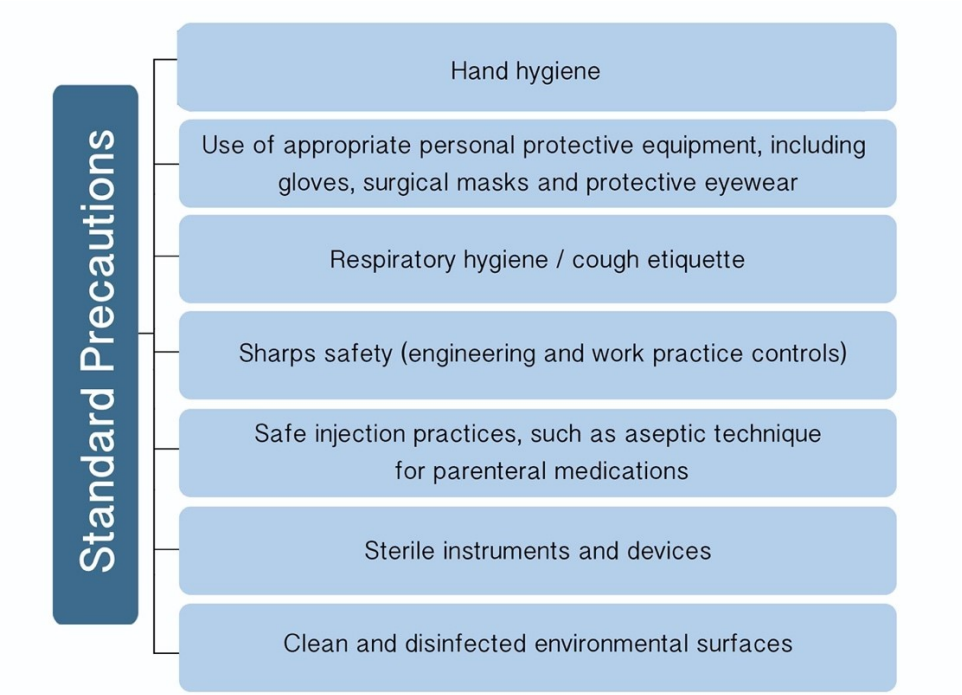
- Obtain informed consent from patient and limit paperwork as much as possible (online email forms is advisable).
- If using paper charting, cover with clear barrier (plastic sheeth so you may read what is needed for appointment.
- Place new chart notes into document away from patient contact area when possible.
- Cover keyboard of computer with disposable, flexible, clear barrier (e.g. plastic wrap) and change between patients.
- Wash hands, glove and open sterilisated instrument pack in view of the patient.
- Let patient rinse with pre-procedural 1% hydrogen peroxide mouth rinse, twice for 30 seconds each.
- Review overall health history, confirm screening questions and review if necessary.
- Determine treatment option, using patient demand, clinical judgment and known facts.
- Utilise lowest aerosol-generating equipment and instrumentation when delivering any type of restorative or hygiene care.

At Chairside in Clinical Areas - After Patient Treatment

- Clean clinical areas while wearing gloves, mask and face shield or goggles.
- Dispose of environmental surface barriers after each patient.
- If surfaces are dirty, clean by using a detergent or soap and water prior to disinfection.
- For disinfection, use approved products effective against SARS-CoV-2 (the cause of COVID-19) and appropriate for the surface, following manufacturer's instructions.
- Replace environmental surface barriers.
- Limit paperwork within the clinical area - rather do it after decontamination in designated and safe area.

Infection Prevention and Control

COVID-19 is a new disease, and we are still learning about how it spreads and the severity of illness it causes. Currently, there is evidence of the virus's ability to survive in aerosols for hours and on some surfaces for days. During OHC procedures, rotary dental and surgical instruments, such as hand pieces or ultrasonic scalers, and air-water syringes are used routinely. Surgical masks protect mucous membranes of the mouth and nose from droplet spatter, *but they do not provide complete protection* against inhalation of airborne infectious agents. There are currently no data available to assess the risk of SARS-CoV-2 transmission during OHC procedures or to determine whether OHC providers are adequately protected when providing dental treatment using the Standard Precautions. To perform any OHC procedure, the Standard Precautions are essential and include:



Each element of the Standard Precautions is described in the sections of this protocol, and in addition, in the "*Infection control guidelines for OHC South Africa*", also published by the South African Dental Association (Oosthuysen et al., 2020). Education and training are critical elements of the Standard Precautions to empower OHC workers to make appropriate decisions and comply with recommended practices.

Personal Protection Equipment (PPE)

- The implementation and use of appropriate PPE have been highlighted by the COVID-19 crisis.
- Untested or non-scientific evidence could be harmful or detrimental to you because of a false sense of security from wearing inappropriate or standard equipment.
- There is a lack of compliance among dental care providers regarding PPE use.
- Clear guidelines on the availability and use of PPE are needed to avoid inappropriate practices that could result in the spread of infection and compromise the safety of patients, staff and dental practitioners.
- Although the best possible options regarding PPE will be provided, they will have no impact if they are not correctly used.
- The sequence for Putting on (**Don, Donning**) and Removing (**Doff, Doffing**) PPE is essential.

- Extended and reuse only apply in an emergency, such as the COVID-19 pandemic coupled with a shortage problem.
- Extended use refers to the practice of wearing the same N95 (or equivalent) respirator for repeated close contact encounters with several patients.
- Reuse refers to the practice of using the same N95 respirator for multiple encounters with different patients, but the respirator is removed (doffed) after each encounter.
- Restrictions are put in place that limit the number of times and in which procedures reuse is allowed.
- Hand hygiene and PPE use cannot be seen or practised in isolation in terms of safety, and both are equally important.

Non-Aerosol-Generating Procedures

- Procedures that do not generate aerosol.
  - Intra-oral examination
  - Intra- and extra-oral x-rays
  - Impressions
- Patient care should be within the guidelines:
  - PPE's
  - Preoperative mouth rinse (1% hydrogen peroxide rinse or 0.23% to 1% povidone-iodine)

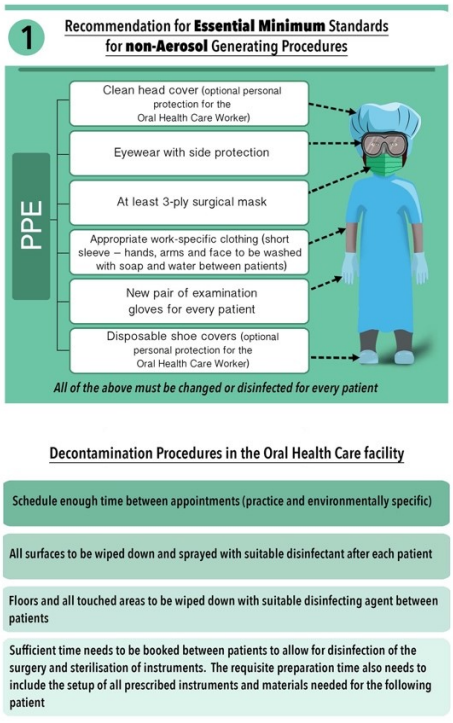
Aerosol-Generating Procedures

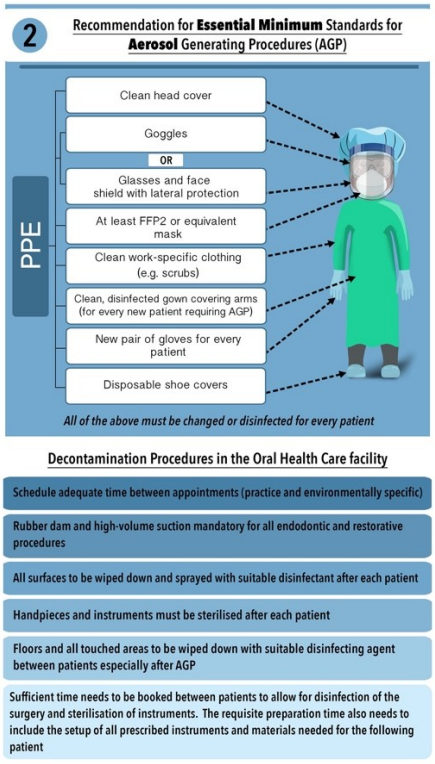
- Fine aerosols generated by AGP produce fine aerosols (<5 microns) or less in diameter that can suspend in the air. Spatter droplets are much larger than aerosol particles (<50 microns). Both aerosol particles and spatter droplets can contain infectious agents (bacteria or viruses).
- Ultrasonic and sonic transmission during nonsurgical procedures have the highest incidence of particle transmission, followed by air polishing, air/water syringe and high-speed hand piece aerosolisation.
- Greater safety measures are needed when these devices are used:
  - Rubber dam
  - High-Volume Evacuation (HVE) / Extra-oral suction devices
  - PPE's
  - Postoperative sanitation
- It is of utmost importance to consider all methods that can minimise the risk of transmission of potentially infectious agents, such as SARS-CoV-2, to dentists, dental auxiliary staff, dental assistants and patients.

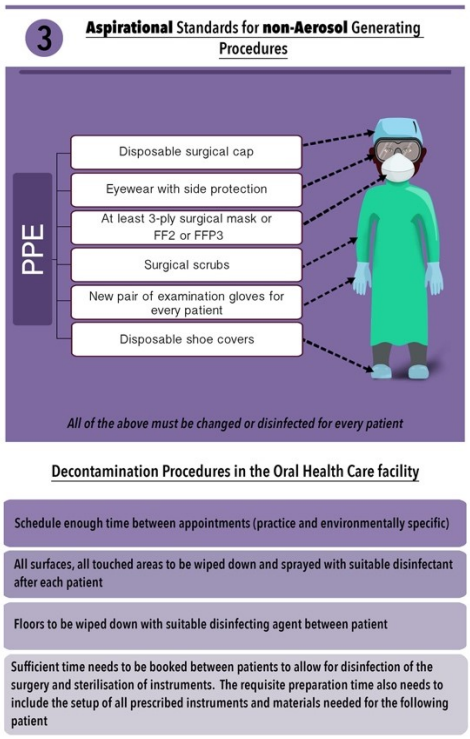
Standards on Personal Protective Equipment and Decontamination Procedures Required for the COVID-19 Pandemic

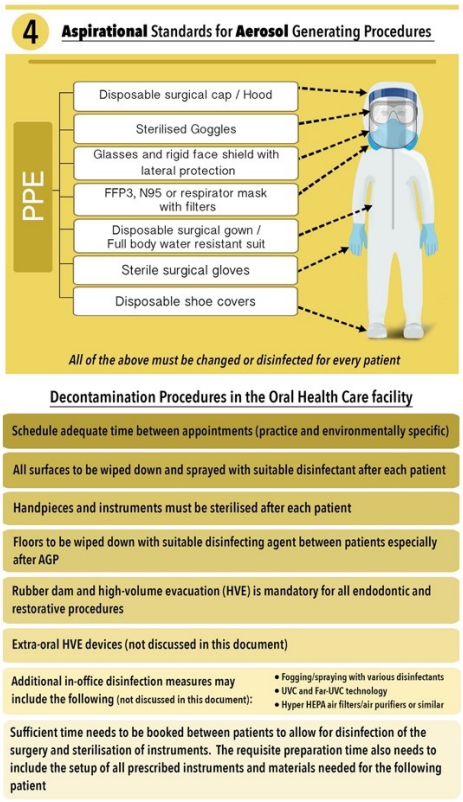
Diagrams 1 and 2 outline the essential minimum standards and decontamination protocols for non-aerosol and aerosol procedures. These are the minimum requirements for treating patients during the pandemic in an OHC facility.

Diagrams 3 and 4 outline aspirational standards and decontamination protocols for non-aerosol and aerosol procedures that an OHC facility can employ to upgrade the essential minimum standards for additional personal and patient protection**. The reasonable standard of care should be seen between these two levels.**









The Use of Dental Auxiliaries

- Two-handed dentistry is not ideal; if the only possibility then special measures should be taken to ensure reduction in Aerosols by using special HVE equipment.
- Ensure that all materials needed for treatment are unpacked before treatment so there is no unnecessary opening of cupboards and drawers.
- Four-handed dentistry is ideal, as it helps reduce aerosol production, improves turnaround time of the surgery and improves overall efficiency and risk.
- Ensure all auxiliaries are trained in all aspects of cross-infection control and aerosol reduction methods.

Isolation and Suction

1. Rubber Dam

- The water coolant from a high-speed hand piece generates aerosols during procedures, and when combined with bodily fluids, bioaerosols are created.
- Dentists and auxiliary staff who treat patients during aerosolisation procedures are at very high risk of infecting themselves or re-infecting other patients.
- Several studies have confirmed that the viral load in human saliva is very high and that preoperative mouth rinses can reduce but not eliminate it.
- Studies have shown that during conservative dental procedures (15–30 minutes) without the use of a rubber dam, the airborne bacterial load increased from 8.8 to 25.1 CFU.
- Patients, dentists and assistants, as well as surfaces and objects, are at a risk of exposure to airborne contamination 2.5 to 3X greater than the norm.

- Various studies have shown that the use of rubber dam isolation during AGP resulted in a 98.8% bacterial reduction (greater reduction with antiseptic mouth rinse before rubber dam application).
- The rubber dam provides a barrier of protection from the primary source and can virtually eliminate all pathogens emerging from respiratory secretions during dental procedures that generate aerosols.
- If the rubber is correctly placed, the only source of contamination would be the tooth /teeth undergoing treatment.
- Rubber dam application during cavity preparation showed a reduction in the spread of microorganisms by 90% and can significantly reduce airborne particles in a 3-foot diameter of the operational field by 70%.
- It is important to note that rubber dam isolation can result in significantly higher aerosol levels on various areas of the dentist's head; dentists are advised to cover the head with suitable protective wear during AGPs.

2. Suction

- During AGP, the use of HVE at source is mandatory. Extra-oral evacuation systems can further assist in reducing aerosol.
- It should be understood that correct efficacy (300 l/min) of the HVE can guarantee the maximum removal of aerosol/splatter.
- Correct installation to control potential toxic waste and meticulous maintenance of the suction system is essential.

3. Final Recommendations

- The rubber dam with an appropriate preceding mouth rinse appears to be the best option for working field isolation in order to infectious agents in aerosol and spatter.
- The rubber dam in conjunction with extra high-volume suction can drastically reduce aerosol and spatter during procedures.

Recommendations for the Use of Specialised Equipment

1. Loupes and Dental Operating Microscope (DOM) Disinfection

- Loupes and the DOM can collect debris and aerosol spray from most dental procedures. Ideally, all areas of the loupe and microscope should be disinfected with a high level of disinfectant after each patient.
- Follow your manufacturer's standards of care guidelines for your surgical microscope to ensure that you are cleaning within the tolerances of your instrument.

a) Dental Loupes

- Ethyl alcohol is the recommended solution of choice to disinfect the loupe telescopes and frame surfaces. The lenses can be cleaned with alcohol or quaternary ammonium disinfectant.

b) Dental Operating Microscope

- All the system's mechanical surfaces can be wiped clean with a damp cloth. Do not use any aggressive or abrasive cleaning agents. Remove any residue using a mixture of 50% ethyl alcohol and 50% distilled water plus a dash of household dishwashing liquid.
- For disinfection of mechanical surfaces, the maximum application concentrations for disinfection solutions are either 60% alcohol, 2% glutaraldehyde or 0.2% quaternary compounds. For regular cleaning of the surgical microscope's objective lenses and eyepieces, it is recommended that special, manufacturer-produced cleaning kits be used.

- Some manufacturers also supply sterilisable caps for handgrips and knobs and custom-made sterile drapes to cover the microscope head and body to protect the microscope from aerosol spray during procedures. Disinfected plastic bags can also be used to protect the DOM from aerosol and should be replaced after each patient.

2. Lasers in Dentistry

- Both wet and dry lasers should be managed in the same way as other aerosol-producing instruments.
- Lasers using water for cooling should have their air/water levels at the minimum possible levels without compromising the health of the tissue one is using them on.
- Both wet and dry lasers produce plume, which has been shown to contain viral material.
- Plume should be treated in the same way as aerosols.
- Photo-biomodulation, laser anaesthesia, and photo-dynamic therapy are deemed safe.
- Ensure the correct sterilisation protocols are used for all laser parts.

Disinfection of Dental Impressions (Laboratory Work)

- Dental impressions invariably are contaminated with patient saliva or blood and are considered potentially infectious.
- It is the responsibility of the dentist to disinfect impressions that are sent to dental laboratories to prevent cross-contamination and spread of disease.
- Communication between the dental practice and dental laboratory is essential to ensure that appropriate disinfection protocols are implemented without overlap.
- See later in this document for more detail on disinfection of impressions, bite registration materials and impression trays.

Conclusions

- Know your environment and the dangers and risks that you pose to your own OHC facility but also to the population at large.
- Identify high-risk patients and potential positive patients appropriately; all other patients should be treated as potentially positive.
- Positive Covid-19 patients should be treated in very specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres or specially designed Airborne Infection Isolation Rooms (AIIR). These could be constructed/adapted in an environment outside of the hospital, decreasing the load on our healthcare facilities, especially if AGP are unavoidable.
- The goal should always be to aim to better isolate your working space and thereby decrease the risk of spread, change from a possible risk situation to a relatively safe situation (rubber dam isolation and use of HVE).
- Implement additional safety and sterility measures until vaccination.
- Take all measures to avoid AGP in the initial relaxing stages.
- Health care workers at high risk: > 65 or with comorbidities as well as environmental high-risk practices (Health and Safety certified) should stay in self-quarantine/closed until such time as vaccination or Level 1 is reached. Professional insurance companies should be encouraged to see these above groups as actively not being able to function normally and should be compensated such as would apply to a long-term illness.

Oral Health Care Facility Preparedness—Post-Lockdown Measures

Patient Triage / Practice Administration

Before the Patient Arrives

Purpose

The purpose of this section is to provide all levels of OHC practitioners with general information on the standard of care for infection control measures and to prevent transmission (spread) of SARS-CoV-2 in the clinical practice setting.

Transmission Dynamics (key points)

Transmission of the SARS-CoV-2 virus and the associated COVID-19 disease can be life-threatening to susceptible patients and exposed DHCWs. Dental care providers need to be aware and be prepared to reduce the risk of transmission and to prevent any possible infectious disease (Ather, Patel, Ruparel et al., 2020).

SARS-CoV-2 transmission predominantly occurs through airborne droplets. Therefore, the use of protective equipment, including gloves, masks, protective outerwear, protective surgical glasses and shields, is strongly recommended to protect eye, oral and nasal mucosa (Meng, Hua, Bian et al., 2020; Peng, Xu, Li et al., 2020). If there is a shortage of N95 (or equivalent) respirators, an ear loop mask can be worn to protect the respirator from surface contamination.

First Contact

A patient's first contact with the OHC facility is normally with the receptionist. This potential weak link must be the first line of defence, infected patients, asymptomatic and early infected with COVID-19 will be seen. Receptionists therefore need a checklist, be it a handwritten or digital document, where patient names are recorded with corresponding questions that shall become part of patient records. Such documentation is valuable for epidemiological tracing, should an infection occur in a practice. Front office staff should be equipped with a temperature camera if this is not done at entrance to the building. Any patient with a raised temperature should be referred to the principal DHC worker preferably before entering the premises.

Front office staff require specific instruction on how to manage this crisis, and it cannot be assumed that they have the skills to perform this very important task. If doubt exists, receptionists and all other staff designated to this duty should be provided with the following information. Any questions should be addressed to the principal OHC worker as it is his/her duty to implement the education and manage patient treatment and may not be assigned inappropriately to staff.

Any person, whether it is a patient, accompanying person or other to be pre-screened and perform hand hygiene at the entrance. Also, see practice management regarding staff.

Pre-appointment Screening Questions and Instructions

1. Does the patient have flu-like symptoms: fever > 38°C, cough, sore throat or difficulty breathing?
2. Has the patient or any member of their household tested positive for COVID-19? When was the diagnosis made and when did the patient experience their most recent symptoms, if any? **see clinical notes below.

3. Has the patient experienced any flu-like symptoms (see question 1) in the past fourteen (14) days?
4. Has the patient been in contact with someone outside their household who has tested positive for COVID-19 or had flu-like symptoms?
5. Has the patient been in contact with somebody with flu-like symptoms who has also received a negative or inconclusive COVID-19 test?
6. Did the patient travel to areas marked by transmission of COVID-19?
7. Has the patient worked in or attended a health care facility where COVID-19 patients were being treated?
8. Has the patient been recently admitted with severe pneumonia?
9. Other: chills, loss of taste, loss of smell, muscle pain, headache?

** Clinical note: a. 'Time-since-illness-onset and time-since-recovery strategy (non-test-based strategy): Persons with COVID-19 who have symptoms and were directed to care for themselves at home may discontinue home isolation under the following conditions: i. At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g. cough, shortness of breath); and, ii. At least 7 days have passed since symptoms first appeared.'; b. 'Test-based strategy: Persons who have COVID-19 who have symptoms and were directed to care for themselves at home may discontinue home isolation under the following conditions: i. Resolution of fever without the use of fever-reducing medications and, ii. Improvement in respiratory symptoms (e.g. cough, shortness of breath) and iii. Negative results of an FDA Emergency Use Authorised molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart (total of two negative specimens).'; and c. 'Individuals with laboratory-confirmed COVID-19 who have not had any symptoms may discontinue home isolation when at least 7 days have passed since the date of their first positive COVID-19 diagnostic test and have had no subsequent illness' (https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html; https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html).

If a patient answer affirmatively to any of the above questions, the OHC staff member should defer to the OHC provider for instruction on scheduling decisions as they require clinical assessment.

If a patient is suspected of having contracted COVID-19, they should be first isolated in a separate room and given a surgical mask. Dental treatment should be limited to pharmacological treatment and the patient referred to the nearest COVID-19 testing centre for confirmation.

It is essential that the clinician assess their environment to assure optimal isolation and ventilation; it is even more essential to use appropriate PPE and appointments be kept short.

COVID-positive or suspected patients need to be scheduled for the end of the day or in areas where they can be managed safely (a dedicated facility or a hospital theatre environment recommended). Remember to factor in enough time for ventilation specific to your own environment (see later: practise ventilation) and disinfection of the treatment area between cases.

Emergency COVID-19-related attention: Know your local COVID-19 Hotline number and have it posted in a prominent visual place for easy referral.

Emergency COVID-19-related symptoms that require immediate attention:

- Persistent pain
- Pressure in the chest
- New confusion
- Bluish face
- Lips and inability to arouse.

General Office Preparation

Practice Management

1. This checklist also applies to all staff, and they must also be actively screened before entering or re-entering the office. Applications are available to declare your health status online and not on paper, as is currently implemented in major hospitals in South Africa. Home printed and signed checklists to be handed in upon entry are advocated at this stage. This declaration becomes part of the practice and patient records. The principal dentist should assume the management of this responsibility at his discretion. The screening process could be referred to an appropriately educated and PPE-protected staff member outside the OHC facility. This would ensure the virus stays outside the healthcare facility.
2. All OHC workers and staff must be tested on a 2-weekly basis for COVID-19 to ensure that they are not asymptomatic carriers and could serve as a source of spread of the disease. These status results must be recorded.
3. Dental service providers are essential workers and are excluded from employee reduction (Clause 13 in Government Gazette). If fewer than 10 employees (clause 40) is applicable (https://www.greengazette.co.za/documents/national-gazette-43257-of-29-april-2020-vol-658_20200429-GGN-43257). If more than 10 employees are employed, all essential workers (clinical and reception employees) may come back to work; admin staff should work from home.
4. Coming to work despite having symptoms of illness is a common and loyal human response, but OHC providers should be equally stringent on themselves, their staff and their patients. All staff members reporting for duty, besides regulations set out in 1, should be tested every 2 weeks.

The practice should be demarcated as far as practical possible into clearly defined areas (Figure 1):

A. **High risk:** **Red—The highest probability** of contamination—aerosol/droplet formation
B. **Medium risk**: Orange—Risk area—Dental practice area
C. **Low risk:** Yellow—Low-risk area—Waiting area
D. **No risk:** Green—Staff resting area—If possible

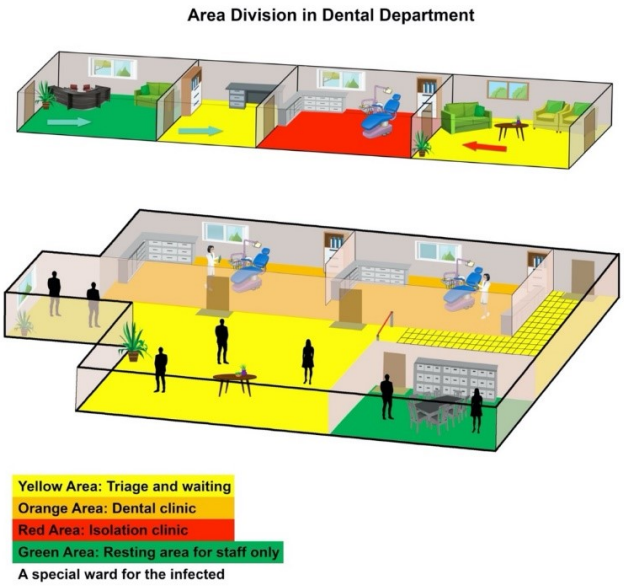


Figure 1. Personal protective equipment diagram for division care area (Adapted from Meng L, HuaF, Bian, J Dent Res, 2020)

5. At this time, communication is essential rather than a courtesy. As such, patients are scheduled with sufficient time between appointments to prevent undue stress. Receptionists, just as the principal OHC worker, should understand the principle of adequate ventilation and governmental orders re COVID-19 that would allow for a safe time period between cases.
    a. **The minimum time needed to clear the air in a well-ventilated area is 15 minutes after a positive patient has left. This only applies to the Orange and Yellow areas (https://www.eurekalert.org/pub_releases/2020-03/erc-hto031920.php). From this data, it can be extrapolated that significant time (specific practice environment dependant) could be needed for proper ventilation of a high-risk (red) area between cases, especially if AGP were performed.** All efforts should be made to minimise the total airborne viral load. In the literature, as above, no benefit is achieved by altering the temperature or humidity of the practice.
    b. Common courtesies should be respected, but the safety of the practice kept in mind. “We recognise, appreciate and respect your rights and needs, but practice safety is paramount. Keep to social distancing and hand sanitising and please refrain from engaging our staff unnecessarily. We appreciate your urgency and will attend to it as soon as possible.”
    c. Rapid COVID-19 testing is currently unavailable as of May 2020. If it becomes available, it may improve flow. All patients should be treated as potentially positive.
    d. Patients that clearly do not adhere to or are suspected of not adhering to the lockdown measures (see the notes on staff use of public transport): The OHC facility should have appropriate overalls duly cleaned and ready. Patients should wear these with overshoes and headgear whilst inside the practice, keeping to stringent hand hygiene control and washing of exposed skin and oral rinses (see later first contact) before engaging with DHC worker. Remove the overalls at exit and duly dispense in a suitable sealable container for reuse after cleaning. Disposable items are to be discarded. This will lessen the risk to the DHC worker of being infected. The cleaning and maintenance of these garments will be the responsibility of the principal DHC worker.
    e. When the Standard Precautions alone cannot prevent transmission, such as in the case of COVID-19, it must be supplemented with transmission-based precautions (Diagram 1).

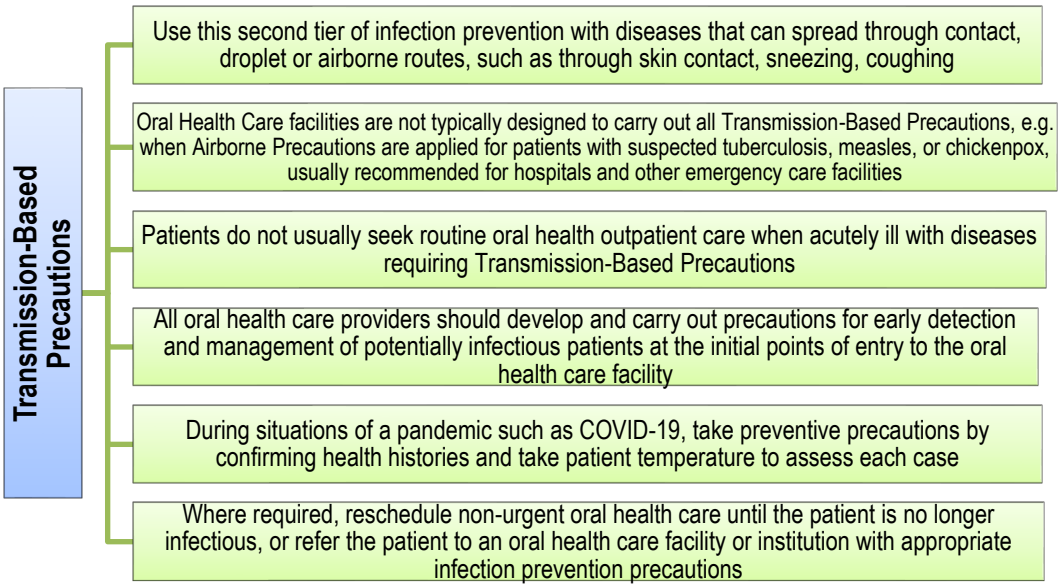


Diagram 1: Transmission-Based Precautions

Instructions for Patients Prior to Visiting the OHC Facility

1. Please wear a new or freshly washed cloth mask at a minimum when visiting the OHC facility. Only the patient will be allowed in the OHC facility unless the patient is a minor or disabled. If the OHC facility is behind schedule, patients must wait outside the office or in their cars. Please contact our OHC facility before you leave home to prevent an unnecessary long wait.
2. Please do not wear any nonessential accessories, jewellery, etc., as it can be contaminated. Essential items such as cell phones will be secured in a safe place at entry.
3. Please be on time. Patients arriving earlier than 10 minutes prior to their appointments will not be admitted into the premises. Patients arriving late will need to be rescheduled. Most OHC facilities in South Africa have safety doors to the entrance; you may be asked to use this entrance for proper distancing. Vigilance should not be relaxed.
4. OHC facilities operating with walk-in patients only should adhere to the above rules. Waiting patients should be asked to line up outside the door, keeping social distancing in mind. These distances should be clearly marked in the expected line-up area. In adverse weather conditions, local situations should be evaluated with informed knowledge to protect the patients against the weather, yet allowing for social distancing.
5. Please fill in all paperwork electronically or at home. For older adults or those who are digitally challenged, please contact our receptionist by phone to complete your paperwork ahead of time. This could also be done by a properly protected and informed staff (PPE—see later) member in the waiting area outside the facility.
6. Make arrangements for the method of payment. Be aware that cash could be a potential source of the SARS-CoV-2 virus.
7. Our personnel adhere to the same strict principles as our patients. Staff at high risk or with comorbidities will be reassigned to positions that do not put them, and you, at additional risk.
8. Our staff have also been directed to receive flu vaccinations to prevent infection and keep our practice open.

Oral Health Care Facility Preparation

Remove all nonessential items from any area that a patient might enter; these items are possible surfaces the virus can adhere to. Essential items, such as keyboards, computer screens, cameras, magazines and other recreational items such as water bottles, other drinks and pay-point terminals, should be isolated with a cleansable disposable material, such as a plastic film. These should be changed on a regular basis and the equipment it protects disinfected/decontaminated before reapplication of a new protective barrier. Nonessential items, including any decorative or loose items (such as magazines and toys), should be removed. Stationery should only be kept at hand when being used. Other items should be cleaned after each use and returned to appropriate containers. Flat, hard, smooth surfaces can be disinfected/decontaminated or deep cleaned easily; all other surfaces should only be used when necessary and kept off-limits to patients, taking into consideration that the virus stays alive the longest on metal surfaces (https://youtu.be/JsXZQACaI2o).

Oral Health Care Facility—Procedural and Environment Upgrades

1. Staff using public transport or people not adhering to public announced private vehicle use: Knowledge of public safety information should not be assumed, and each member should be given specific instructions. It is advocated that all staff be notified that only prescribed clean OHC worker attire is allowed beyond the entrance. The normal attire must stay outside the practice or—if this is impossible to implement—as close to the entrance as possible. If possible, the garments should not enter the office and stay in a sealed bag for use when leaving the practice again. The rotational office garments should stay in the office and be exchanged every time the practice is left. The office attire should be cleaned and distributed under the responsibility of the principal OHC worker, a fresh pair available at each entrance to the practice. Hair protection should be disposable and single use.
2. Wearing masks in public is mandatory by law, make sure your workers know the proper fit (see further recommendations later in this document pertaining to PPE, as indicated by job description).
3. The workers must adhere to hand sanitising but also, at entry, wash any exposed skin, such as the face and neck, for at least 20 seconds.
4. If possible, change door handles for ones that can be opened easily by pushing or pulling with a limb rather than the palm of a hand. In the South African scenario, vigilant crime protection must not be compromised.
5. Have a dedicated hand cleansing area available at the door.
6. Delivery personnel should not be allowed past the front door. All packages should be placed outside the door with the delivery person instructed to practise social distancing. Sanitise/disinfect packages with appropriate sanitiser/disinfectant before taking them past the front door. Arrangements should be made to provide delivery personnel with signed notes on practice stationery rather than signing and handling delivery notes.
7. Follow administrative procedures to keep wait times and patient contact with staff to a minimum. Discourage all nonessential talking between the personnel and the patient.
8. Add clearly visible red lines and crosses to the floor to help patients with social distancing.
9. Add a sheet of Perspex/Acrylic glass/Plexiglas in any area where there will be contact between staff and patients. Attempt to limit this to a single area.
10. If possible, cover all furniture and carpets with plastic coverings that can be wiped down easily.

Oral Health Care Facility Ventilation

1. Whilst a viral threat exists, it is essential to ascertain the specifics of proper OHC facility ventilation before starting any treatment. Common areas and areas where droplet or AGP will be done may have differing environments. Some might be self-sustaining with natural airflow if windows are open. However, other cases (such as high-rise buildings) might not have such options and may even be dangerous if aerosol is released into an unprotected area, such as a central air-conditioning system (https://www.healthcaredesignmagazine.com/trends/perspectives/tips-for-rapid-room-conversion-to-handle-covid-19-patients/).
2. Contact landlords or building administrators regarding existing ventilation and safety measures, as closed-circuit ventilation (as opposed to open-circuit ventilation) poses a significantly higher risk of building or building floor contamination as this could lead to a significant cumulative viral load of a specific volume of air over time (https://www.eurekalert.org/pub_releases/2020-03/erc-hto031920.php).
3. In the case of isolated OHC facilities, such as a stand-alone dwelling, closed room recirculation system with no contact to neighbouring rooms, special measures such as opening windows to natural ventilation or stand-alone medical-grade (Hyper HEPA) air filtration systems can contribute significantly to reducing viral load. (https://www.ncbi.nlm.nih.gov/pubmed/9192919). The Hyper HEPA (or equivalent) filter, equivalent to H13/H14, must be able to remove particles of less than 0.1 µm. Key attributes to the choice of correct filtration system are: (1) Airflow to assure adequate ventilation of the room space; (2) Efficiency to filter out a range of small particle sizes and (3) regular maintenance schedules must be adhered to. The appropriate HEPA filtration is essential to secure the ventilation system or which can be combined with other measures in the HVAC air supply (https://www.fda.gov/media/136533/download)(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4587002/) (https://www.ncbi.nlm.nih.gov/pubmed/26241071).
4. Popular commercially available air filter systems, such as air purifiers, air cleaners, etc., and even standard medical-grade HEPA filters that only remove particles up to 0.3 µm are totally inadequate to catch the virus and by removing bigger particles from the air, might in fact increase the viral load in air at the exhaust of the filter/purifier (https://static1.squarespace.com/static/5b68a4e4a2772c2a206180a1/t/5e67a58357b4e0440343e1fa/1583850883797/SpeculationOnAirFIlters.pdf Top Air Purifier or equivalent).
5. With this information, an informed decision can be made regarding additional necessary measures. This is a highly specialised field, and it cannot be assumed that it falls within our professional knowledge. If any doubt exists, contact a qualified engineer.
6. The most practical solution should your facilities not comply with any of the above scenarios is to create an isolated OHC facility for droplet- and aerosol-generating areas with or without negative pressure. These rooms should have the following characteristics: (1) These rooms **do nothing** to aid the sick/positive patient nor do they protect the staff who are in the room with the patient (2)The rooms **do allow** staff to work outside the room with limited PPE and rely on proper PPE to protect staff inside the room (https:/www.healthcaredesignmagazine.com/trends/perspectives/tips-for-rapid-room-conversion-to-handle-covid-19-patients/). A good solution is to refer to an Intensive Care type of ventilation system and to adapt this to create an AIIR albeit at less stringent measures (https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html). The ideal scenario (Figure 2): A negative pressure ventilated space with a minimum of 12 air changes per hour using an external exhaust connection. Recirculation is only possible with an adequate medical-grade HEPA (H13/H14) filter - as the coronavirus is 0.15 µm in size—in the system. Routine medical HEPA filters only remove particles up to 0.3 µm in size, clearly not stopping the virus.

The American Centers for Disease Control (CDC) guidelines are that all AGPs should be performed in an AIIR environment (https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html). The negative pressure inlet should always be above the working area and the amount of negative pressure should be visible as per ASHRAE standards (https://www.ashrae.org/). These isolation chambers pose a real possibility of treating patients outside a hospital setting, **saving very valuable healthcare resources.**

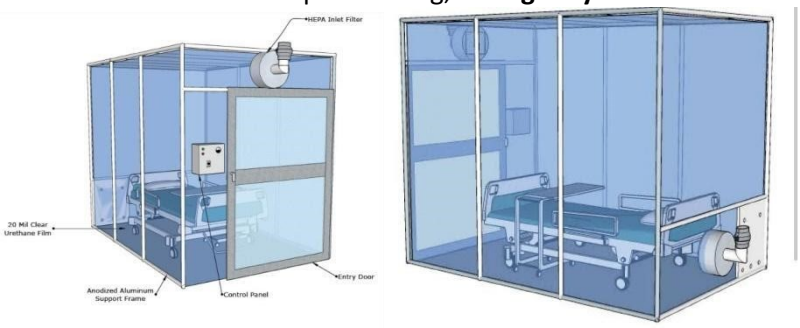


Figure 2: Example of a free-standing Airborne Infection Isolation Room

7. Every practice needs to determine their own risk and may even fall within the criteria to serve as an AIIR, making an informed professional decision if vapour and virus concentrations pose an additional risk. Insufficient ventilation or circulatory problems in an OHC facility can endanger the OHC provider, staff and the general population; these problems can also create risk in their immediate surroundings. The problem is that when air is not circulated, a gradual increase in viral load can accumulate over time (a comparison is how an automotive wheel is filled with air). It is possible for an OHC facility to become a node for the spread of COVID-19. This would obviously contravene national law with serious consequences.

Patient-Health Care Worker Interactions

Oral Health Care Provider-Patient Contact Guidelines

Although the COVID-19 virus has been identified in the saliva of patients testing positive for COVID-19 (Sabino-Silva, Jardim, & Siqueira, 2020) (https://doi.org/10.1007/s00784-020-03248), the path of transmission in dentistry during AGP is not yet clear. We thus need to assume that all AGP pose a high risk of transmission. In contrast to the SARS crisis (2003) in which no OHC provider died (https://jada.ada.org/article/S0002-8177(14)62542-3/pdf), presumably because of adequate sterilisation techniques, many OHC provider deaths have been reported during the COVID-19 crisis. No evidence exists that links these deaths to their profession. It has been shown that viruses may stay alive, airborne for hours, and on hard surfaces for days after exposure (https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html).

Initial Contact

1. Maintain social distancing at the meet-and-greet stage. Take patient histories with patients wearing masks. A medical-grade mask is recommended for the OHC worker. The looped around the ears, three layered/or any other suitable mask is adequate (only against droplet emission).
2. Intra-oral x-rays—use the best clinical judgements—should not be done without the appropriate PPE as for AGP. Taking all appropriate care, to obtain valuable information, to aid in the diagnosis and treatment of patients.
3. Take extra-oral x-rays as indicated for each patient.
4. The person taking the extra-oral x-ray should wear PPE (mask, eye protection, disposable gloves and clothing that covers all visible skin), as the patient will not be wearing a mask during the procedures. Be aware of droplet dissemination and take immediate action in the unlikely event of contamination. (Change clothes and PPE with appropriate personal sanitising. Standard of care to be applied at all times.)

Patient-Related Factors

Pre-contact

The patient could be provided with disposable head and footwear, and the exposed skin should be washed to lower the risk of OHC worker–contaminated surface contact. However, no scientific evidence exists to support the efficacy of these. The patient must rinse their mouths immediately with H_2O_2 (1% for 2 periods of 30 seconds each) or povidone-iodine rinses (0.5%) as well as nasal spray can be of benefit (https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3563092)(https://www.nature.com/articles/s41368-020-0075-9.pdf).

The use of Listerine and chlorhexidine is not supported by the literature against COVID-19; hence, SADA does not advise the use of these.

In droplet or AGPs, it would be optimal to cover the patient fully, exposing only the face to guard against possible contamination. The patient's comfort and well-being should be a priority. This is similar to standard practice in a theatre setting; however, the drapes (water resistant) need to be clean but not sterile. These items need **not** be disposable; to reduce costs, it could be recycled in an appropriate manner. In low socio-economic environments, the measures set out above could be a large cost-saving measure, although patient inconvenience would be more.

In Contact

The patient's comfort must be the first priority, but unnecessary movement from underneath the drapes, such as scratching and touching the face, must be discouraged and these actions done on their behalf.

Post Contact

Although not scientifically tested or proven, we strongly suggest that the patient use the same rinsing procedure as before contact at the completion of the appointment. This would reduce the possibility of nosocomial infection. It is further suggested that they also wash their faces with water for 20 seconds to reduce droplet contamination during the procedure. This is in line with government proposals on sanitation and adds to the safety of the patient, who may have been exposed to a higher viral load.

Sterilisation and Disinfection Protocol (refer to SADA main document)

Sterilisation and Disinfection Protocol

During the extraordinary circumstances experienced during the lockdown and global pandemic, this protocol must be used in conjunction with the infection control 'Guidelines for Oral Health Care South in Africa' (Oosthuysen et al., 2020). The following sections of the guidelines have special significance: Section 3: Environmental and Work Controls, Section 4: Surface Contamination Management, Section 9: Sterilisation Practices, and Section 10: Safe Sharps Handling.

It is imperative to maintain a very high degree of suspicion by all OHC personnel, whilst strictly adopting the Standard Precautions and transmission-based precautions, including hand hygiene practices, appropriate use and application of PPE, precautions when performing AGP, practising efficient and effective aseptic procedures, disinfection and cleaning of household surfaces, and also safe and efficient recirculation, sterilisation, storage and distribution of instruments needed during all OHC procedures.

Reduce Facility Risk

Restrict the OHC workload as set out in the document that refers to scope of practice during COVID-19 emergency regulations. Use teledentistry when possible.

Isolate symptomatic patients as soon as possible. Set up separate, well-ventilated triage areas, place patients with suspected or confirmed COVID-19 in areas where the door can be closed. Reserve AIIR's for patients with COVID-19 undergoing AGPs and for care of patients with pathogens transmitted by the airborne route, such as tuberculosis.

Implement Environmental Work Controls

In Contact

Dedicated medical equipment should be used when caring for patients with known or suspected COVID-19.

All non-dedicated, non-disposable medical equipment used for patient care should be cleaned and disinfected according to the manufacturer's instructions and facility policies (refer to the SADA published document). Ensure that environmental cleaning and disinfection procedures are followed consistently and correctly.

1. Office disinfection: doorknobs, handles, phones, computer keyboards, light switches, chair arms, head rests, toilet handles, faucets, countertops, handrails, elevator buttons, etc.
2. Sterilising/disinfecting instruments: apply Spaulding's Modified Classification to determine which to use (ADA 2013; Oosthuysen et al., 2020; CDC 2020)
3. Use protective environmental barriers on objects such as plastic wrap/ aluminium paper: radiographic devices, light handles, chair switches, keyboards and computer mice, etc. (change with each patient).

Post Contact

Routine cleaning and disinfection procedures—such as using cleaners and water to pre-clean surfaces prior to applying an approved, hospital-grade disinfectant to frequently touched surfaces or objects for appropriate contact times as indicated on the product's label—are appropriate for SARS-CoV-2 in OHC settings, including those patient-care areas in which AGPs are performed (CDC 2020).

1. Use disinfectant to wipe debris, then disinfect again. Use disposable gloves and effective wipes/sprays. CDC suggested disinfectant: hypochlorite 0.1% for one minute (mix 1 part of bleach with 9 parts of water)
2. 0.5% Hydrogen peroxide for one minute.
3. Benzalkonium has mixed efficacy with COVID-19.

In the presence of body fluids, such as saliva, nasal excretions and blood in OHC produced aerosols, smears and spatter, a significantly more thorough disinfection is required. Also refer to the infection control 'Guidelines for Oral Health Care South Africa' (Oosthuysen et al., 2020) and the referenced research information from Clinicians Report TRAC Research (CR Foundation 2020).

Post-Contact Sterilisation

1. Required sterilisation: Critical items are all surgical instruments that are used to penetrate soft tissue or bone in sterile areas of the body. Instruments such as surgical and cutting instruments, forceps, chisels, periodontal scalers, burs and those classified as critical instruments should be sterilised.
2. Hand pieces, *all, including all attachments*: sterilised after each patient (CDC 2016). Acceptable methods: steam under pressure (autoclave is the gold standard, wrapped cycle pre- and post-vacuum Type B autoclave 5 min @ 132°–135°C plus drying time, wrapped cycle Steam-flush Pressure-pulse Type S autoclave 14-17.5 min @ 132°-135°C plus drying time, wrapped cycle Gravity Displacement Type N autoclave 15-30 min @ 121°-123°C plus drying time, chemical vapour, dry heat (static air dry heat 120 min @ 160°C, forced air dry heat 12 min @ 190°C).
3. Semi-critical items that are used to touch only mucous membranes (do not penetrate soft tissues), such as hand instruments, mirrors, mouth props, curing light guards, and cheek protectors, if heat tolerant: sterilised, otherwise high-level disinfection (10–12 hours' exposure).
4. The tips of air/water syringes should not be reused or sterilised. These should be single-use disposable items and should be replaced for every patient. In cases where metal reusable tips are still used, replace all tips of air/water syringes to be single-use disposable tips. Metal air/water syringe tips get severely contaminated during procedures and cannot effectively be cleaned and sterilised.

Disinfection (Surfaces) and Housekeeping

Pre-Contact

1. Prepare the facility.
2. Know how to contact your health department.
3. Step up precautions when the virus is spreading in your community.
4. Assess and restock supplies now and on a regular schedule as available, check the SADA site.
5. Communicate with patients.
6. Ask patients about symptoms during reminder calls.
7. Consider rescheduling non-urgent appointments.
8. Post signs at entrances and in waiting areas about prevention actions.
9. Prepare the waiting area and patient rooms.

10. Provide supplies—tissues, alcohol-based hand sanitiser, trash cans and soap at basins.
11. Place chairs 1.5 m apart when possible. Use barriers (like screens), if possible.
12. If your facility has toys, reading materials, or other communal objects, remove them (CDC).

In Contact

For appropriate chemicals to use for disinfection, refer to the disinfectant comparison chart (Table 1) and the List of Disinfectants on the SADA website for approved disinfectants and also disinfectants that have qualified under the EPA's emerging viral pathogens programme for use against SARS-CoV-2 (List N: Disinfectants for use against SARS-CoV-2 accessed 20 April 2020 from https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2).

Table 1: Disinfectant comparison chart

Characteristics	Hydrogen Peroxide (H_2O_2)	Hydrochlorous acid (HOCL)	Bleach (NaOCl)	Isopropyl alcohol
Form	Fluid	Aerosol spray	Fluid	Fluid
Suggested effective concentration	3% Hydrogen peroxide for disinfectant, 1% pre-procedural mouth rinse, 6% to 25% as chemical sterilant	80–200 ppm	500–1000 ppm	Concentrations of 60%–80% is a potent virucidal agent
pH (disinfection efficacy is determined by pH)		4- 5.5 (weak acid)	8 to 9 (alkaline)	Neutral
Stability	Stable and effective			
Effectiveness (killing power)	Bactericidal, virucidal, sporicidal and fungicidal properties	80–100 x more effective than NaOCl + Faster		
Bacteria	Strong	Strong	Strong	Strong
Viruses	Strong	99.9% effective	Strong	Strong
Tuberculocidal		Strong		

Contact time	0.5% Accelerated hydrogen peroxide demonstrated bactericidal and virucidal activity in 1 minute and mycobactericidal and fungicidal activity in 5 minutes	Immediate effect	10–30 minutes	2–5 minutes
Safety	Toxic and irritant to skin, serious eye irritant (use protective eyewear)	Safe and non-toxic and non-irritant to skin and eyes	Toxic and irritant to skin and eyes	Toxic and irritant to skin and eyes
Odour	Odour not significant	Odourless	Strong odour	Strong odour
Physical characteristics	Leaves residue	Does not evaporate and leaves no residue	Leaves residue	Evaporates quickly
Disadvantages	Materials compatibility concerns (lead, brass, copper, zinc) both cosmetic and functional. Limited clinical experience. Potential for eye and skin damage			
Corrosiveness	Oxidising	None	Corrosive	Corrosion of metal
Discolouration	Cosmetic changes e.g. discolouration of black anodised metal finishes	None	Discolouration of fabrics and plastic surfaces	Prolonged use—discolouration and cracking of rubber and plastics
Other		FDA approved		Non-FDA cleared
Flammable	No	No	No	Yes

Ease of use	Rinsing, Spray and wipe	Spray and Foggers	Spray and wipe	Spray and wipe
Cost	+ manual ++ automated	++	+	++++
Accessed and adapted from: Stanford University: Environmental Health and Safety. https://ehs.stanford.edu/reference/comparing-different-disinfectant and the Centers for Disease Control. Chemical disinfectants—Guidelines for disinfection and sterilisation in health care facilities (https://www.cdc.gov/infectioncontrol/guidelines/disinfection-methods/chemical.html).				

- Only H_20_2, NaOCl (household bleach), alcohol, and hydroclorous acid (HOCl) are effective surface disinfectants with virucidal efficacy.
- Each has its own advantages and disadvantages, in different formulations (vapour, fluids, wipes, sprays, etc.), and required contact times for optimum disinfection differ.
- We cannot present the full prescription and instead refer to the main SADA document published.
- Our clinical recommendations as best practices policy are as follows.

Assessment of the Disinfectant Comparison List

Alcohol	As an environmental surface disinfectant, it is no longer recommended. Apart from the fact that it fixates protein, such as blood and saliva on hard surfaces, it is, furthermore, volatile and inflammable.
Accelerated hydrogen peroxide	Costly and takes too long to disinfect
Bisguanide	Not virucidal
Citric acid	Corrosive and irritating to eyes
Chlorine dioxide	Corrosive to metals, irritation to eyes and skin, unstable and must be prepared fresh daily
Glutaraldehyde	Toxic fumes causing irritation and other adverse effects—not recommended
Halogen compounds	Intermediate disinfection, corrosive skin and eye irritation. Can only use on hard surfaces
Hydroclorous acid (HOCl)	Clean, deodorise and intermediate disinfectant effective against viruses similar to COVID-19 on hard, non-porous surfaces. Also applied for wound healing.
Hydrogen peroxide	High-level disinfection, compatible with plastic surfaces but not metal surfaces. Serious eye damage with contact
Iodophors	Discolouration and corrosive
Formaldehyde	Toxic
Peracetic acid	Good materials compatibility, but can cause serious eye and skin damage

Phenolics	May degrade plastics and etch glass
Quaternary ammoniums	Not recommended and can cause damage to materials
Sodium hypochlorite (bleach)	Intermediate-level disinfection, inexpensive but corrosive, damages plastics, vinyl fabrics and irritating to skin and eyes
Super-oxidised water (e.g. Ozone)	High-level disinfection requires equipment and additional cost—expensive

(The information outlined in the table above was extracted from the EPA List N document)

Take Home Information to the Oral Health Care Profession

Alcohol as a surface disinfectant is not recommended because it fixates protein and also due to its volatility and flammability.

1. NaOCl (bleach) is inexpensive but not compatible with plastics and fabrics. It is, furthermore, corrosive and may cause irritation of eyes and skin (intermediate-level disinfectant).
2. HOCl (Hydroclorous acid): moderately expensive, compatible with fabrics, plastics and metals (high-level disinfectant).
3. H_2O_2 (Hydrogen peroxide): Compatible with plastics and elastomers but poor metal compatibility and serious eye damage with contact (high-level disinfectant).

Considering efficacy (virucidal and bactericidal), ease of use, cost, compatibility with plastics and metals, and safety—HOCl comes out with most boxes ticked!

Hard Surfaces (Floors/Chair and Accessories/Cabinets/Fixed Fixtures)

Post Contact

1. Cleaning is an essential part of disinfection. Organic matter can inactivate many disinfectants. Cleaning reduces the soil load, allowing the disinfectant to work. Removal of organisms, such as the virus that causes COVID-19, requires thorough cleaning followed by disinfection.
2. The length of time that SARS-CoV-2 (the cause of COVID-19) survives on inanimate surfaces will vary depending on factors such as the amount of contaminated body fluid (e.g. respiratory droplets or soiling present and environmental temperature and humidity). SARS-CoV-2 can remain viable in aerosol and survive up to three days on inanimate surfaces at room temperature, with a greater preference for humid conditions (Van Doremalen, Bushmaker, Morris et al., 2020) (https://doi.org/ 10.1056/NEJMc2004973).
3. Corona viruses can survive on surfaces for many hours but are readily inactivated by cleaning and disinfection. It is good practice to routinely clean surfaces as follows:
    - Clean frequently touched surfaces with detergent solution (Diagram 2).
    - Clean general surfaces and fittings when visibly soiled and immediately after any spillage.

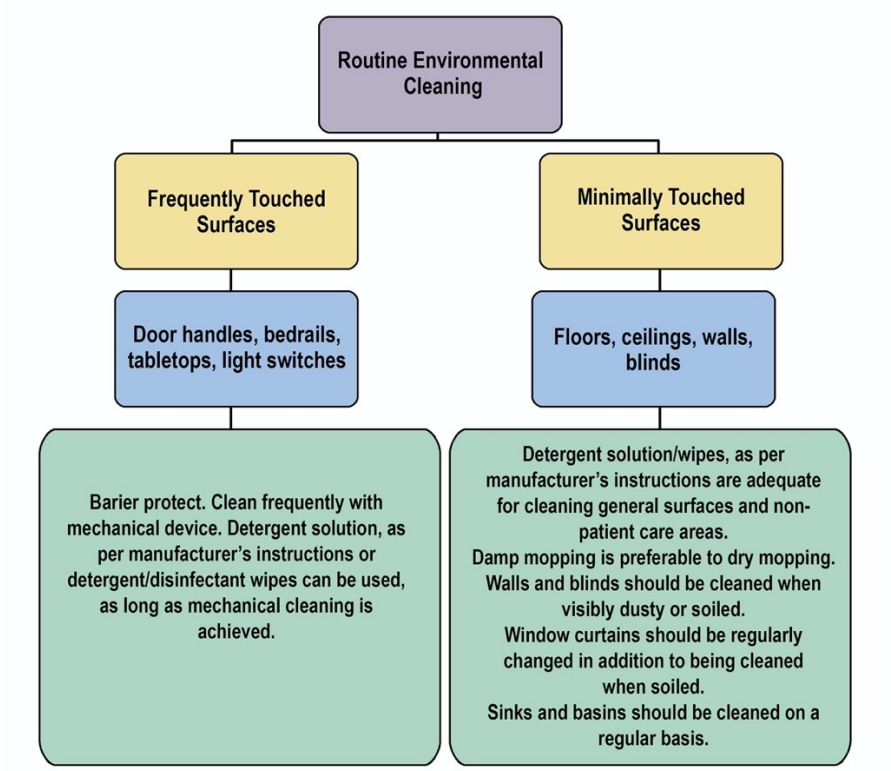


Figure 2: Routine environmental cleaning requirements can be divided into two groups.

[Adapted from Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: National Health and Medical Research Council (2019).] https://www.health.gov.au/sites/default/files/documents/2020/03/coronavirus-covid-19-environmental-cleaning-and-disinfection-principles-for-health-and-residential-care-facilities.pdf

4. Clinical personnel should make sure to disinfect hard surfaces using chemicals recently approved for COVID-19 and maintain a dry environment to curb the spread of SARS-CoV-2 (List N: EPA's registered antimicrobial products for use against novel coronavirus SARS-CoV-2, the cause of COVID-19 (United States Environmental Protection Agency). (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2).
5. The management of laundry, utensils and health care waste should also be performed in accordance with routine procedures (https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html#adhere).

Essential Moveable Furniture

Post Contact

1. SARS-CoV-2 can remain viable in aerosol and survive up to three days on inanimate surfaces at room temperature, with a greater preference for humid conditions (Van Doremalen, Bushmaker, Morris et al., 2020) (https://doi.org/ 10.1056/NEJMc2004973).

Clinical personnel should make sure to disinfect hard surfaces using chemicals recently approved for COVID-19 and maintain a dry environment to curb the spread of SARS-CoV-2 (List N: EPA's registered antimicrobial products for use against novel coronavirus SARS-CoV-2, the cause of COVID-19 (United States Environmental Protection Agency). (https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2).

Pre-Contact

1. Waiting areas in OHC facilities are common areas where a higher likelihood of cross-infection or increased exposure between patients and accompanying persons or OHC personnel is a pertinent threat.
2. Further guidance includes frequent cleansing of 'high-touch' surfaces, such as the reception counter, toilet doors, doorknobs and handles, etc.), using a neutral pH detergent (Ge, Yang, Xia, Fu, & Zhang, 2020). In addition, patient-related infographic images, demonstrations of optimum hand hygiene techniques, management of cough etiquette, illustrations of the concept of 'social distancing' that are easy to read and understand should be exhibited in the common areas (New Zealand Dental Association, Jamal, Shah, Almarzooqi, Aber, Khawaja, El Abed, Zuhair, & Samaranayake, 2020) (https://dx.doi.org/10.20944/preprints202004.0357.v1).

Post Contact

1. Provide at-home care instructions to patients with respiratory symptoms. Consider telephone or other options for follow-up.
2. After patients leave, clean frequently touched surfaces and work areas using an approved disinfectant.
3. Use disposable (single-use) devices, such as mouth mirrors, syringes and blood pressure cuffs, to prevent cross-contamination is encouraged.

Protocol Before Seating Patient

Put on protective clothing, protective eyewear, mask/respirator, gloves, and clean and disinfect those surfaces that may be touched during patient treatment that will not be protected by surface barriers. These surfaces can include the following:

- Cuspidor rim and control knob
- Countertops
- Drawer pulls and top edges of drawers that may be used
- Basin faucet handles
- Hand piece connectors
- Clean and disinfect items brought into the area to be used during patient procedures.
- Disinfection procedure
    - Spray surface with the surface disinfectant that has been prepared properly
    - Clean surface by vigorously wiping with paper towels or 4×4 gauze pads.
    - Disinfect the pre-cleaned surface by respraying it and letting it air dry or by wiping it dry if it is still wet after the prescribed contact time.
    - Alternatively, wipe with a disinfectant towelette, discard towelette, wipe with a second fresh towelette, and let dry
- Remove and discard the mask/respirator and gloves and wash hands (Doffing).
- Obtain surface barriers, supplies and sterile instruments and other equipment from the supply area.
- Cover the following surfaces with the appropriate barriers:
    - Headrest
    - Control buttons on side of chair
    - Light handles
    - Unit light switch and view box switch
- Air/water syringe buttons/handles
- Cover the following surfaces with the appropriate covers:
    - High-volume evacuator control

  - Unit control switches and hand piece, air/water syringe and HVE holders
  - Saliva ejector, hand piece and air/water syringe hoses
  - Bracket table
  - Stool backs
- Remove all items not used during patient treatment from countertops
- Make sure a sanitised sharps container is available at chairside.

Protocol After Seating Patient

- Adjust chair and headrest
- Place patient napkin
- Take or update medical history, discuss treatment and do necessary paperwork.
- Remove the chart from the countertop.
- Open instrument packages or trays without touching the instruments.
- Put on mask and eyeglasses.
- Perform hand hygiene, preferably in view of the patient.
- Handwashing procedure:
  - Perform surgical scrub for procedures indicated
- Put on gloves, preferably in view of the patient
- Use sterile gloves for procedures as indicated; otherwise, use non-sterile examination gloves.
- Use powder-free gloves. Rinse with plain, cool water (no soap) to remove any residue and towel dry before making impressions and bite registrations (non-sterile)
- Connect sterile hand pieces and sterile or disposable air/water syringe tip, HVE tip, and saliva ejector tip.

Protocol During Patient Treatment

- Restrict the spread of microorganisms, other potentially infectious materials and aerosols from the patient's mouth:
  - Use a rubber dam
  - Use the HVE
  - Touch as few surfaces as possible with saliva-coated fingers
  - Keep gloved hands out of hair; do not rub eyes or bare skin or adjust mask/glasses.
  - If leaving chairside during treatment is necessary, remove and discard the gloves
  - Wash hands and re-glove with fresh gloves on return
  - Remove contaminated gloves and wash hands before handling cameras for intra-oral photographs.
- Do not use items dropped on the floor or on other non-sterile surfaces. Obtain sterile replacements. Remove and replace gloves, preferably in view of the patient.
- If gloves are torn during treatment, remove, discard, wash hands, and re-glove with fresh gloves.
- Do not recap needles by hand. Insert the needle into the cap using the one-handed 'scoop' technique or a cap holder that will not permit contact of the needle with any part of the body.
- Look before reaching for a sharp instrument.
- When placing sharp instruments back on the instrument tray, make sure sharp tips are not pointed up and make sure they are placed in a stable position.
- If equipment, such as a curing light or other apparatus, is brought to the chairside, make sure it is protected with a surface barrier or has been disinfected before use.
- Use an aseptic retrieval technique to obtain supplies from bulk containers at chairside.

- If one must obtain supplies, such as amalgam, composite, or cavity liner from a storing area, do not take a container to the unit unless it is covered with plastic wrap or is cleaned and disinfected after use.
- Disinfect contaminated items before taking them to the dental laboratory.
- Do not handle charts with contaminated gloves. Use an over-glove or remove gloves and wash hands prior to touching anything else.
- If exposed to a patient's blood or saliva, immediately contact the appropriate responsible person to institute a post-exposure medical evaluation.

Protocol After Patient Treatment

- Remove gloves and then the mask/respirator by touching only the ties or elastic band; discard them in a plastic-lined waste container at the unit, and then wash hands or use an alcohol hand rub.
- Send the patient to the front desk for dismissal or reappointment.
- Put on fresh gloves and mask.
- Place all instruments back on the tray or, preferably, in an instrument cassette with a lid that can lock securely.
- Place all disposable sharps, including capped or uncapped needles, directly into the sanitised sharps container at chairside.
- Place non-sharp disposable items in the plastic-lined health care risk waste container (red) at the unit.
- Flush the air/water syringe, high-speed hand piece and ultrasonic scaler into the basin, cuspidor or container for 20 to 30 seconds and disconnect them from hoses.
- Remove all surface barriers without touching the underlying surface; discard them in plastic-lined health care risk waste containers (red) at the unit.
- Clean and disinfect patient-care-related surfaces that were not covered and were contaminated during treatment.
- Take instruments and headpieces to the decontamination/sterilisation area.
- Remove and wash contaminated protective eyewear; rinse and dry them. Avoid contaminating hair.
- Remove and dispose of the disposable gown (if used) in the plastic-lined health care risk waste container (red) at the unit.
- Remove gloves and discard them in the plastic-lined health care risk waste container (red).
- Wash, rinse, and dry hands or use an alcohol hand rub. If hands are visibly soiled of feel tacky, soap and water is the preferred method of practising hand hygiene.
- If UV-C lights or disinfectant fogger equipment are available, it can be used, based on established protocols from the manufacturer/distributor.

Laboratory Asepsis (Miller, 2018)

- Gloves, mask, protective eyewear and protective clothing are used until items in the laboratory are decontaminated.
- Before items are used in the laboratory, all dental prostheses and prosthodontic materials are cleaned and disinfected.
- Manufacturers are consulted when needed.
- Specific information regarding the disinfection technique used is included when laboratory cases are sent off-site and returned.
- Heat-tolerant items used in the mouth are cleaned and heat-sterilised.
- Manufacturers' instructions are followed for cleaning and sterilising or disinfecting items that become contaminated but that do not normally come into contact with the patient.

Suction

During high-fluid and aerosol-producing procedures:

Limit the number of patients seen, relevant to your own environment, risk and ventilation requirements. Have a dental assistant designated for constant HVE to eliminate aerosol spray.

For OHC procedures, add 20–30 minutes per patient per procedure to help mitigate any contamination and allow for the best patient–OHC waste management.

Post Contact

End of Day: OHC Team Procedures

1. Remove disposable protective clothing.
2. If possible, protective clothing must be cleaned at the facility. If not, bring a change of clothing to change into, and properly store clinical wear in a plastic bag to wash when returning home.
3. After disposal of PPE, wash hands with soap and water for at least 45 seconds.

Disinfectant Fogging

Perform disinfectant fogging only for extraordinary circumstances and purposes in patient-care areas. Disinfectant fogging recommendations refer to the spraying of chemicals, such as formaldehyde or phenol-based agents, to decontaminate environmental surfaces or disinfect the air in health care facilities. Newer technologies involving fogging for room decontamination fogging-type applications, such as ozone mists or vaporised hydrogen peroxide, have become available and are preferred.

Personal Protection Equipment

The implementation and use of appropriate PPE have been highlighted by the COVID-19 crisis. This is the most rapidly changing and adaptive field in the medical and dental fraternity at present. We aim to provide the most current information and recommendations. It must be borne in mind that this can rapidly change and refer to the latest scientifically tested research, should these be available after the publishing of this document (May 2020). As a general rule, we would caution against any untested or non-scientific evidence. This could not only be harmful or detrimental to you because of a false sense of security wearing inappropriate or standard equipment. It could also damage the profession as a whole, as well as the patients and country we serve. Refer to the accredited suppliers and standards list as an appendix to this document. The updated version of this document on SADA site should be referred to as it needs constant updating—at least until a vaccination is produced and herd immunity is achieved.

Key Concerns Regarding the Use of PPE

Many concerns regarding complying in dentistry to PPE protocols exist. The most compelling being cost, availability and reuse (https://www.ncbi.nlm.nih.gov/pubmed/30738757).

Several studies have reported a lack of compliance among dental care providers for not using appropriate PPE for infection control. Common reasons cited were: (i) policies and practices were inconsistent, (ii) PPE was not available in many facilities and its use was limited to high-risk situations, (iii) face masks and gloves were the most commonly used PPE to protect from respiratory and other infection, (iv) compliance with PPE use was low and reuse was common, (v) lack of training in proper use and knowledge on when and what PPE to use, as well as the cost implications of complying with appropriate PPE use (Chughtai, Khan, 2020; Anagnostopoulos-King, Rodriques, 2020).

PPE supplies are currently constrained due to increased usage, panic buying and closure of borders. To avoid depletion of PPE supplies, we endorse optimal use of the correct safety equipment.

Key Basic Policies for Use of PPE in Health Care Settings

The standard of dental care infection control and associated occupational safety and health regulations worldwide are very similar, although some specific differences exist. These regulations directly impact OHC facilities. In South Africa, this is set by the Department of Health.

(https://www.idealhealthfacility.org.za/docs/Manuals-and-Handbooks/Practical%20Manual%20for%20implementation%20of%20the%20National%20IPC%20Strategic%20Framework%20March%202020.pdf). Other, often referred to instances are: CDC (https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm) , European Centre for Disease Prevention and Control (https://www.ecdc.europa.eu/sites/default/files/documents/novel-coronavirus-personal-protective-equipment-needs-healthcare-settings.pdf) and others.

Whilst there are differences in the standard of care for OHC Infection control globally, most countries follow the same basic policies and procedures, namely that of the CDC (Kohn, Collins, Cleveland, 2003), European Centre for Disease Prevention and Control (ECDC, 2020), and Organisation for Safety Asepsis and Prevention (OSAP, 2020) to promote the safety of patients and staff, and OHC providers. The Occupational Safety and Health Administration's places OHC providers in the very high exposure risk category (CDC, 2020). In South Africa, infection prevention and control policies are defined in the recently approved Practical Implementation Manual (Department of Health, 2020).

Clear guidelines on the availability and use of PPE are needed to avoid inappropriate practices that could result in spread of infection and compromise the safety of patients, staff and dental practitioners. OHCW's are referred to the linked SADA document.

Clear guidelines do not exist, but we report on our opinion of the world gold standard and how it should be adapted to South African conditions. See below for specific procedural implications.

Our recommendations, based on worldwide scientific evidence and general standard practice opinions, were adapted to the South African dental community. We recognise that there are apparent disparities within the practices of South African dental practitioners. We endeavour to supply a recommendation that should be seen as the standard for the average dentist practising within the limits of South Africa and conclude with a minimum and aspired to levels of PPE use (https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/managing-shortages-in-personal-protective-equipment-ppe).

We recommend PPE for use in the following categories:

Protection of:

4. Head:
    a. Skull—The parts normally be covered by hair, inclusive of hair protection
    b. Face—Skin normally visible
    c. Eyes—Including aids that are generally worn to correct or improve vision (glasses, loupes, microscopes, etc.)
    d. Nose
    e. Mouth
5. Neck
6. Body—including limbs, but excluding hands
7. Hands

Although the best possible options regarding PPE will be provided, these recommendations have no impact if the PPE is not correctly used. OHC providers and staff should be educated on the proper fit, use, cost and disposal of the products used. Always follow the manufacturer's guidelines, but we also suggest viewing the following links to videos and recommendations, especially for PPE that we are not used to wearing as standard operating procedures pre-covid-19.

(https://www.cdc.gov/niosh/npptl/hospresptoolkit/training.html; https://youtu.be/oxdaSeq4EVU; https://www.cdc.gov/niosh/npptl/hospresptoolkit/training.html.

It is critical that dental health care providers are trained properly so that they (i) know the technical requirements when procuring PPE, (ii) be aware of the critical aspects and known pitfalls when using PPE, (iii) understand staff protection as a combined approach, which is not based on PPE alone, and (iv) strengthen occupational safety and health within the practice setting (ECDC, 2014) (https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/safe-use-of-ppe.pdf).

General Guidelines on Putting on (Donning) and Removing (Doffing) PPE

The correct way to don and doff is essential to secure your safety. This is best illustrated by means of graphics and video. These cannot be accepted as known entities and should be trained and practised (even experienced surgeons need to complete this education)
(https://youtu.be/06u0HyFUhAI https://youtu.be/vrrGyWSbEgI English Version, 8.5" x 11" size pdf icon[PDF – 2.85 MB] https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf

This poster demonstrates the sequence for donning and removing PPE. The poster provides key instructions to reinforce safe practices that to limit the spread of contamination (English Version, 8.5" x 11" size pdf icon[PDF – 2.85 MB] https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf).

Sequence for Putting on (Don, Donning) and Removing (Doff, Doffing) PPE

Donning and doffing correctly are essential to secure your safety. This is best illustrated by means of graphics and video. These aspects of putting on and removal of protective clothing cannot be accepted as known entities and should be trained and practised (even experienced surgeons need to complete this education)(https://youtu.be/06u0HyFUhAI; https://youtu.be/vrrGyWSbEgI; English Version, 8.5" x 11" size pdf icon [PDF – 2.85 MB]; https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf) (PowerPoint ppt icon[PPT – 1.45 MB]) (PDF icon[PDF – 285 KB])(Trainers Information).

Sequence for Putting on Personal Protective Equipment (Donning) - Non-sterile

1. Hand hygiene
2. Put on gown
3. Put on mask/respirator
4. Put on eye protection
5. Put on gloves

(Source: Ontario Public Health)

How to Fit a Respirator Mask

Respirator masks must be correctly fitted to be effective. When placing the respirator mask, make sure it has a tight seal. Mould (do not pinch) the respirator mask over the bridge of the nose. Breathe out against the resistance of the respirator and check for any air leaking from the side. Breathe in and again make sure there is no air entering the mask from the side. Facial hair prevents a good seal and should be shaved off (Source: SASA recommendations for appropriate PPE).

Guidance on Use of N95 Respirators

OHC workers treating patients known to be symptomatic or suspected of being infected with SARS-CoV-2 and those performing AGPs are required to use N95 respirators (https://www.osha.gov/Publications/OSHA3990.pdf).

Face shields may also be worn on top of a respirator to prevent bulk contamination of the mask.

When disposable N95 respirators are not available, consider using other respirators that provide greater protection and improve worker comfort e.g. R/P95, N/R/P99, or N/R/P100 filtering facepiece respirators or other devices. CDC strategies for optimising supply of N95 respirators, 2020) (https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/index.html).

Consider factors such as function, fit, ability to decontaminate, disposal and cost.

Respirator training should address selection, use (including donning and doffing), proper disposal or disinfection, inspection for damage, maintenance and the limitations of respiratory protection equipment (https://www.cdc.gov/niosh/npptl/hospresptoolkit/training.html).

Sequence of Postoperative Removal of PPE (Doffing) - Non-sterile

- Remove shoe covers (last procedure-AGP)
- Remove outer gloves followed by hand hygiene
- Remove disposable plastic gown followed by hand hygiene

- Remove eye protection
- Remove mask/respirator and perform hand hygiene. When removing the respirator, touch only the straps and not the respirator itself.
- Remove head cover followed by hand hygiene (source: Ontario Public Health)
- Since the virus tends to remain in airborne particles, it is recommended not to remove PPE prior to exiting the contaminated room.
- After each procedure, all PPE should be removed and high-level disinfection performed.
- Disinfection of eye glasses and shields with 70% isopropyl alcohol or HOCL
- Discard disposables and medical waste into appropriate containers.

Guidance for Training of Dental Health Care Providers in Appropriate Use of PPE

It is critical that dental health care providers are trained properly so that they: (i) know the technical requirements when procuring PPE, (ii) be aware of the critical aspects and known pitfalls when using PPE, (iii) understand staff protection as a combined approach, which is not based on PPE alone, and (iv) strengthen occupational safety and health within the practice setting (**ECDC, 2014**).

Extended Use and Reuse

It must be stressed that extended and reuse are applied only according to CDC recommendations in an emergency situation, such as the COVID-19 pandemic coupled with a shortage problem, problems we face currently (https://www.fda.gov/media/135763/download). This should, however, not be seen as a cost-saving measure to circumvent the standard of care.

Extended and reuse is not recommended for any aerosol-producing procedure. In aerosol-producing procedures, N95 respirator masks are indicated as single-use disposable items (https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html#risksextended).

When disposable N95 respirators are not available, consider using N95 equivalent or other respirators that provide greater protection and improve worker comfort (e.g. R/P95, N/R/P99 or N/R/P100 filtering facepiece respirators). CDC strategies for optimising the supply of N95 respirators (2020) can be found at https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/index.html.

Definition of Extended Use

Extended use refers to the practice of wearing the same N95 (or equivalent) respirator for repeated close contact encounters with several patients, without removing the respirators between patient encounters.

Usage Recommendations

Extended use may be implemented when multiple patients infected with SARS-CoV-2 are treated consecutively in a designated high-risk room. We are acutely aware of the different profiles of OHC facilities in South Africa. Those OHC facilities that are limited to the relief of pain and sepsis could qualify for this usage, with the provision of refraining from AGPs. Thus, they should not make use of a hand piece to aid in/simplify the removal of teeth and drainage of abscesses. These procedures should be limited to manual means, thus extraction pinsets and root removals with the use of elevators, periotomes, etc. Removable stitches should be used if possible. The mask must further be protected with a face shield. This is also relevant to dental therapists. These practices would most often also be located in rural or naturally well-ventilated areas, in line with our ventilation recommendations.

Scrutiny of measures—with stringent controls—on the fit and efficacy of these masks must be imposed by the principal OHC provider in charge during the time period; masks must be exchanged once compromised. Many health care deaths are attributed not to contracting the virus but to a very high viral load, such as those that can be attributed to rebreathing. Thus, in the end, they are self-inflicted.

Once the session is completed, the mask must be discarded; as soon as another shift in the same room starts, a new mask best be donned.

Definition of Reuse

Reuse refers to the practice of using the same N95 respirator for multiple encounters with patients, but it is removed (doffed) after each encounter.

Usage Recommendations

The respirator is stored in between encounters to be put on again (donned) prior to the next encounter with a patient. When N95 (or equivalent) respirator reuse is practised or recommended, such as during non-droplet/aerosol-forming procedures, **restrictions such as (Refrain from touching the front of the respirator; limit touch during donning and doffing, to the strings only) are put in place that limit the number of times and in which procedures it can be reused.** Thus, N95 (or equivalent) respirator reuse is often referred to as 'limited reuse'. Limited reuse has been recommended and widely used as an option for conserving respirators in times of limited supply (Beckman, Materna, Goldmacher et al., 2013; Hines, Rees, & Pavelchak, 2014; CDC, 2010; Rebmann, Alexander, Cain et al., 2009; IOM, 2006).

Risk of Reuse During Extended and Reuse Scenarios

1. The most significant risk is contact transmission from touching the surfaces of the contaminated respirator. Clean hands with soap and water or an alcohol-based hand sanitiser before and after touching or adjusting the respirator.
2. A reused mask would decrease filtration efficiency and promote poor fit. The fit can easily be rechecked, but the inferior efficiency will only be noted when the OHC worker is infected.
3. Discard N95 respirators when: (i) contaminated with blood, respiratory or other bodily fluids from patients; (ii) following close contact with any symptomatic or suspect COVID-19 patient or a patient co-infected with an infectious disease requiring contact precautions except as defined in the extended use category (primary dental primary care clinic in a well-ventilated area).
4. Cleanable full face, face shield over an N95 (or equivalent) respirator helps reduce surface contamination of the respirator.
5. Follow the manufacturer's guidelines regarding the maximum number of donning or use they recommend. If no manufacturer guidance is available, preliminary data suggest limiting the number of reuses to no more than 5 per device to ensure an adequate safety margin (Fisher & Shaffer, 2014; Bergman, Viscusi, Palmiero, Powell, & Shaffer, 2012).
6. It is recommended that if reuse is practised by an OHC worker in close contact with a patient that the mask is gas sterilised by an approved facility, after each patient. Thus, after use, it is safely stored, sent for sterilisation and reused after sterilisation. This would imply that each OHC worker has a few masks at his/her disposal.
7. Instrument holding and pre-cleaning: For instrument cleaning, use a neutral or near-neutral

Recommendations for Reuse in Non-Aerosol-Forming Procedures

Use a pair of clean (non-sterile) gloves when donning a used N95 respirator and performing a user seal check. Discard gloves after the N95 (or equivalent) respirator is donned and checked.

Avoid touching the inside and front parts of the respirator. If inadvertent contact is made with the inside of the respirator, discard the respirator and perform hand hygiene. Place each used respirator in its own designated Ziploc plastic bag. Paper is pervious and could add to contamination between uses to minimise cross-contamination (CDC recommendation).

Final and Important Remarks

Hand hygiene and PPE use cannot be seen or practised in isolation in terms of safety, nor are one more important than the other. Infection control measures should be practised according to the standard of care at multiple levels to prevent transmission and to protect patients, staff and dental health care providers.

'This storm will pass. But the choices we make now could change our lives for years to come' (Yuval Noah Harari).

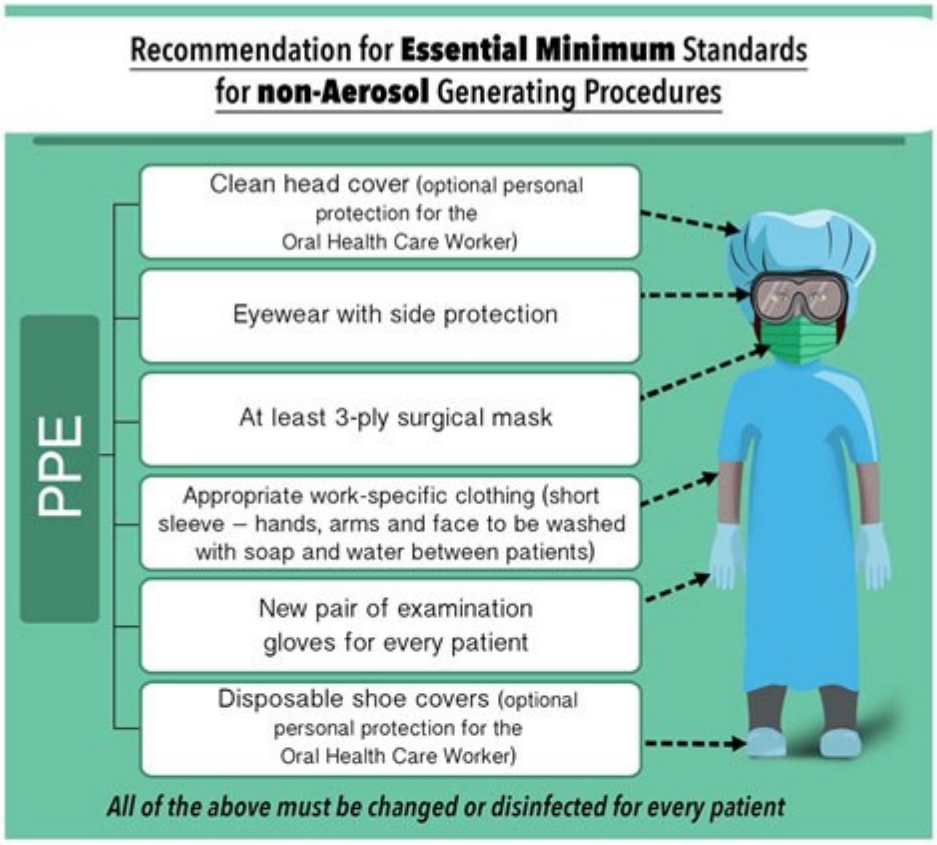
Dental clinicians can download the free mobile app: 'CDC DentalCheck' to access CDC resources and checklists to assess their practice and to ensure they are meeting the minimum standard expectations for safe care (https://www.cdc.gov/oralhealth/infectioncontrol/dentalcheck.html). For local content also refer to (Oosthuysen 2015; Oosthuysen and Fossey 2015) (http://hdl.handle.net/11462/669) and (http://hdl.handle.net/11462/1565).

Summary PPE

Standards on PPE and Decontamination Procedures Required for COVID-19 Pandemic

Diagrams 1 and 2 outline the essential minimum standards and decontamination protocols for non-Aerosol and Aerosol procedures. These are the minimum requirements for treating patients during the pandemic in the OHC facility.

Diagrams 3 and 4 outline aspirational standards and decontamination protocols for non-Aerosol and Aerosol procedures that the OHC facility can employ to upgrade the essential minimum standards for additional personal and patient protection. The reasonable standard of care should be seen between these two levels.



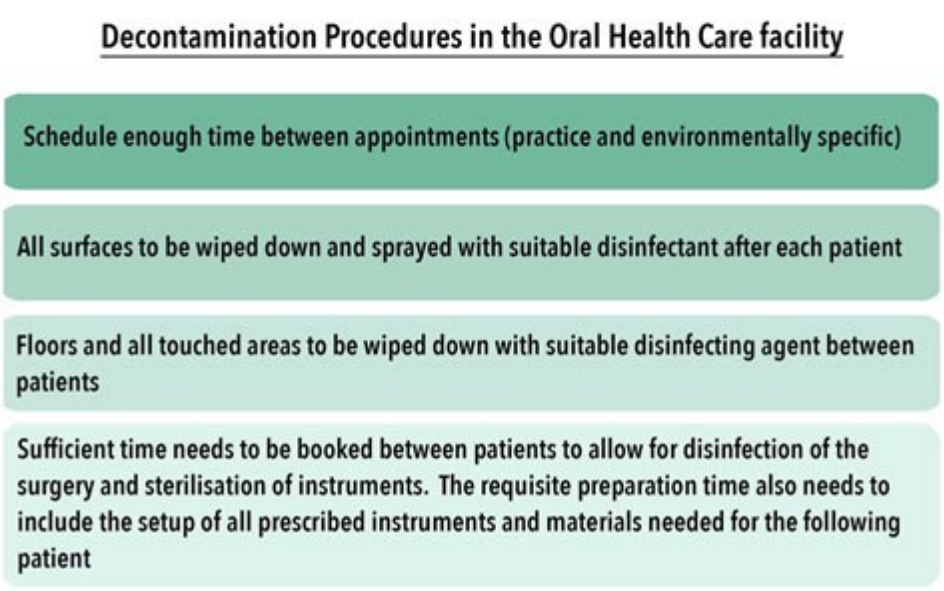
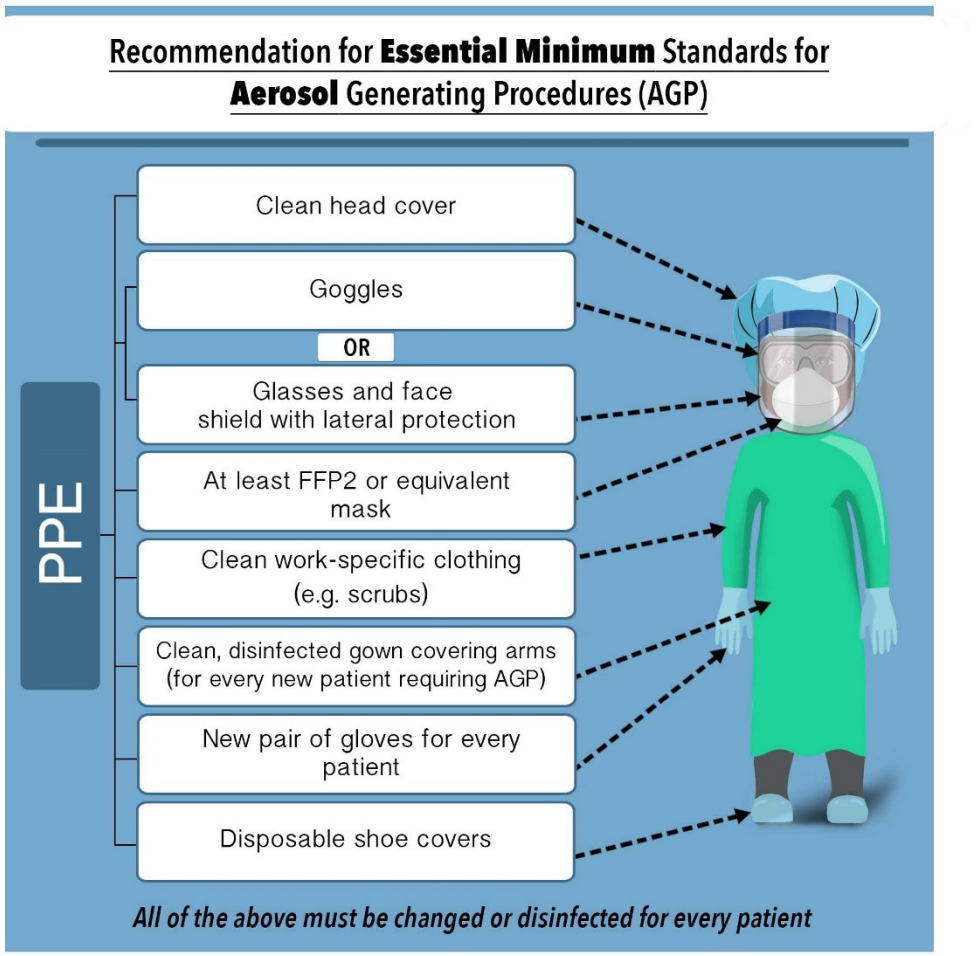


Diagram 3: Recommendation for essential minimum standards for non-aerosol-generating procedures



Decontamination Procedures in the Oral Health Care facility

- Schedule adequate time between appointments (practice and environmentally specific)
- Rubber dam and high-volume suction mandatory for all endodontic and restorative procedures
- All surfaces to be wiped down and sprayed with suitable disinfectant after each patient
- Handpieces and instruments must be sterilised after each patient
- Floors and all touched areas to be wiped down with suitable disinfecting agent between patients especially after AGP
- Sufficient time needs to be booked between patients to allow for disinfection of the surgery and sterilisation of instruments. The requisite preparation time also needs to include the setup of all prescribed instruments and materials needed for the following patient

Diagram 4: Recommendation for essential minimum standards for AGPs

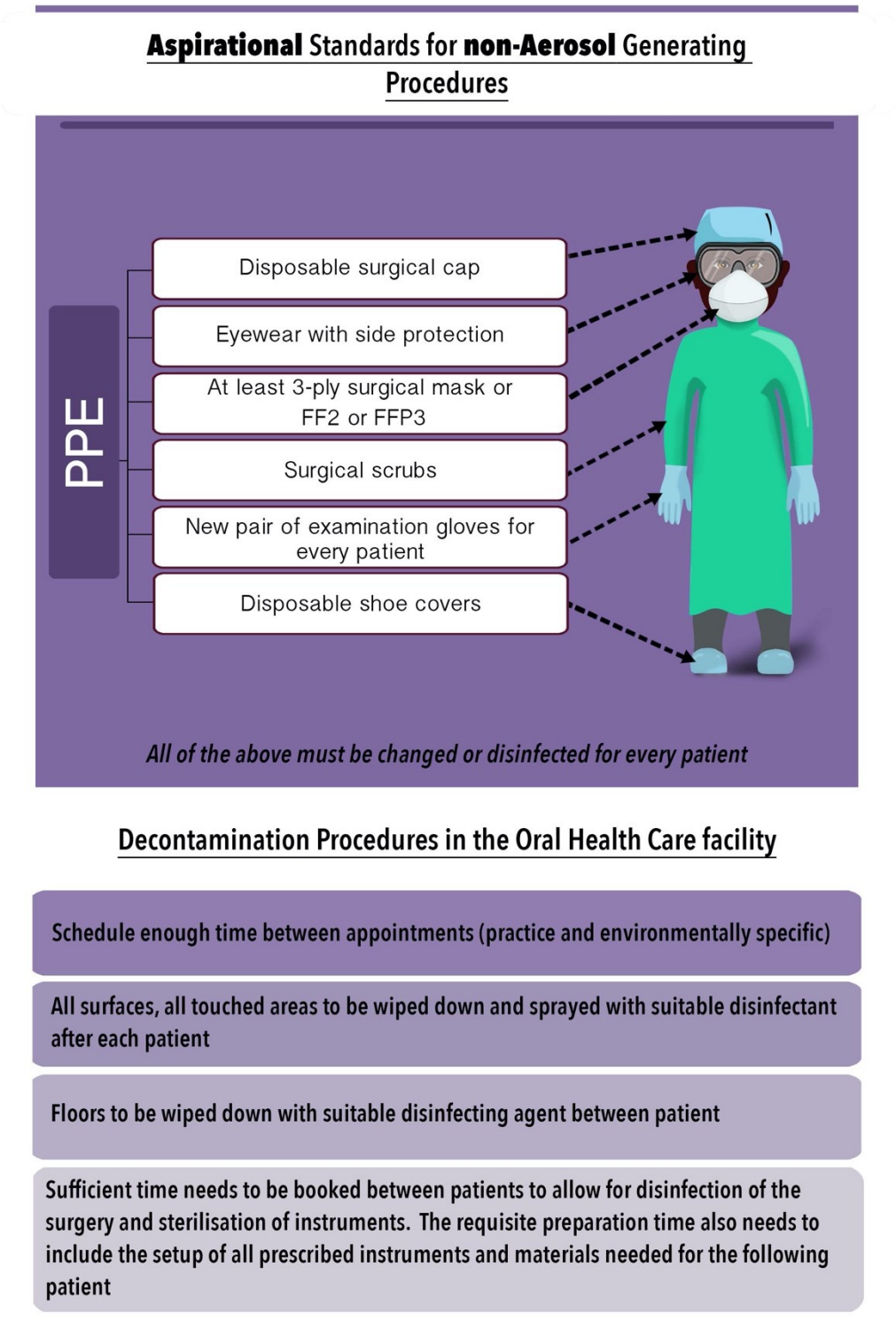


Diagram 5: Aspirational standards for non-aerosol-generating procedures

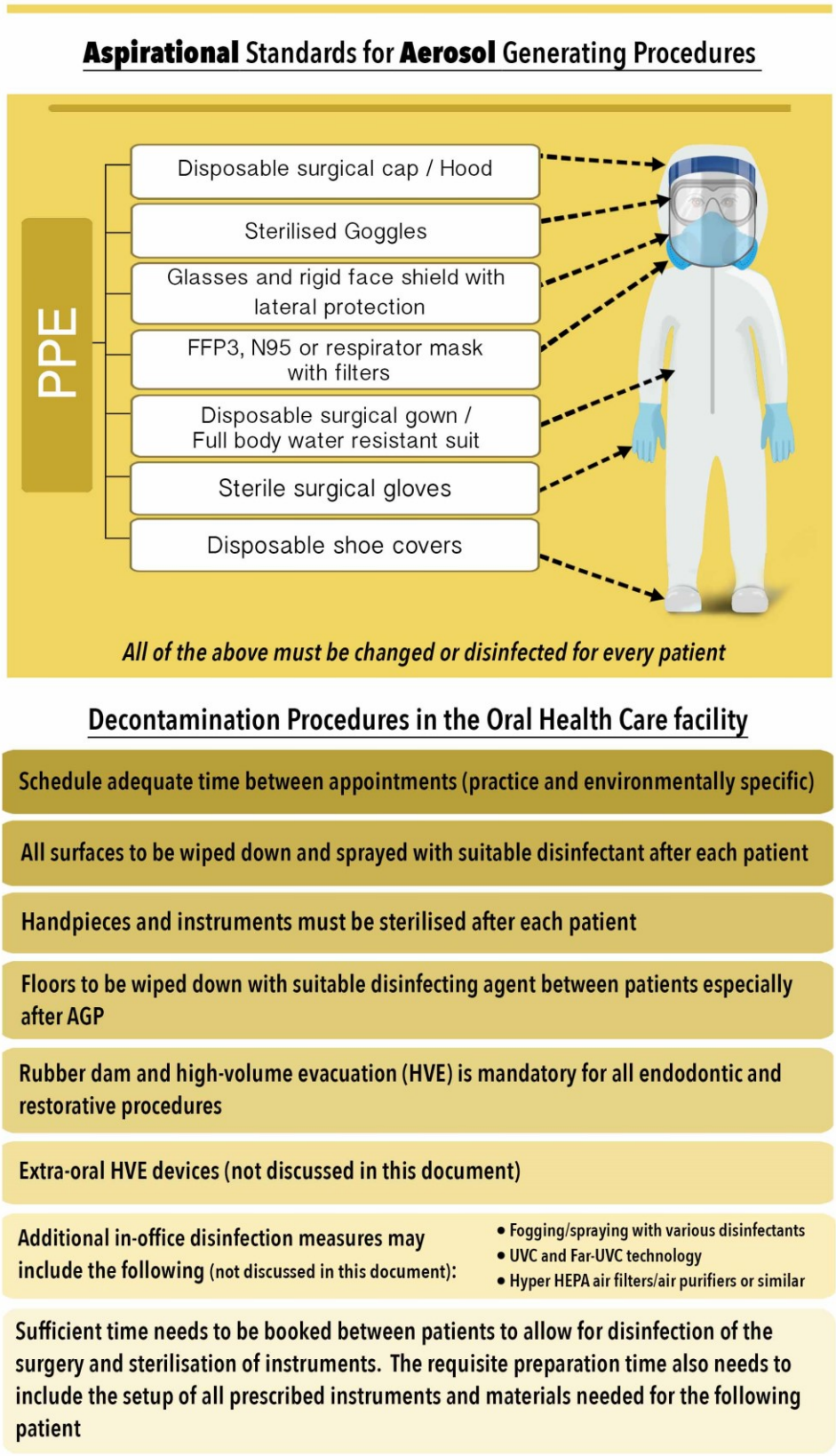


Diagram 6: Aspirational standards for AGPs

Classification of Contact

1. Non-Aerosol-Generating Procedures
2. Aerosol-Generating Procedures

We recognise that many procedures do not fall strictly into the above categories and would be a combination of the two. The strictest classification should then apply.

Non-Aerosol-Generating Procedures

Definition

For the purpose of this document, this would be defined as procedures with minimal droplets and no AGP (more than expected but in line with non-facemask social contact). All patients should be treated as though they are potentially infected, and no aerosols should be produced during clinical interventions. It would include all procedures that are done without any rotary/vibrating instruments, suction (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3322898/) or pressurised air.

Procedures that could fall into this category include clinical extra- and intra-oral examinations without the aid of a 3-in-1 syringe, intra-oral x-rays and dental impressions (be aware of an increased risk of coughing or gagging), as well as denture repairs and changing elastics for orthodontic patients.

Persons at Risk

1. It must be accepted that all members of the OHC team are at risk.
2. All staff entering the red zone should wear appropriate PPE in line with their function in this area. Administrative staff are less at risk and should be instructed to avoid the red zone as much as possible. Everybody should adhere to the PPE protocol set out above.

Standard Precautions

All staff members should wear masks at all times. Social distancing should be practised during tea breaks/meals.

1. It is expected that hand disinfection protocols will be performed much more frequently and diligently than those proposed as public guidelines.
2. Appropriate protective clothing to be worn by staff in line with their job description. For clinical staff, scrubs or similar attire are preferred. Additional protective clothing for routine and emergency changes during a working day is advocated, with changing to personal street clothing upon leaving the premises.
3. Personal cough etiquette and respiratory hygiene to be adhered to as per government proposals. It is advocated that all staff are formally informed and educated and that they police each other.

Pre-Procedural

1. The assistant should stand behind the patient when placing the bib. Refrain from using bib chains or clips, as these may increase the potential cross-infection risk disease from patient to patient or from patient to health care worker (Molepe et al., 2015).
2. Cleanse the peri-oral area with either a water face wash at the basin or, as an untested opinion, using swab with 0.2% povidone-iodine (povidone-iodine is known to be virucidal).

Patient Hand Hygiene on Entry and Exit

1. Patients sanitise/disinfect their hands again with the use of an alcohol-based hand sanitiser, dispensed into their hands by the dental assistant. Requesting patients to refrain—as far as practically possible—from touching any surfaces, such as working surfaces.
2. Add a visual display of hand disinfection protocol for patient education and reassurance.

Appropriate PPE

1. Head:
    a. Cover head with a disposable surgical cap
    b. Face to be covered by a visor/face mask
    c. Eyes—protective eyewear with side shields or goggles
    d. Nose and mouth to be covered, preferably with an N95*(or equivalent*) mask but at minimum a 3-layered surgical mask
2. Cover exposed skin at neck area with polar/buff neck clothing, preferably a fluid-resistant material or part of the gown design.
3. Cover body with a fluid-resistant gown or at least an apron with at least full-length arm coverage clothing and legs to the below the knee.
4. Hands—Gloves—latex gloves offer the best protection against bacteria and viruses, whilst synthetic gloves provide better chemical protection. Of the different types of latex-free gloves, nitrile gloves offer a higher degree of protection against viruses, besides the chemical protection they provide (https://www.cadth.ca/sites/default/files/pdf/htis/oct-2013/RC0486%20Disposable%20gloves%20final.pdf).

Hand Hygiene

General Dental Operating Procedure

1. Wet hands and apply sufficient liquid soap to create a proper lather.
2. Temperature of water ideally between 35°C and 45°C
3. Rub palms together in a circular motion. Rotate clockwise and anti-clockwise
4. Rub back of hands with fingers linked through the other hand and then alternate
5. Interlink facing fingers into clasped hands followed by rubbing palms and fingers together
6. Cup fingers together, with right hand over and left hand under. With fingers interlocked, scrub the backs of them against palms and then alternate
7. Clean thumbs by enclosing your right hand around your left thumb as you rotate and then alternate.
8. Rub palms with fingers in a circular motion, then alternate
9. Dry hands with disposable paper hand towels
10. Apply alcohol-based hand sanitiser
11. Don gloves
12. Apply alcohol-based hand sanitiser on donned gloves. Avoid touching any surfaces prior to touching the patient (https://www.cdc.gov/handhygiene/)

Sterile Surgical Protocol Pertaining to Surgical Interventions

Refer to routine sterile protocol procedures as prescribed in hospital/sterile environments, plus additional measures during crisis management. Donning procedure: as prescribed above by illustrations and video.

Aerosol-Generating Procedures

Definition

Aerosols are produced when a current of air moves across the surface of a film of a liquid. The greater the force, the smaller the droplets formed. OHC AGPs are defined as any patient and medical care procedure that results in the production of airborne particles (aerosols). AGPs can produce particles <5 µm in size, which can remain suspended in the air and travel over a distance, causing infection when inhaled. Therefore, AGP creates the potential for airborne transmission of infections that may otherwise be transmitted via droplets (Shiu E, Leung N, Cowling B). Controversy around airborne versus droplet transmission of respiratory viruses exists. This has implications: implication for infection prevention, and we need to accept the probability of airborne spread is high (Curr Opin Infect Dis. 2019;32(4):372–9) (NIPC Scotland: AGPs guidelines reviewed November 2019) (https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2892/documents/1_2019-10-11-combined-nipcm-methodology-v1.pdf).

Aerosol-Generating Procedures in Dental Practice

The list of procedures is vast, but for the purpose of this definition, it is more inclusive to concentrate on aerosol-producing and air abrasion dental equipment used to perform OHC procedures. This would include the following:

1. Use of 3-in-1 syringe in dental oral examination to facilitate better vision of the intra-oral working area
2. Use of ultrasonic scalers to aid in oral hygiene and periodontal procedures
3. Use of high and low speed hand pieces with or without water coolant. Surgical hand pieces, air or electric turbine hand pieces, also when used to adjust prosthesis intra-orally and peri-orally.
4. Maxillofacial and oral surgery where high-speed devices are used
5. Use of Lasers

Persons at Risk

Anybody in the area of expected higher viral load (red zone) is at risk of acquiring the virus upon entering this area. Special mention should, however, be made of persons directly in contact with the patients, such as OHC personnel and those present in the room to assist. In this time the following scenario can be imagined: In a time of need, a staff member, correctly donned for distant contact, may be asked to open certain items that were not considered when planning for a specific procedure. An example may be that a sterile package needs to be opened but is not easily reachable, the implication being that the assistant's hands may contaminate multiple surfaces to reach this. The distant staff member correctly trained and donned could open this package whilst maintaining social distancing. This is an ideal opportunity for the reuse of an appropriate mask if treated as explained above.

Appropriate Clothing, Hygiene, and PPE

Head Protection

- Types: caps and covers (disposable or reusable)
- Additional hair cover is recommended when working in a sterile or high-risk environment with long hair and beards.

Respiratory (Nose and Mouth) Protection

The purposes of respiratory protection are (i) to prevent or reduce transmission of air droplets and aerosols between health care workers and the patient and (ii) to prevent air droplets and aerosols into oral and nasal mucous membranes of OHC workers during procedures.

Type of PPE for Respiratory Protection

- Respirators (without valves) are indicated for high-risk clinical procedures—AGP.
- N95 (or equivalent) respirators without valves (cone shaped or duckbill shaped) are indicated during any AGP procedure.
- Respirators with valves are recommended where prolonged contact with the patient is expected (> 1 hour).

Eye Protection

- Type of eye protection: Goggles, face masks and face shields.
- Goggles and face shields protect the eyes from splashes and spatter of contaminated (saliva) air droplets and contaminated aerosols.
- Face masks and face shields protect the eyes and other parts of the face against the spatter of contaminated air droplets and contaminated aerosols.
- Face shields or face masks are indicated when doing AGP
- Protective safety glasses and face shields should undergo thorough disinfection with 70% isopropyl after each procedure.

Body Protection

- Types: Gowns (disposable and reusable) and overalls.
- Must meet the following criteria: sterile if reusable, long sleeves to cover arms and water resistant
- Cloth gowns are not recommended, as they are not water resistant.
- Commercially available reusable gowns should be water resistant, washable and sterilisable according to manufacturer's recommendations.
- Plastic aprons are not recommended for dental and surgical purposes because they do not provide full body and arm cover.

Shoe Protection

- Types: Overshoes and shoe covers (disposable).
- It is suggested that overshoes and shoe covers should be single patient use. Any airborne droplet will gravitate to ground level and will contaminate footwear. Inadvertent contact may be a route for mucosal entry after touching these soiled areas.

Hand Protection (Gloves)

Types

- Latex or latex-free (nitrile) gloves—short cuff and non-sterile. Indicated for all general procedures. Latex or latex-free surgical gloves—sterile, individually wrapped and long cuff. Indicated for all surgical procedures.
- Gloves are used to protect health care workers from direct contact with blood, saliva and body fluids and secretions.
- Gloves should be worn with every patient intervention/procedure; they are for single-use purposes only and should be discarded after each procedure and patient use.
- Double gloving in dentistry is impractical, as dexterity is lost, which is crucial in our profession. The donning of a new set of non-sterile gloves before starting doffing is advised.

Non-Clinical Staff Selection and Utilisation of PPE

- **Reception and non-clinical staff:** Surgical mask or cloth mask, N 95 (or equivalent) if in the Red zone and at least 30 min thereafter.
- **Cleaning staff:** Surgical mask and gloves

Non-AGP and AGP on High-Risk Patients

Health care workers in contact with a suspected or confirmed COVID-19 case should wear a surgical mask or, if available, an FFP2 respirator—tested for fit, eye protection (goggles) and face shields, a cover all and gloves (EDCD Technical Report, 2020). It is recommended that these procedures be treated in a specialised environment, such as Airborne Infection Isolation Room (AIIR) or theatre environments that meet these standards as set out under practice ventilation requirements. Laminar flow, appropriate HEPA protected.

Guidance for the Selection and Use of Personal Protective Equipment in Healthcare Settings

CDC has developed this slide set for use by staff development, infection control and occupational health personnel for training healthcare personnel on how to select and use PPE to protect themselves from exposure to microbiological hazards in the healthcare setting.

Available Formats for download:

- PowerPoint ppt icon [PPT – 1.45 MB]
- PDF [PDF – 285 KB]
- HTML Trainers Information

Special Precautions

General

Isolation Devices

Fine aerosols generated by AGP (e.g. use of air turbines, ultrasonic and sonic devices and 3-in-1 syringes) produce fine aerosols (<5 µm) or less in diameter that can suspend in the air. Spatter droplets are much larger than aerosol particles (<50 µm). Both aerosol particles and spatter droplets can contain infectious agents (bacteria or viruses). Respiratory tract viruses are a recognised hazard for health care workers, including dentists. SARS-CoV-2 has predominantly respiratory transmission through aerosols <10 µm (Shiu E, Leung N, Cowling B). Controversy around airborne versus droplet transmission of respiratory viruses: implication for infection prevention (Curr Opin Infect Dis. 2019;32(4):372–9) and droplets (<50 µm) (Izetti, Nisi, Gabriele, 2020). It is therefore reasonable to assume that any method for reducing the viable bacterial or viral load in saliva and/or oral environment and/or limiting the effects of viral diffusion could lower the risk of cross-contamination and are therefore critically important for infection control (Izetti, Nisi, Gabriele, 2020).

It is of utmost importance to consider all methods that can minimise the risk of transmission of potentially infectious agents, such as SARS-CoV-2, to dentists, dental auxiliary staff, dental assistants and patients.

Pre-procedural Mouth Rinse

To this end, the most important method for reducing the viable bacterial and viral load is through pre-procedural rinsing with povidone-iodine (0.23% to 1%) or 1% hydrogen peroxide rinse.

Rubber Dam

Contamination from aerosols and spatter (air droplets) dissemination remains a significant hazard to dental personnel when AGP are done.

Studies have shown that during conservative dental procedures (15–30 minutes) without the use of a rubber dam, the airborne bacterial load increased from 8.8 to 25.1 CFU. This means that patients, dentists and assistants, as well as surfaces and objects in the operative area, are at a risk of exposure to airborne contamination 2.5 to 3X greater than the norm (Legnani et al., 1994).

Various studies have shown that the use of rubber dam isolation during AGP resulted in a 98.8% bacterial reduction (El-Din, Ghoname, 1997; Cochrane, Muller, 1989; Samaranayake, Reid, Evans, 1989; Al-Aman, Awad, Edher et al., 2017). This reduction increased with antiseptic mouth rinse used before the rubber dam application.

When resources are limited or under strain, the presence of physical constraints (e.g. wearing eyeglasses), or due to personal preferences, dentists and their assistants have the choice to use rubber dam isolation for eye protection instead of using a face shield and N95 respirator when performing AGP.

Several studies have confirmed that the viral load in human saliva is very high and that preoperative mouth rinses can reduce but not eliminate it (https://journals.sagepub.com/doi/10.1177/0022034520914246; Peng et al. 2020 (https://www.nature.com/articles/s41368-020-0075-9.pdf?origin=ppub). In terms of the coronavirus, Wang et al. (2004) (https://doi.org/10.3201/eid1007.031113) examined the oral cavity of SARS patients and found a large amount of SARS-CoV RNA in their saliva ((7.08×103) to (6.38×108) copies/mL). This suggests a strong possibility of coronavirus transmission through oral droplets. According to Chowell et al. (2015) (https://doi.org/10.1186/s12916-015-0450-0), evidence shows that the majority of SARS-CoV and MERS-CoV cases are associated with nosocomial transmission in hospitals, resulting, partly, from the use of AGPs performed on patients with respiratory disease. Based on the current epidemiological data, 2019-nCoV has higher transmissibility than SARS-CoV and MERS-CoV (Chen, 2020) (https://doi.org/10.1016/j.micinf.2020.01.004). Therefore, modification of standard precaution and infection control regimen targeted toward 2019- nCoV is essential during this outbreak (Ge et al. 2020) (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7089481/pdf/11585_2020_Article_417.pdf).

Viral transmission can occur when viral particles are aerosolised by a cough, sneeze, or during dental care. According to Froum and Strange (2020), particles can potentially travel up to a distance of 6 m from an infected person and have the potential to incite secondary infections (https://www.perioimplantadvisory.com/periodontics/oral-medicine-anesthetics-and-oral-systemic-connection/article/14173521/covid19-and-the-problem-with-dental-aerosols).

Dentists and auxiliary staff who treat patients during aerosolisation procedures are at very high risk of infecting themselves or to re-infect other patients. The highest risk occurs from splatter and droplet transmission to the midface of the dentist and/or dental assistant, as well as the nasal area of the patient (Nejatidanesh et al. 2013) (http://europepmc.org/article/med/23930175#free-full-text).

The water coolant from a high-speed hand piece could generate aerosols during restorative, prophylaxis and surgical procedures (Farah, 2019) (https://www.ncbi.nlm.nih.gov/pubmed/30834225). When combined with bodily fluids in the oral cavity, such as blood and saliva, bioaerosols are created (Ge et al. 2020) (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7089481/pdf/11585_2020_Article_417.pdf).

These bioaerosols are commonly contaminated with bacteria, fungi and viruses, and have the potential to float in the air for a considerable amount of time and be inhaled by the dentists or patients (Grenier, 1995) (https://aem.asm.org/content/aem/61/8/3165.full.pdf); (Jones and Brosseau, 2015) (https://www.ncbi.nlm.nih.gov/pubmed/25816216). Ultrasonic and sonic transmission during nonsurgical procedures had the highest incidence of particle transmission, followed by air polishing, air/water syringe and high-speed hand piece aerosolisation (Harrel and Molinari, 2004) (https://www.ncbi.nlm.nih.gov/pubmed/15127864).

Therefore, taking additional measures, such as the use of dental rubber dams to reduce exposure to contaminated aerosols during treatment, is very important (Spagnuolo, De Vito, Rengo, and Tatullo, 2020). Several published guidelines, not only for endodontics procedures, but for almost all aerosol-generating dental procedures recommend the use of rubber dam when possible (American Association of Endodontics, 2020) (https://mddsdentist.com/wp-content/uploads/2020/03/COVID-JOE-Preprint-3.18.20-v2.pdf); American Dental Association, 2020a (https://www.ada.org/en/publications/ada-news/2020-archive/march/ada-adds-frequently-asked-questions-from-dentists-to-coronavirus-resources); Indian Endodontic Society et al., 2020 (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwij6bm-iPfoAhVkoXEKHS7JC-4QFjABegQIARAB&url=https%3A%2F%2Fida.org.in%2F&usg=AOvVaw1qx0nI8HBbOfQYZS_Ge04v).

The rubber dam provides a barrier of protection from the primary source and can virtually eliminate all pathogens emerging from respiratory secretions during dental procedures that generate aerosols (Ge et al. 2020) (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7089481/pdf/11585_2020_Article_417.pdf). According to Harrel and Molinari (2004) (https://www.ncbi.nlm.nih.gov/pubmed/15127864), if the rubber dam is placed correctly, the only source of contamination would be the tooth that is undergoing treatment. The application of a rubber dam during cavity preparation showed a reduction in the spread of microorganisms by 90% (Cochran et al. 1989) (https://doi.org/10.14219/jada.archive.1989.0131). Samaranayake, Reid and Evans (1989) (https://www.ncbi.nlm.nih.gov/pubmed/2681303) reported that the use of a rubber dam could significantly reduce airborne particles in a 3-foot diameter of the operational field by 70%. The efficacy of a rubber dam isolation as an infection control procedure in paediatric dentistry has also been reported. They showed a 98.8% bacterial reduction up to 1 m from the patient (El-Din and Ghoname (1997) (http://www.emro.who.int/emhj-volume-3-1997/volume-3-issue-3/article16.html).

In contrast to previous studies, Al-Amad et al. 2017 (https://core.ac.uk/download/pdf/82393007.pdf) demonstrated that despite the clinical value of the rubber dam, it can result in significantly higher aerosol levels on various areas of the dentist's head. They advised that dentists should cover their heads with suitable protective wear during AGPs.

Another device that can be used for isolation of the oral cavity during restorative procedures is Isolite (Isolite Systems, 2017) (https://optident.co.uk/app/uploads/2018/03/Isolite-Systems-Brochure.pdf). Isolite delivers quick, easy, reliable isolation with uninterrupted retraction and continuous evacuation of fluids and oral debris with a reduction of aerosols. By inserting the soft Isolite mouthpiece, immediate tongue protection, cheek retraction and throat protection are accomplished whilst the built-in bite block allows the patient to comfortably rest his or her jaw and keep the mouth open at all times. The system also provides unique shadowless illumination in the patient's mouth, which reduces eye strain for the practitioner.

Dahlke et al. (2012) (https://www.ncbi.nlm.nih.gov/pubmed/23115148) evaluated the spatter-reduction effectiveness of a non-isolated control consisting of HVE with a dental rubber dam in conjunction with HVE and the Isolite system. The results of this in vitro study showed that the rubber dam with HVE and the Isolite system reduced spatter significantly compared to HVE alone. However, a more recent in vivo study compared aerosol and spatter reduction of a saliva ejector and the Isolite system during and after ultrasonic scaling (Holloman et al., 2015) (https://jada.ada.org/article/S0002-8177(14)00002-6/pdf).

The results of the study showed no significant difference between the two groups in aerosol and spatter reduction. The authors concluded that there was a significant amount of contamination during ultrasonic scaling in both groups and that additional measures should be taken with these devices to reduce the likelihood of disease transmission.

In conclusion, the rubber dam with an appropriate preceding mouth rinse appears to be the best option for working field isolation devices in order to eliminate AGP. It is also important to note that when the rubber dam is used, extra high-volume suction for aerosol and spatter should be used during procedures in conjunction with regular suction (Samaranayake & Peiris, 2004) (https://www.ncbi.nlm.nih.gov/pubmed/2681303)

Suction

During clinical procedures known to cause aerosol and splatter formation, it is mandatory to incorporate the use of an HVE. Studies have shown that effective use of an HVE can remove more than 90% of the aerosol. The most efficient way to remove aerosols is with four-handed dentistry (https://pubmed.ncbi.nlm.nih.gov/9766105/)(https://www.ncbi.nlm.nih.gov/pubmed/25581979).

When evaluating suction systems in an OHC environment, consideration should be given to the following:

1. Efficiency
2. Maintenance/disinfection
3. Installation

Efficiency: The ideal power of an HVE should be a minimum flow rate of 300 l/min

Maintenance/disinfection: After procedures involving blood or aerosol, a glass of cold water should be passed through the system. It is essential to clean filters and disinfect with the correct solutions at the end of every day (see later: sterility recommendations).

Installation: All suction systems have an exhaust that removes toxic waste. Ideally, these exhausts should be outside and if potentially close to a public place should have a filter of an appropriately strong UV-C system to sterilise the air (removing particles of 0.01 µm or less, efficiency of 99.99%). The filter should provide particle removal to 0.01 µm with a Dispersed Oil Particle (aerosol) efficiency of not less than 99.9%. Some practices will not be able to install an external exhaust; here filters are mandatory. Also refer to ventilation in this document: http://www.bcga.co.uk/assets/HTM_2022_S1.pdf.

In conclusion, modified suction devices that are fitted to the HVE do not remove aerosol/splatter at the source, so we must accept there will be a compromise in reduction of exposure to operators. External suction devices must be considered as an additional layer of protection and not a replacement of the use of HVE. The ideal control of aerosol would be with isolation procedures, such as a rubber dam in combination with an HVE used by an assistant.

The Use of Dental Auxiliaries

Two-Handed Dentistry

Two-handed dentistry is defined as dentistry where the OHC worker is the only person working on the patient. There is no dental auxiliary available to assist with any of the normal procedures, such as suctioning, instrument control and management and, most importantly, surgery decontamination following patient treatment. The clinician is the sole operator and manages all functions when treating, aftercare, admin, billing and seeing the patient out. Once this is complete, surgery disinfection and sterilisation need to take place.

There are many disadvantages to two-handed dentistry:

1. Time: A single operator needs to carry out all the functions themselves.
2. Bringing patient into the surgery along with patient preparation prior to entering the surgery
3. Patient and surgery preparation preoperatively and intra-operatively
4. Patient post-treatment management including billing and clinical notes
5. Surgery decontamination before the next patients are seen
6. Cross-contamination
    - Two-handed dentistry requires that all items necessary for treatment are prepared so that the operator does not need to open drawers or touch any item that can be contaminated with aerosol. This means having to glove up and de-glove not just between patients but during the procedure to open a drawer or open items needed for normal practice. All this may lead to cross-infection and contamination of various items in the surgery. All of which need to be decontaminated after the treatment has been completed.
    - Trying to save money by reducing staff may not only put your patients at risk but also yourself and your staff. Reducing aerosol is essential to prevent the spread of virus droplets. Without having a second set of hands to hold the HVE, the risk of droplet spread and aerosol production is extremely high. Although one can hold the HVE and work at the same time, the efficacy of this is not tested. At this point, there is no current data to suggest that two-handed dentistry leads to increased aerosols; however, it is not recommended by this working group.

Several options are available to operators working without an assistant. They include using the operating instrument in one hand and the HVE in the other hand, HVE devices that attach to the operating instrument and various ‘dry field’ devices that attach to an HVE. For air polishing and air abrasion, devices are available that combine a barrier device to help contain the abrasive material and a vacuum to remove the abrasive material and the airborne particles created by the procedures. All of these instruments are available commercially from multiple sources.

Four-Handed Dentistry

Four-handed dentistry had been advised by the CDC. Glene Robinson (1968) summarised the concept of four-handed dentistry: Four-handed dentistry involves the coordinated work of both the dentist and the assistant, working as a team to perform operations in a manner that has been carefully and deliberately planned.

It involves the use of a trained, competent, chairside assistant to work constantly with the dentist in performing the technical procedure during any dental procedure in the dental setup. The CDC has stated categorically that any person who will be producing aerosols needs to employ four-handed dentistry (https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html). This is due to the fact that a second person or dental assistant is needed to adequately reduce the aerosols produced by the instrumentation used in dentistry, thereby reducing the risk of COVID spread. Meng et al. (2020) in the *Journal of Dental Research* has also advised the use of four-handed dentistry to help reduce aerosols.

There are, however, no references for this (https://journals.sagepub.com/doi/full/10.1177/0022034520914246). In a letter, the president of the FDI referred to this publication and endorsed the use of four-handed dentistry (https://www.fdiworlddental.org/news/20200317/journal-of-dental-research-publishes-covid-19-guidelines-from-researchers-based-in).

Auxiliary Responsibilities

1. Help with patient management before bringing them into the surgery
2. Help with patient management before, during and after treatment
3. Reduce aerosol to a minimum level possible
4. Reduce the operators' need to touch, and thus contaminate, other areas with contaminated gloves
5. Reduce aerosol spread and cross-contamination from the operator and patient
6. Reduce treatment times
7. Improve disinfection protocols of the surgery and instrumentation following treatment

Responsibilities of the Dental Assistant Pre- and Intra-operatively

The job of the dental assistant is to ensure that the surgery is ready for the acceptance of the patient into the surgery. Following disinfection of the surgery as described in this document. It is important to ensure that all items and instrumentation that are going to be needed during the procedure or surgery are packed out and anything that is in drawers is laid out prior to any procedure being done. All instrumentation that is unpacked and left on the surface should be in sterile bags and opened only once the patient is seated so that the patient can see that all instrumentation is sterile. Making sure that all instrumentation is available prior to treatment ensures that there is no need to unnecessarily open any drawers or cabinets during treatment. All water bottles used for coolant should be disinfected between patients, and the filling of the bottles should be carried out, preferably in a green or appropriate zone where there is no risk of aerosol entering the bottles whilst they are being filled. Ensure that the bottles have caps so that the water is not exposed to aerosols whilst being carried.

Due to the ability of the aerosol to remain in the air for a long period following treatment, opening and closing drawers could lead to contaminated aerosols resting on instruments, burs or any other items that are in the drawers and cabinets. There are also many nooks and crannies where the aerosol may sit, resulting in contaminated areas that are not easily cleaned or disinfected. Once the patient is seated and the appropriate pre-procedural mouth rinse has been provided, all instrumentation can be opened. It is important that your assistant ensures that during AGP suctioning with the HVE is utilised at all times, no matter the procedure type. The HVE should be as close as possible to the area of aerosol formation to limit the aerosol spread from the mouth.

Once your assistant has seen the patient out of the surgery, the decontamination and disinfection of the surgery can begin again, making it ready for the next patient.

It is important for your assistant to understand and be trained in all aspects of disinfection and cross-contamination control so that the correct protocols are followed. It is also critical that our assistants understand that we are now dealing with not just blood-borne contaminants but also aerosol-borne contaminants that spread far more easily. It is essential that they understand how the spread of airborne and aerosol infections takes place. We need to change the thinking of our auxiliaries so that they understand the risks and the severity of cross-contamination and the implications they have for our practices.

It is advised that in order to reduce the amount of aerosol production that we utilise a dental assistant for four-handed dentistry in order to reduce the risk of SARS-CoV-2 spread.

Recommendations for the Use of Specialised Equipment

Loupes and Microscope Disinfection

Magnifying loupes and the DOM allow both dentists and oral hygienists to perform tasks not possible without improved visual acuity. However, loupes cannot be compared to the comfort, versatility, illumination and visual acuity offered by the DOM (Van Faunhofer & Johnston, 1992).

Loupes and the DOM can collect debris and aerosol spray from most dental procedures. Ideally, all areas of the loupe and microscope should be disinfected with a high level of disinfectant after each patient. Zwicker et al. (2019) showed that even visually clean eyewear used by the dental profession can be a source of contamination, and thorough disinfection is recommended between patients.

Follow your manufacturer's standards of care guidelines for your surgical microscope to ensure that you are cleaning within the tolerances of your instrument.

Dental Loupes

Ideally, all areas of the loupe should be disinfected with a high-level disinfectant after each patient. However, facing the reality that most dentists using loupes have only one set of loupes and that some loupes will not tolerate constant use of disinfectants, the infection control challenge is obvious (Christensen, 2003) (https://endoexperience.com/documents/Magnification-Christensen.pdf).

Most of the time, ethyl alcohol is the recommended solution of choice to disinfect the loupe telescopes and frame surfaces. The lenses can be cleaned with alcohol or quaternary ammonium disinfectant.

Even though the optical lenses of most of the loupes are manufactured with protective coatings, they are still susceptible to damage. Without proper care, the lenses may become cloudy, scratched, and difficult to use.

If your dental loupe is water resistant, you can use a water lavage to wash off the debris. After such, wipe the lenses and the loupes with cleaning wipes followed by a microfibre cloth.

If it is not water resistant, you can use a can of compressed air to remove debris. Once done, wet a soft cotton swab or tissue with mild soap, 70% isopropyl alcohol or other lens cleaning solutions that the dental loupe manufacturer has recommended and then carefully wipe away loose particles and major debris. Finally, dry the loupes by successively wiping it with another set of microscope cleaning wipes or with the use of a microfibre cloth.

Dental Operating Microscope

All the system's mechanical surfaces can be wiped clean with a damp cloth. Do not use any aggressive or abrasive cleaning agents. Remove any residue using a mixture of 50% ethyl alcohol and 50% distilled water plus a dash of household dishwashing liquid.

For disinfection of mechanical surfaces, the maximum application concentrations for disinfection solutions are either 60% alcohol, 2% glutaraldehyde or 0.2% quaternary compounds. For regular cleaning of the surgical microscope's objective lenses and eyepieces, it is recommended that special, manufacturer-produced cleaning kits be used.

Some manufacturers also supply sterilisable caps for handgrips and knobs and custom-made sterile drapes to cover the microscope head and body to protect the microscope from aerosol spray during procedures. Disinfected plastic bags can also be used to protect the DOM from aerosol and should be replaced after each patient.

Lasers

Lasers in dentistry have evolved dramatically over the years. Initially, lasers were limited to soft tissue treatment, such as gingivectomies and frenectomies. Newer lasers are now able to cut bone and tooth structure as well as soft tissue.

Lasers used in dental practice can be classified by various methods:

1. According to the lasing medium used, such as gas laser and solid laser
2. According to tissue applicability, hard tissue and soft-tissue lasers
3. According to the range of wavelengths
4. We will further classify them for this document as lasers that utilise water (wet lasers) for cooling and those that are dry (dry lasers) (i.e. those that produce aerosol and those that do not).

Wet Lasers: ErCr;YSGG 2780 nm/Er;YAG 2940 nm

These lasers are now able to cut bone, tooth and soft tissue but have a multitude of applications in all fields of dentistry. These types of lasers work on heating water molecules within the tissue, which differs from the dry lasers. The introduction of lasers that cut bone and teeth required the need for coolant to reduce lateral heat production during treatment, thereby reducing damage to the pulp and adjacent structures. It is this coolant combined with air spray that has the ability to produce aerosol. Therefore, it is recommended that all lasers that utilise water cooling be handled and managed in exactly the same way and with the same protocols as AGP.s. Wet lasers also have the ability to create plumes; however, there is no evidence to show that this plume has viral inclusions or that it is infective in any way.

Strict AGP reducing protocols should be in place when utilising a laser.

5. During treatment, HVE is essential. This has two important functions: (1) reduce aerosol release and (2) help with tissue cooling through airflow.
6. Keeping the HVE as close to the laser as possible is advised.
7. Where possible, it is essential to reduce the amount of water as well as the airflow from the laser hand piece in order to reduce the amount of aerosol formation.
8. When utilising lasers for either tooth preparation or endodontics, it is mandatory to use a rubber dam during these procedures to reduce the aerosol formation, as set out with normal use of rotary instruments in these fields.

9. Typically, in soft-tissue procedures, the water and air ratios can be very low; this may cause the tissue temperature to rise more than is ideal, with the consequence of slower healing as a side effect. It is important to use high magnification to observe the tissue for any carbonisation or a noticeable band of denaturation. Should this become evident, then the air/water ratios should be adjusted to improve tissue cooling. Guidelines for the Waterlase Iplus laser (2780 nm) suggest a minimum of 20% water and 30% air.
10. The pulse duration also has an influence on the thermal reaction in tissue. Typically, visible thermal reaction decreases as the pulse duration shortens. Iplus (2780 nm) has two options: S-mode has a pulse duration of 700 ms and H-mode has a pulse duration of 60 ms. It is better to operate at the shortest possible pulse duration available if air/water ratios are decreased. The specific procedure and suggested laser parameters should still be respected.
11. Hard tissue (Bone / Enamel /Dentine/ Cementum/Caries): The water percentage plays a crucial role as a mediator to the ablation of hard tissue, and an over-compromise might have a detrimental effect on the living tissue. However, it is still possible to use the minimum amount of water required to perform procedures safely.

Guidelines for Waterlase iPlus

a. Enamel—80% water / 60 %air
b. Bone—60% water/ 50–40% air
c. Cementum—similar to bone
d. Caries—the possibility of decreasing water to a point lower than for enamel, but it is not advised due to the risk of a rise in pulpal temperatures above safe levels.

12. The use of lasers to treat periodontal disease can be carried out with either a dry or wet laser. When utilising a wet laser, it is better to reduce the air flow and water coolant and make sure your HVE is as close as possible to the area you are working on. This will collect as much of the aerosol as possible, and the airflow will help cool the area being treated by the laser.
13. No matter what procedure is being carried out with lasers, it is advised that the normal PPEs and ventilation are used to reduce the risk from AGP and plume.

Dry Lasers: Diodes (810 Nm, 940 nm, etc. and some CO_2 Systems 10600 nm)

Dry lasers do, however, create a plume, and there is some data to show that there are viral particles present in the plume. No known transmission of illness of HIV and HBV due to laser use has, however, been recorded (CDC). MMWR 2003;52(No. RR-17; http://www.cdc.gov/oralhealth/infectioncontrol/guidelines/index.htm).

These lasers are limited to soft issue work, periodontal and endodontic decontamination. These lasers do not use water for cooling and therefore do not generate aerosol. Dry lasers heat blood and haemoglobin within the tissue. Lasers that do not utilise water (dry lasers), namely a diode laser or a carbon dioxide laser (or wet lasers used without water), do not create aerosol at all and are deemed safer to use, as no aerosol is produced. **However,** these lasers do create a plume (defined as the vapours, smoke and particulate debris produced during these surgical procedures), and there is some data to show that there are viral particles and some carcinogens present in the plume. Data from dermatology and otolaryngology both show the viability of virus DNA in the plume. No known transmission of illness of HIV and HBV due to laser use has, however, been recorded (CDC). MMWR 2003;52(No. RR-17; http://www.cdc.gov/oralhealth/infectioncontrol/guidelines/index.htm).

To date, nothing has been shown with regards to SARS-CoV-2. New data (May 2020), however, may come out later and may require further adjustment of our techniques and protocols. Although we do not have enough data at this point, it is strongly recommended that HVE be utilised at all times to remove the plume and that we take all the normal precautions for aerosol management. The close use of the HVE as close to the cutting area whilst using these lasers is also advised to help reduce the heat generation of the laser.

Alternative Therapies Using Laser

1. Photo-biomodulation (PBM): The use of laser energy to promote healing and reduce inflammation and pain.
2. Laser anaesthesia was used to anaesthetise teeth.
3. Photo-Dynamic Therapy is the painting of tissue with a toluene blue or other dyes onto the infected tissue. The addition of lasers will lead to the formation of oxygen radicals that will kill bacteria.

None of these techniques use water or create a plume. Hence, they are deemed safe to use at any stage.

How Do I Disinfect my Laser Equipment?

1. All laser hand pieces need to go through the normal sterilisation protocols with autoclaves.
2. It is not enough to wipe off these hand pieces between patients.

All tips that are used either need to be sterilised, if possible, and if not, then cold sterilisation can be used, but proper protocols need to be followed. Combustible disinfectants must be avoided.

3. Certain tips need to be initiated (for gingivectomy and other soft-tissue procedures), which means that they are run along a piece of blue articulating paper to make them cut more effectively.
4. Tips need to be replaced more often than tips that are utilised non-initiated (for periodontal and endodontic applications).
5. Dry lasers that utilise a single cable of glass fibre need to have at least 1 mm of the tip cut off after each patient and the cable disinfected according to the manufacturer's recommendations.
6. There are certain hand pieces for biostimulation and bleaching that cannot be autoclaved, and these hand pieces need to be disinfected with adequate disinfection material, as described in this document. These hand pieces should also be covered with plastic covers to reduce contamination of the hand pieces.
7. The main laser unit should have plastic covers to protect it from aerosol and should be wiped down between patients according to the protocols advised in this document.
8. The water bottles used for the wet lasers should be refilled in a room that has not been contaminated by aerosol sealed and disinfected in that room and then returned to the laser units.
9. Most wet laser hand pieces have positive pressure when changing tips and when removing the hand pieces, thus making them more easily autoclavable.

Other Risk Reduction Considerations

Disinfection of Dental Impressions (Laboratory Work)

According to the British Dental Association (2013), it is the responsibility of the dentist to disinfect impressions that are sent to dental laboratories to prevent cross-contamination and spread of disease. Communication between the dental practice and the dental laboratory is essential to ensure that appropriate disinfection protocols are implemented without overlap. Repeated exposure to disinfectants could compromise the quality of the impression and the restoration or appliance (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6511629/#CIT0002).

Dental impressions invariably are contaminated with patient saliva or blood and are considered potentially infectious https://www.researchgate.net/publication/257678834. Such fluids can contain viral and bacterial pathogens, including HIV and the hepatitis A, B and C viruses. Although most infectious agents do not survive for extended periods outside the body, many pathogens, if present in high enough numbers, can survive several days in protein-containing body fluids. Microorganisms can be transferred from contaminated impressions to dental casts, and oral bacteria can remain viable in set gypsum materials for up to seven days.

Disinfection Methods

Optimally, impressions should be decontaminated at chairside immediately after removal from the patient's mouth. Impressions should be rinsed thoroughly under running tap water before disinfection to remove as much bioburden as possible.

PPE must be utilised, and adequate ventilation must be in place when hazardous materials, such as disinfectants, are used.

The OHC provider must keep in mind that different impression materials would react differently to disinfectant procedures. In selecting an impression disinfectant, material compatibility is a requirement (see Table 1).

Both immersion and spraying have been recommended for disinfection of impressions. Spraying uses less solution, and often the same disinfectant can be used for general disinfection of operatory surfaces. Spraying does increase the chances for staff exposure to hazardous chemicals. Using stream spray can minimise aerosolisation.

When using impression materials that are predisposed to distortion from immersion into a disinfectant, spraying may provide an acceptable alternative. Impressions can be sprayed thoroughly and placed in airtight plastic bags. After the appropriate contact time, the impression can be removed, rinsed thoroughly with tap water, shaken gently to remove adherent water, and then poured.

For adequate inactivation of microbial contaminants, the contact time between impression and disinfectant should be at least equal to the time for tuberculocidal activity, as recommended by the manufacturer of the germicide.

Alginate Impressions

A number of studies have evaluated the effects of disinfection on irreversible hydrocolloid (alginate) impressions. The results varied greatly depending on the techniques and materials evaluated. Generally, however, distortion has been found to be minimal and not clinically significant. Based on these findings, disinfection via immersion in diluted sodium hypochlorite or iodophor is recommended. Impressions can be submerged or sprayed with disinfectants like diluted hypochlorite, iodophors and surface disinfectants. It should be done within the prescription of the manufacturer's instructions (https://www.dentaleconomics.com/macro-op-ed/article/16393662/impression-disinfection).To emerge for 10 minutes in 0.5% sodium hypochlorite (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3410321/;) (https://www.ncbi.nlm.nih.gov/pubmed/29358546).

Elastomeric Impressions

Rubber-base silicone impressions can be disinfected adequately by immersion in an iodophor, diluted sodium hypochlorite solution, chlorine dioxide, glutaraldehyde, or complex phenol for the time recommended for tuberculocidal activity. However, the method of disinfection should be verified with the material manufacturer to prevent distortion of the impression or loosening of the adhesive bond between the impression tray and the impression material. Phenols with a high alcohol content, for example, can desiccate some impression materials.

ZOE and Compound Impressions

Limited data are available on disinfection of zinc oxide eugenol (ZOE) and compound impressions. Current ADA recommendations for ZOE impressions suggest disinfection via immersion in a 1:213 iodophor or 2% glutaraldehyde solution prepared according to the manufacturer's instructions. Compound impressions reportedly can be disinfected via immersion in a 1:10 sodium hypochlorite solution or with an iodophor (https://www.sciencedirect.com/topics/medicine-and-dentistry/iodophor).For 10 minutes in a 0.5% sodium hypochlorite solution (https://www.ncbi.nlm.nih.gov/pubmed/22505972).

Wax Bites and Wax Rims

Because of the delicate nature of wax, the wax is prevented from being safely immersed in disinfectant without distortion. Wax rims and wax bites can be disinfected using an iodophor, chlorine dioxide, or sodium hypochlorite spray and a spray-wipe-spray technique. Following the second spray, the wax bites can be enclosed in a sealed plastic bag for the proper contact time and should remain wet with disinfectant for the time recommended to halt tuberculocidal activity.

Wax bites can be thin and be deformed easily. It can be immersed but with care as above.

Impression Trays

Impression trays should be rinsed thoroughly under running water to remove residual blood and saliva. Consistent with dental infection-control guidelines for semi-critical instruments, chrome-plated and aluminium impression trays can be cleaned, packaged and heat-sterilised. Single-use, plastic impression trays provide a disposable alternative to heat sterilisation.

Conclusions

- Know your environment and the dangers and risks that you pose to your own OHC facility but also to the population at large.
- Identify high-risk patients and potential positive patients appropriately; all other patients should be treated as potentially positive.
- Positive COVID-19 patients should be treated in very specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres or specially designed AIIR. These could be constructed/adapted in an environment outside of the hospital, decreasing the load on our healthcare facilities, especially if AGP are unavoidable.
- The goal should always be to aim to better isolate your working space and thereby decrease the risk of spread, change from a possible risk situation to a relatively safe situation (rubber dam isolation and use of HVE).
- Implement additional safety and sterility measures until vaccination.
- Take all measures to avoid AGP in the initial relaxing stages.
- Health care workers at high risk: > 65 or with comorbidities as well as environmental high-risk practices (Health and Safety certified) should stay in self-quarantine/closed until such time as vaccination or Level 1 is reached. Professional insurance companies should be encouraged to see these above groups as actively not being able to function normally and should be compensated such as would

Addendum A
Government Levels of Restrictions During the COVID-19 Pandemic and Their Implications on Oral Health Care in South Africa

COVID-19 Pandemic

Level 5 Guidelines and Restrictions

During this time of national emergency, not all regular dental procedures will be performed. Please follow these guidelines for what is allowed during level 5 (**High virus spread, and/or low health system readiness).**

Definition

1. Emergent and urgent dental procedures must be performed without delay a) if and when the patient is medically stable and b) only if the patient needs immediate treatment to avoid permanent disability or death.

2. Urgent essential surgery is a surgery that must be performed in order to preserve the patient's life or limb or prevent longer-term systemic morbidity. It does not need to be performed immediately but should be generally performed within 2 weeks.

3. Essential surgery or procedure is surgery scheduled in advance and where postponement of the surgery or procedure will result in the patient's outcome or quality of life being significantly altered if extended past 2 weeks or up to 3 months.

4. Semi-discretionary elective procedure cannot be done during level 5, but if it is urgent, it can be scheduled during Level 4 should the patient's condition worsen, and pain and sepsis recur.

Dental Treatment Categories

Category A	Category B	Category C
See Definition 1	See Definition 2	See Definition 3
Emergency	Urgent conditions that can be managed with minimally invasive procedures and without aerosol generation	Urgent conditions that need to be managed with invasive and/or by AGP
Unstable maxillofacial fractures that can compromise the patient's airway	Severe dental pain (≥7) from pulpal inflammation that requires tooth extraction	Severe dental pain (≥7) from pulpal inflammation that needs to be managed with AGPs
Diffuse soft-tissue bacterial infection with intra-oral or extra-oral swelling that can compromise the patient's airway	Severe dental pain (≥7) from a fractured vital tooth that can be managed without aerosol generation.	

Uncontrolled postoperative bleeding	1. Dental trauma with avulsion/luxation that can be minimally managed without aerosol generation 2. Surgical postoperative osteitis or dry socket that can be managed without aerosol generation 3. Pericoronitis or third-molar pain that can be managed without aerosol generation 4. Stable maxillofacial fractures that require no intervention 5. Localised dental/periodontal abscess that can be managed 6. Fractured or defective fixed orthodontic appliance causing soft-tissue laceration without aerosol generation	1. Dental trauma with avulsion/luxation that needs invasive/AGPs 2. Debonded fixed prosthesis cleaning and temporary cementation 3. Removable dentures adjustments for radiation/oncology patients 4. Fractured or defective fixed prosthesis 5. Acute periodontal disease

During Level 5, this table should be the standard of care to evaluate any interactions between DHCW and patient interactions. Should a Level-5 emergency be declared again, these strict measures should apply.

Antibiotics: After a proper diagnosis has been made of an acute infection or a condition that will not be resolved due to the lockdown precaution, antibiotic treatment should be the first line of defence (i.e. despite the worldwide move against the unnecessary use of antibiotics; see http://bsac.org.uk/antibiotic-prescribing-in-the-context-of-covid-19-pandemic/.)

Remote consultations: It is strongly advised to consult with patients via email, phone and/or video and by obtaining photographs of the dental emergency from the patient. Whilst this approach can be successful, it is important to closely monitor the case through regular remote consultations so that necessary steps can be taken as soon as possible if it worsens. *Once lockdown is lifted, this standard of care should immediately cease.*

Use of discretion: Depending on how long the lockdown continues, conditions that could not be treated under the current strict guidelines will eventually need urgent intervention. The risk of a DHCW–patient intervention should first be governed by law but should also be weighed against the best interest of the patient at the DHCW's discretion. Should a practice be identified as a node of viral spread—whether with the help of cell phone tracking and other measures that aid the government in combatting the virus—the DHCP must be able to prove reasonable behaviour.

Special longer-term implications: Five to 7 days after a Level-5 emergency has been declared, interventions that include treatments from categories B and C can be considered, especially after failed pharmacological interventions.

Use of PPE: All patients should be treated as potentially being COVID-19 positive. The healthcare staff should use all relevant PPE—head cap, eye protection, nose and mouth protection and water-resistant gown—as discussed in detail in the SADA COVID-19 protocol document.

Remember: AGPs are severely restricted and only allowed when no other measures are possible.

Below are specialty-specific guidelines.

1. General Dentistry

Clinicians must do a risk assessment of their facilities and time after emergency declarations, with the general rules in mind, to determine which of the following procedures can safely be done. Treatments that can be considered are listed below. Note that these are examples, only, and treatments are not limited to those listed.

Scope of Treatment

- Emergency root canal treatments: preparation of canals
- Re-cementation of crowns or bridges, whether temporary or permanent. If the final prosthesis has been completed and the temporary prosthesis has de-bonded, the permanent prosthesis can be placed.
- Repair of broken dentures
- Biopsy and possible excision of lesions
- Ortho follow-up where patient has a function like a rapid palatal expansion or for the replacement of worn elastics
- Atraumatic Restorative Technique (ART) restorations
- Suture removal

2. Orthodontics

The routine practice of orthodontics is fundamentally distinct from general dentistry due to its continuous and protracted nature, necessitating consistent monitoring and adjustment. It is essential that orthodontists are judicious and use their professional judgement to determine the urgency of orthodontic needs and whether in-person treatment is necessary. These essential in-person procedures should be of short duration and generally non-aerosol-generating (or could be modified to be conducted as such).

Scope of Treatment

Emergency orthodontic management.

- With careful prioritisation, orthodontic maintenance of cases currently under treatment. The rationale for maintenance is that pre-lockdown, some patients had not consulted with the orthodontist for approximately 6 weeks. After lockdown, this has added up to approximately 10 weeks or more. It is important that these patients be seen in order to circumvent any side effects.

3. Paediatric Dentistry

Paediatric dentistry focuses on the treatment of children 12 years and younger (i.e., mixed dentition).

No AGP
Use triplex syringes, where possible.

Symptoms & Clinical Assessment	Treatment Required	Protocol (Practical Tips)
Emergency	**Primary teeth** and **permanent teeth**: Facial swelling or cellulitis	• Prescription of antibiotics and/or analgesics • Extraction • Protocol to be followed for all procedures requiring access with a hand piece: For anterior permanent teeth, pulp extirpation, medicament and conventional glass ionomer (GI) cement restoration can be considered (with restricted use of hand pieces), high-volume suction, and rubber dam
	Primary teeth: Spontaneous pain or traumatised anterior teeth with exposed pulp	• Prescription of analgesics • Extraction • For restorable posterior teeth and hand excavation, Ledermix paste sealed in with a Kalzinol restoration and prescription of analgesics could be considered.
	Primary teeth: Avulsion	• No re-implantation
	Permanent teeth: Avulsion	• Re-implant and stabilise with splint
	Permanent teeth: Trauma to anterior tooth with pulp exposure (vital)	• Restricted use of hand pieces, pulp capping and restoration
	Permanent teeth: Trauma to anterior tooth with pulp exposure (non-vital/abscess)	• Restricted use of hand pieces to gain access, pulp extirpation, medicament, temporary restoration (conventional GI cement)
	Primary and permanent teeth: Trauma to anterior tooth (no pulp exposure)	• Smoothen rough edges • Cover with conventional GI cement for slightly bigger fractures
No pain Asymptomatic Mild symptoms Pain on eating	Primary and permanent teeth: Fractured restorations	• Conventional GI cement restoration
	Deep carious lesion (open cavity)	• Caries excavation (hand instruments) • Indirect pulp treatment (primary teeth)—conventional GI cement restorations (no replacement) • Indirect pulp capping (permanent teeth)—conventional GI cement restorations (need to replace at follow-up visit)

	Primary and permanent teeth: Basic restorative work (no open cavities)	• Fluoride/ tooth mousse
Soft-tissue infections	Primary herpetic gingivostomatitis	• Palliative management
Comprehensive treatment under general anaesthesia or sedation		• Not permitted due to generation of aerosols
Radiographs		• Only extra-oral or panoramic

4. Periodontology, Implantology and Oral Hygiene

The systemic dissemination of bacteria from periodontal disease is one of the potential pathways linking periodontal infection to several systemic diseases. There is an abundance of scientific data documenting the detrimental impact of periodontitis on the cardiovascular system and glycemic control in type 2 diabetes.

The benefit of periodontal therapy is well established in the literature. Following periodontal therapy, there is an improvement in both oral and systemic health, with resultant reduction in associated systemic diseases, particularly in the management of atherosclerotic cardiovascular disease and diabetes mellitus.

Specialists in oral medicine and periodontics are trained in and adhere to the highest levels of infection control protocols in their daily practice—even before the COVID-19 pandemic. These stringent infection and sterilisation standards include PPE protocols and are mandatory practice as part of our surgical discipline.

Scope of Treatment

- Recommended procedures include emergency and essential treatment to address dental or periodontal infection, sepsis and pain.

5. Endodontics

Dental practitioners should avail themselves of remote consultations (for example, by phone, WhatsApp, video or Zoom) throughout lockdown. No elective treatment or treatment that can be postponed should be attempted during Level 5. Dental treatment should be limited to emergency cases only, or if withholding immediate treatment will lead to serious complications.

COVID-19-positive patients should be treated in specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres, or specially designed AIIR.

All endodontic treatment should be performed under rubber dam isolation. Aerosol-creating procedures should be avoided as far as possible. If an aerosol-creating procedure is absolutely vital for performing an emergency treatment (for example, drilling though a zirconium crown to gain access to a root canal system), the procedure should be performed under rubber dam isolation with close approximation of a high-volume suction. This procedure should be completed in the shortest possible time. In addition, it is advised to douse the tooth under isolation for 30 seconds with 1% H_2O_2 prior to instrumentation.

Scope of Treatment

Only cases included in these criteria may be treated. Defer all other treatments.

- Emergency root canal treatment in cases presenting with irreversible pulpitis, facial swelling, acute pain and infection is allowed. If pharmacological management of these cases is possible, practitioners are advised to do so.
- Endodontic management of dental trauma should only be done in cases where postponement of treatment poses a risk of serious harm. The objective in the treatment should be limited to reducing the immediate pain and risk—not to complete a treatment that can be postponed.
- Vital pulp therapy (for example, treatment of complicated crown fractures, pulpotomy treatment or direct pulp capping) is only advised in extreme cases where the lack of treatment will result in serious harm or complications. If it is possible to postpone treatment, practitioners are encouraged to do so.
- The obturation phase of endodontic treatment should be postponed until Level 4 or lower unless withholding such treatment will cause serious harm/complications.

6. Prosthodontics

Prosthodontists should make themselves available for remote consultations throughout lockdown. Prosthodontic treatment should be limited to emergency and urgent care where withholding or delaying treatment will lead to life-threatening or more serious bodily complications. No elective treatment or treatment that can be postponed (without causing harm to the patient's health) should be attempted during Level 5.

Patients should be consulted in person only if further investigation or case management is necessary or where the lack of treatment may result in harm, infection or future complications.

COVID-19-positive patients should be treated in specialised environments such as specially designed AIIR (See SADA main protocol document for guidance) or laminar flow, HEPA filtered (H13, H14) hospital theatres, and try to lessen the burden on general healthcare facilities.

Note: Appropriate PPE sterilisation and patient preparation measures must be adhered to strictly, as defined in the main SADA protocol document. All essential AGPs should be performed under a rubber dam or other isolation. The use of chlorine dioxide in dental unit waterlines is encouraged. Prior to any procedure, prosthodontic patients must use appropriate virucidal preoperative oral rinses.

Scope of Treatment

a. **Fixed Prosthodontics**
   - The use of rubber dam or other suitable isolation is mandatory.
   - The re-cementation and bonding of crowns and fixed partial dentures where there is vital pulp, and when non-treatment may result in devitalisation and necessitate endodontic therapy.
   - Fabrication of provisional crowns and bridges where there is a vital pulp or where there is ongoing treatment which may be compromised, if not attended to.
   - These include instances where an adequate coronal seal is necessary during or post-endodontic therapy.

b. **Removable Prosthodontics**
   - No rubber dam is required
   - Repair and/or adaptation of prostheses where the prostheses are critical for the patient's quality of life (QOL)

c. **Implant Therapy**
   - The use of rubber dam isolation is mandatory when removing screw-retained prostheses.
   - Implant procedures related to complications where the prostheses are critical for the patients' QOL

d. **Oncology and Craniofacial Trauma**
   - All prosthodontic procedures that are related to the management of malignant and benign maxillofacial lesions that cannot be deferred

e. **Temporomandibular Disorders (TMD)**
   - Pharmacological management
   - Counselling

f. **Endodontics**
   - Refer to the endodontics guidelines

7. Maxillofacial and Oral Surgery

During Level 5, maxillofacial surgery is allowed only when the patient is facing a life-threatening condition, such as severe facial trauma, uncontrollable facial sepsis and orofacial oncology and its appropriate reconstruction prior to chemo and radiotherapy.

Examine, Treat and Discharge: If the patient has a confirmed emergency, they are sent to the "Examine, treat and discharge, if possible" room in the Casualty. From there, the majority of these patients will require admission into hospital, requiring inpatient medical and maxillofacial surgical treatment. The most efficient treatment with the shortest duration should be performed. Where possible, patients who can be managed adequately with the least-invasive procedures—and through the generation of the fewest possible contacts under local anaesthesia—should be the treatment of choice and discharged rather than being treated in a hospital environment to lessen the burden on the general health care facilities.

During these severe emergency procedures, the necessary AGP is allowed, but it should be kept to a minimum. AGPs include extractions, incision and drainage of a facial or dental abscess with concomitant removal of the offending tooth/teeth, the use of power tools to place plates and screws in facial fractures and in orthopaedics for the same fracture management, use of scopes in general surgery, naso-sinus endoscopy and intubation for anaesthesia.

If there is an option to treat the patient without the need for an AGP, this should be done, but the objective should be for definitive one-stop treatment, if at all possible. For example, an extraction is much safer than first-stage endodontic treatment in terms of the aerosol risk and failure of the procedure to resolve the problem in one visit. The reason for the decision should be recorded in the patient's notes.

Clinicians should wear the appropriate PPE as set out in the SADA protocol document.

Note: Procedures should be performed by the best qualified surgeon available. It is therefore advised that surgical extractions and impacted teeth—along with any other surgical and/or oral procedures that fall within the scope of maxillofacial and oral surgery requiring management—be referred to a maxillofacial and oral surgeon. This would ensure the shortest treatment time, along with the ability to manage any complication that arises from the procedure and, therefore, adhere to the one-stop treatment protocol. No procedure should be performed outside the scope of practice of your speciality, and reference in this regard should be made to the SADA 2016 *Coding Journal*.

Level 4: Guidelines and Restrictions

As a reminder, when treating patients, all patients should be treated as potentially COVID-19 positive. Patients presenting with symptoms or are COVID-19 positive should only be seen with relevant PPE and only for the management of pain and sepsis.

As dental practitioners, we are part of the economy, and this is it important for us to be able to rebuild our practices which have been as hard hit as any other business. And as dental practitioners, we are considered providing essential services. As a result, we have been able to continue to treat emergency patients as required. With the implementation of Level 4 restrictions, we are now able to expand the scope to include essential treatment as well as emergency therapies. The purpose of Level 4 is to enable the economy to start to get back on its feet.

What are essential dental services? Essential services are deemed to be any service that is not only taking care of pain and sepsis but also any disease or dental problem that may lead to future pain, sepsis and any other pathological process. This includes any treatment deemed essential to reduce the risk of further breakdown, which may have a deleterious effect on the patient's future. This does not include any treatment that is deemed elective, such as cosmetic procedures or implant procedures that can be put off until such time as we have reduced the risk of cross-contamination of our clinicians and patients.

During delivery of emergency and essential services, avoid AGPs as far as possible. The strictest PPE guidelines should be followed by the clinician and supporting staff.

The focus of dentistry during Level 4 is on the management of pain, disease and pathology. Although examination and assessment of patients may reveal incipient lesions or a desire for cosmetic dentistry or full/partial rehabilitations, these are not treatments that are suitable for Level 4. Discussion and information sharing may be appropriate so that these treatments can be scheduled for Levels 3, 2 or 1.

Where a procedure falls within the scope of a specialist dental field, those procedures should, as far as practically possible, be performed by the best qualified person in that line of dentistry available and it is therefore advised that specialised work be performed by a specialist or any person who has excelled and is recognised as an expert in a certain field. This would ensure the highest standard of care, protecting the patient against undue exposure to the virus, providing safe quality care in a safe environment and adhering to the one-stop treatment protocol.

No procedure should be performed outside the scope of practice of your speciality. Reference in this regard should be made to the SADA 2016 *Coding Journal.*

1. General Dentistry

Dental practitioners should avail themselves of remote consultations throughout lockdown. Patients should be consulted in person if further investigation and/or management is necessary or where the lack of treatment may result in harm, infection or future complications.

As with Level 5, dental treatment a during a Level-4 lockdown should be limited to emergency cases or cases where withholding treatment will lead to more serious complications (for example, progressing caries).

No elective treatment should be offered, nor should treatment that can be postponed—without harm to the patient's health—be attempted during Level 4.

COVID-19-positive patients should be treated in specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres, or specially designed AIIR.

AGPs should be avoided as far as possible. If an AGP is inevitable, the procedure should be performed under rubber dam isolation with close approximation of an HVE suction for limited, short intervals only. The operator should be equipped with the correct PPE—**head cap, eye protection, nose and mouth protection and a water-resistant gown.**

Precautionary rinses or sprays: For all the procedures listed below, it is recommended that the patient rinse their mouth immediately with 1 % H_2O_2 (1% for 2 periods of 30 seconds each). Povidone-iodine rinses (0.2%), as well as nasal spray, can also be of benefit, providing the patient is not allergic to iodine.

General anaesthesia (GA) should only be considered in the treatment of emergencies. Hospital rules and regulations applicable to Level 4 apply. The merit and scope of work along with its associated risks should be discussed with the anaesthesiologist and theatre management.

Sedation (inhalation/ intravenous) should only be considered in cases where treatment justifies the use of sedation. Apply extreme caution regarding infection control measures to ensure a safe environment and outcome for both patient and dental staff. This includes full PPE, sterilisation of all equipment used, including sedation machines, pipes and masks. No evidence is available on the safety of sedation or GA in COVID-19 positive patients.

Scope of Treatment

a. **Diagnostics**
   - Requires HVE and adequate PPE.
   - Examination and assessment of patients can be done as part of early diagnosis of possible disease and pathology. This includes essential intra-oral radiographs, which should be limited to diagnosis and treatment verification.
   - Extra-oral radiographs are encouraged where they may assist in the diagnostic process.

b. **Restorative**
   - Requires limiting aerosol and working under rubber dam, with HVE and adequate PPE.
   - Treatment of carious lesions that are approaching the pulp and may result in devitalisation of the tooth with subsequent pain and infection if left untreated.
   - Treatment of symptomatic and painful carious and crack lesions.
   - Treatment of broken or chipped teeth or restorations causing soft-tissue trauma, even if the teeth are asymptomatic.

c. **Fixed Prosthodontics**
   - Requires limiting aerosol and working under rubber dam, with HVE and adequate PPE.
   - In extreme situations where single teeth are broken or cracked to the point that a bonded composite or amalgam restoration is impossible, an indirect restoration may be considered. This requires very careful assessment and judgement by the clinician and is a last resort. The use of long-term provisional crowns is also an option to consider.
   - Where previous indirect restorations have fractured resulting in food traps, periodontal disease and caries, these should be replaced following the protocol outlined above.
   - Re-cementation and re-bonding of loose crowns or bridges on vital or non-vital teeth should be carried out to prevent devitalisation, caries, loss of coronal seal and further complications. This is applicable to permanent or provisional restorations.

d. **Removable Prosthodontics**
   - Requires HVE and adequate PPE.
   - Denture repairs may be undertaken with laboratories exercising full COVID-19 protocols. New removable prostheses should be delayed until the threat is reduced.
   - Chairside repairs of removable dentures should be carried out where these prostheses are essential for the patient's well-being.
   - The use of temporary soft liners is not encouraged, as this will necessitate follow-up appointments.

e. **Implants**
   - Requires limiting aerosol with HVE and adequate PPE.
   - Fractured and poorly fitting implant abutments may lead to food impaction, infection around the implant and pain. As very little aerosol is generated during implant restoration, the abutment may be replaced to preserve the implant and prevent complications. Fully integrated implants may be considered for restoration in order to stabilise occlusion and maintain correct dental relationships and function.
   - Guidelines for implant placement by general dentists will be governed by the same protocols as periodontists with the same absolute planning and procedure protocols.
   - Periodontal disease is covered in its own section as described by our periodontist colleagues.

f. **Trauma and Extractions**
   - Requires HVE and adequate PPE.
   - Dental trauma and soft-tissue damage must be managed as dental emergencies with the applicable endodontic and surgical protocols.
   - Teeth with a poor prognosis which are painful may be extracted, taking all necessary infection control safeguards into account. Asymptomatic hopeless teeth should be monitored and extracted only when it becomes an emergency or during a later level of lockdown.

g. **Endodontics**
   - Requires limiting aerosol under rubber dam, with HVE and adequate PPE.
   - AGPs should be avoided as far as possible. If an AGP is inevitable, the procedure should be performed under rubber dam isolation with close approximation of an HVE for limited, short intervals only. In addition, it is advised to douse the tooth under isolation for 30 seconds with 1% H_2O_2 prior to instrumentation.

Only cases included in these categories may be treated. Defer all other treatments.

- Emergency root canal treatment in cases presenting with irreversible pulpitis, facial swelling or acute pain or infection should be performed.
- An endodontic obturation can be done, provided the obturation is performed during the emergency visit (single visit) and in line with conditions mentioned above. Where the obturation phase of treatment can be postponed, practitioners are encouraged to do so. The exception is for cases where withholding further treatment might cause harm or complications.
- Endodontic management of dental trauma should only be done in cases where postponement of treatment may pose a risk of harm/loss of a tooth. The objective in the treatment should be limited to reducing the immediate pain and risk and not to complete treatment that can be postponed.

- Vital pulp therapy (for example, treatment of complicated crown fractures, pulpotomy treatment or direct pulp capping) is allowed in cases presenting with reversible pulpitis or where the lack of treatment will result in irreversible pulpitis/infection.

2. Paediatric Dentistry

- Requires limiting aerosol under rubber dam, HVE and adequate PPE.

Only patients included under the following criteria may be treated. Defer all other treatments.

- Cavities causing pain/trauma to adjacent soft tissue, ART or Interim Therapeutic Restorations with limited aerosol are the treatments of choice.
- Extraction is the treatment of choice for primary teeth associated with acute pain, abscess formation, facial swelling and cellulitis.
- Endodontic treatment on primary teeth (pulpotomy and pulpectomy) should only be performed if extraction of the tooth may have long-term consequences. (Refer to the Endodontic section for more options).
- Management of trauma: Refer to Endodontic section for more options.

a. **Periodontal Treatment/Oral Medicine**

- Requires limiting aerosol with HVE and adequate PPE.
- Diagnostic services enabling the clinician to perform essential treatment.
- Management of periodontal diseases or infection.
- Management of peri-implant diseases.
- Supporting Periodontal Therapy (SPT) restricted to hand instrumentation for periodontal maintenance of patients with a history of periodontal disease.
- The nature of oral medicine is such that a biopsy is often required to provide a definitive diagnosis. The diagnosis speaks to management. AGPs can be greatly reduced whilst practising within the scope of oral medicine; hence, dentists should be allowed to practise oral medicine fully.
- Implant placement and associated procedures may only be carried out if delaying the implant placement may be deemed detrimental to the patient's final outcome or may lead to further destruction and damage to the supporting structures. This may only be done as part of a procedure that includes the elimination of teeth due to pain and sepsis that may lead to increased bone destruction if left unchecked.
- Procedures immediately following extraction as treatment for pain and sepsis where such procedures reduce the loss of biological tissue and the possibility of requiring further invasive and costly grafting procedures in the future.

b. **Oral Hygiene Related Procedures**

- Requires limiting aerosol under rubber dam, with HVE and adequate PPE.
- Fissure sealants under rubber dam for teeth at high risk for developing dental caries.
- Vital bleaching procedures—home treatment only; no in-office procedures.
- Fluoride treatment, where applicable (as prevention method only).
- Desensitisation of exposed roots where patients are experiencing symptoms.
- Scaling and polishing eliminating the use of aerosol-producing equipment (only hand scalers should be used—no ultrasonic scalers).

3. Orthodontics

Scope of Treatment

More routine orthodontic procedures may now be conducted.

- The scheduling of patients should give appropriate consideration to the following:
  - Prioritisation of appointments according to need of care
  - Minimisation of length of appointments
  - Adjustment of the workflow to reduce inter-patient contact
  - Allowance for adequate time between patients for preparation of the clinical environment
- AGPs should be avoided or modified to be kept to a minimum
- Debonding procedures should be postponed where possible unless postponement will compromise the teeth in any way (for example, decalcifications).
- Should the postponement of debonding not be possible, consideration should be given to the use of hand instruments to avoid aerosol generation. This may require the patient to return for completion of the removal of bonding material.
- Should it be necessary to use AGPs, proper PPE should be used, and HVE protocols should be employed.

4. Periodontology, Implantology and Oral Hygiene

Scope of Treatment

Periodontological procedures that can be done during this level include (but are not limited to):

a. **Diagnostics**
   - Services enabling the clinician to perform essential treatment

b. **Infection Management**
   - Ongoing management of periodontal diseases or infection

c. **Disease Management**
   - Management of peri-implant diseases

d. **Supportive Periodontal Therapy (SPT)**
   - Supportive therapy is restricted to hand instrumentation
   - Periodontal maintenance of patients with a history of periodontal disease.

e. **Biopsies**
   - The nature of oral medicine is such that a biopsy is often required to provide a definitive diagnosis. The diagnosis speaks to management.
   - Aerosol-forming procedures can be greatly reduced whilst practising within the scope of oral medicine and hence we feel that oral medicine specialists should be allowed to practise oral medicine fully.

f. **Implant Placement and Associated Procedures**
   - These may only be carried out if delaying the implant placement may be deemed detrimental to the patient's final outcome or may lead to further destruction and damage to the supporting structures. This may only be done as part of a procedure that includes the elimination of teeth due to pain and sepsis that may lead to increased bone destruction if left unchecked.

g. **Ridge Preservation**
   - Procedures immediately following extraction as treatment for pain and sepsis where such procedures reduce the loss of biological tissue and the possibility of requiring further invasive and costly grafting procedures in the future.

h. **Oral Hygiene Related Procedures**
   - Requires limiting aerosol under rubber dam, with HVE and adequate PPE.
   - Fissure sealants under rubber dam for teeth at high risk for developing dental caries.
   - Vital bleaching procedures—home treatment only; no in-office procedures.
   - Fluoride treatment, where applicable (as prevention method only).
   - Desensitisation of exposed roots where patients are experiencing symptoms.
   - Scaling and polishing eliminating the use of aerosol-producing equipment (only hand scalers should be used—no ultrasonic scalers).

5. Prosthodontics

Prosthodontic treatment should be performed under the umbrella of **Expanded Care**, which encompasses emergency and urgent care as well as minimal aerosol-producing procedures, where withholding or delaying treatment will lead to more serious complications.

No elective treatment should be offered, nor should treatment that can be postponed (without harm to the patient's health) be attempted during Level 4.

Prosthodontists should avail themselves of remote consultations throughout lockdown. Patients should be consulted in person if further investigation and/or management is necessary or where the lack of treatment may result in harm, infection or future complications.

COVID-19-positive patients should be treated in specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres, or specially designed AIIR.

Note: Appropriate PPE sterilisation and patient preparation measures must be adhered to strictly, as defined in the preamble. All AGPs should be performed under rubber dam isolation. Prior to any procedure, prosthodontic patients must use preoperative oral rinses.

Scope of Treatment

a. **Fixed Prosthodontics**
   - Requires limiting aerosol and working under rubber dam, with HVE and adequate PPE.
   - It is necessary to complete procedures with minimal to no aerosol production.
   - The only procedures offered are ones where further maintenance is necessary, failure of which may lead to infection and/or further deterioration of the oral health and QOL.

b. **Removable Prosthodontics**
   - The continuation or completion of procedures where further maintenance is necessary, failure of which may lead to infection and/or further deterioration of the oral health QOL.

c. **Implant Therapy**
   - Implant procedures related to complications where the prostheses are critical for the patients' QOL.

d. **Oncology and Craniofacial Trauma**
   - All prosthodontic procedures that are related to the management of malignant and benign maxillofacial lesions that cannot be deferred.

e. **TMD**
- Management of cases that cannot be otherwise managed pharmacologically.

f. **Endodontics**
- Refer to the Endodontics guidelines under General Dentistry.

6. Maxillofacial and Oral Surgery

Like Level 5, Level 4 also includes life-threatening and severe emergency procedures. During these severe emergency procedures, the necessary AGP is allowed, but it should be kept to a minimum and include those criteria and principles as for stage 5. AGPs include extractions, incision and drainage of a facial or dental abscess with concomitant removal of the offending tooth/teeth, the use of power tools to place plates and screws in facial fractures and in orthopaedics for the same fracture management, use of scopes in general surgery, naso-sinus endoscopy and intubation for anaesthesia.

Level 4 sees a slight easing of measures and scope of working but only essential AGPs are still allowed, with recognition of additional safety to avoid the spread of vapour.

The Oro-Facial Sepsis Aspect

The following protocols are advised by the Scotland National Health System. This advice might change as new information becomes available. Please ensure that you are viewing the most recent version of this document by referring to www.sdcep.org.uk.]

Problem (symptoms)	Management
Acute apical abscess • Pain (usually localised to a single tooth) • Swelling of the gingiva, face or neck • Fever • Listlessness, lethargy, loss of appetite for children younger than 16 years old	**Advice and self help** • Recommend optimal analgesia. • Prescribe antibiotics if you are concerned about swelling or if there are signs of systemic infection (fever, malaise) • Ask patient to call back in 48-72 hours if their symptoms have not resolved. **Urgent care** • If patient has spreading infection **without** airway compromise, or if patient has continuing or recurrent symptoms, refer to designated urgent dental care centre for extraction or drainage. **Emergency care** • If patient has spreading infection **with or likely to have** airway compromise and/or severe trismus refer for emergency care. N.B. For a chronic abscess draining through a sinus, reassure the patient and advise to continue usual oral self-care.
Acute periodontal abscess/Perio-endo lesions • Pain and tenderness of gingival tissue • Increased tooth mobility • Fever and swollen/enlarged regional lymph nodes • Presence of swelling on gingiva • Suppuration from the gingiva	**Advice and self help** • Recommend optimal analgesia. • Prescribe antibiotics if you are concerned about swelling or if there are signs of systemic infection (fever, malaise) • Ask patient to call back in 48-72 hours if their symptoms have not resolved. **Urgent care** • If patient has spreading infection **without** airway. compromise or if patient has continuing or recurrent symptoms, refer to designated urgent dental care centre for extraction or drainage. **Emergency care** • If patient has spreading infection **with or likely to have** airway compromise and/or severe trismus refer for emergency care. N.B. For a chronic abscess draining through a sinus, reassure the patient and advise to continue usual oral self-care.

Problem (symptoms)	Management
Acute pericoronitis • Pain around a partially erupted tooth • Swelling of the gingiva around tooth • Discomfort with swallowing • Limited mouth opening • Unpleasant taste or odour from affected area • Fever • Nausea • Fatigue	**Advice and self help** • Recommend optimal analgesia. • Recommend chlorhexidine mouthwash/gel or warm saltwater mouthwash. • Gently brush area, ideally with small-headed toothbrush (benzydamine mouthwash or spray may make toothbrushing less painful). • Prescribe antibiotics if you are concerned about swelling or if there are signs of systemic infection (fever, malaise) • Ask patient to call back in 48-72 hours if their symptoms have not resolved. **Urgent care** • If patient has spreading infection **without** airway compromise or if patient has continuing or recurrent symptoms, refer to designated urgent dental care centre for possible extraction. **Emergency care** • If patient has spreading infection **with or likely to have** airway compromise and/or severe trismus refer for emergency care.

Note: The notion that cases should be treated in a hospital should be avoided. Many of these cases can be treated in the surgical rooms—provided that this does not pose a public safety risk. This risk can be assessed through a multitude of individual factors, e.g. the air-conditioning system, location of the rooms, outside ventilation, and more. The admission of a patient into a hospital, as evident from the outbreaks at St Augustine's and Morningside Hospitals, indicates that at least 60 contacts are generated per patient admitted.

Should a COVID-19 positive patient be admitted, this could lead to the total closure of the facility. This constitutes a devastating loss of healthcare capability and poses enormous public health risks. A procedure done in a surgical room, however, can be done with two contacts only, and contact would be limited to about one hour. Current testing protocols for hospitals would constitute that an admission of 48 hours dramatically increases the risk to the patient, healthcare workers, the facility and the public at large.

SASMFOS would therefore suggest the following: The management of the patient should be performed using the shortest and most efficient treatment protocol and the safest place of service possible. In the decision of the safest place of service, the surgeon should take into consideration the interests and safety of the patient, healthcare workers, public health and the integrity and safety of healthcare services.

This also includes the individual hospital and surgical room factors as outlined in the document "Dental protocol in response to the COVID-19 epidemic—A South African private practice perspective" should be taken into consideration in determining the safest place of service.

Surgery During Level 4

The scope of maxillofacial and oral surgery is extensive, and we advise that each clinician will use their utmost discretion when confronted with an essential, urgent or emergent case. The appropriate PPE needs to be used at all times, and the use of assistants as well as persons present in theatre—including trade representatives—should be limited where possible.

In the event that a patient requires a general anaesthetic for treatment, it is recommended that the surgeon and anaesthetist discuss the merit of each case and follow the recommendations as per the guidelines outlined in A Pragmatic Approach to Surgery During COVID-19, which was published by South Africa Society of Anaesthesiologists (SASA). Furthermore, the facility where the procedure will be undertaken must fulfil the recommendations for safe surgery during the COVID-19 period.

Scope of Treatment

Level 4 procedures for maxillofacial and oral surgery include trauma and acute musculoskeletal patients in the following categories:

Maxillofacial and Oral Surgery

a. **Obligatory inpatients:** Continue to require admission and surgical management, e.g. significant mandibular and mid facial fractures and serious cervicofacial infections. We must expedite treatment to avoid pre-op delay and expedite rehab to minimise length of stay**.**
b. **Non-operative patients:** Patients with injuries that can reasonably be managed either operatively or non-operatively e.g. condylar fractures. We must consider non-operative care if that avoids admission. Intermaxillary fixation (IMF) may also be considered in the office setting for amenable facial fractures with the use of IMF screws, resulting in minimising contacts, treatment time and avoiding admission to hospital.
c. **Day cases:** Surgery can be safely undertaken for many conditions. Provision for day-case surgery must be made.
d. **Outpatient Local Anaesthetic clinics:** Lacerations, biopsies and unresolved dental abscesses
e. First contact and clinics: Outpatient attendances should be kept to the safe minimum. Emergency departments (EDs) are likely to come under intense and sustained pressure and OMFS surgeons can make an important contribution by reducing the ED workload so that clinicians in EDs can focus on medical patients. ED will change their system and will use triage

at the front door and stream patients directly to OMFS Clinic before examination or diagnostics. Fracture clinics are likely to be asked to take all patients presenting with trauma (including wounds and minor injuries) straight from triage.

f. **Treatment of myofascial pain disorders:** Consider as a Level 3 service. Can be managed via remote consultation (telemedicine) in Level 4, except where special investigations need to be performed during the workup of these patients or maintenance of therapy via infiltration is needed.
g. **Maxillofacial oncology:** These are not deemed extremely urgent except if they were urgent referrals in Level 5.
h. **Dental emergencies and symptomatic infectious conditions:** Offered only where further delay in treatment will negatively influence the outcome of treatment. Limit AGP as per standard protocol and additional measures suggested in the SADA protocol document.
i. **Implant placement and associated procedures:** May only be carried out if delaying the implant placement may be deemed detrimental to the patient's final outcome or may lead to further destruction and damage to the supporting structures. This may only be done as part of a procedure that includes the elimination of teeth due to pain and sepsis that may lead to increased bone destruction if left unchecked.
j. **Implant-related surgery:** Procedures following extraction at the time of treatment for pain and sepsis that reduce the loss of biological tissue and hence reduce the possibility of requiring further invasive and costly grafting procedures in the future.

Level 3: Guidelines and Restrictions

Dental care during Level 3 includes procedures where aerosol can be generated. Hence, pre-assessment screening for COVID-19 is crucial. This should not be seen as a deterrent to offering treatment but instead as a way of assessing risk to the dental team, ancillary personnel and patients.

Medical Pre-Assessment of Patients During COVID-19 Pandemic

In addition to taking a standardised medical history, additional pre-assessment for COVID-19 needs to be done and categorised. Pre-assessments need to be done in all these cases:

- Patient is asymptomatic, unsuspected but unconfirmed for COVID 19
- Patient is symptomatic, suspected but unconfirmed for COVID 19
- Patient is confirmed positive with active symptoms but stable
- Patient is confirmed positive and unstable
- Recovered COVID 19 patient

If a patient is confirmed positive for COVID-19, they should be treated in specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres or specially designed AIIR.

1. General Dentistry

Dental treatment is not limited at this stage. Dentists can continue with telephonic consultations to practise social distancing in the reception area. Face-to-face consultations can occur with correct PPE: **head cap, eye protection, nose and mouth protection and water-resistant gown**.

AGPs are allowed. However, these must be performed under rubber dam and HVE close to the tooth being worked on. Again, the operator should be equipped with the correct PPE.

Precautionary rinses or sprays: For all the procedures listed below, it is recommended that the patient rinse their mouth immediately with 1 % H_2O_2 (1% for 2 periods of 30 seconds each.) Povidone-iodine rinses (0.2%) as well as a nasal spray can also be of benefit, providing the patient is not allergic to iodine.

The operator should be equipped with the correct PPE (head cap, eye protection, nose and mouth protection and water-resistant gown). For all the procedures listed below, it is recommended that the patient rinse their mouths immediately with 1% H_2O_2 (1% for 2 periods of 30 seconds each). Povidone-iodine rinses (0.2%) preoperatively strongly advised.

General anaesthesia can be considered with the consultation of hospital protocols of AGPs.

Sedation (inhalation/ intravenous) can be considered with stringent care taken to use PPE and sterilise *all* equipment, including sedation machines, pipes and masks. No evidence is available on the safety of sedation or GA in COVID-19 positive patients.

Scope of Treatment

a. **Diagnostics**
   - Requires HVE and adequate PPE
   - Examination and assessment of patients can be done as part of an early diagnosis of possible disease and pathology. This includes essential intra-oral radiographs, which should be limited to diagnosis and treatment verification.
   - Extra-oral radiographs are encouraged where they may assist in the diagnostic process.

b. **Restorative**
- Requires limiting aerosol under rubber dam, with HVE and adequate PPE
- Treatment of carious lesions that are approaching the pulp and may result in devitalisation of the tooth with subsequent pain and infection if left untreated.
- Treatment of symptomatic and painful carious and crack lesions.
- Treatment of broken or chipped teeth or restorations causing soft-tissue trauma, even if the teeth are asymptomatic.

c. **Fixed Prosthodontics**
- Requires limiting aerosol under rubber dam, with HVE and adequate PPE.
- Indirect restorations are permissible (with the use of rubber dam, HVE and PPE).
- Preparation and cementation of crowns and bridges are permissible (with the use of rubber dam, HVE and PPE).
- Failed indirect restorations, crowns and bridges can be replaced at this stage. (The use of rubber dam, HVE and PPE is always advocated.)
- Protheses for implants are also permissible.

d. **Removable Prosthodontics**
- Requires HVE and adequate PPE.
- Denture repairs may be undertaken chairside or through laboratory processing.
- New removable prostheses can be done at this stage, disinfection of impressions to follow protocols from the SADA COVID-19 protocol document.
- All prosthodontic procedures that are related to the management of malignant and benign maxillofacial lesions can be done.
- All necessary TMD adjustments of oral appliances used in the pain management of TMDs can be done.

e. **Implants**
- Requires HVE and adequate PPE
- Routine implants can be placed.
- Prostheses for implants can be placed.

f. **Trauma and Extractions**
- Requires HVE and adequate PPE.
- The extraction of teeth due to trauma is allowed.
- Teeth that have a poor prognosis and hopeless periodontally compromised teeth can be extracted.
- Non-elective extraction for orthodontic purposes can be done.
- Extractions of teeth with pericoronitis that cannot be managed pharmacologically can be extracted by aerosol-generating techniques.
- If extractions are done by surgical interventions, HVE and the correct PPE are essential.

g. **Endodontics**
- Requires a rubber dam, HVE and adequate PPE.
- There is no restriction on the level of care with regard to endodontics at this point.
- Emergency root canal treatments can be done to resolve irreversible pulpitis, facial swelling and acute pain and infection.
- Endodontic obturation after a preparatory visit or done as a single visit is at the discretion of the clinician.
- Endodontic management of trauma can be done at this stage and should follow endodontic protocols.
- Direct pulp capping and indirect pulp capping can be done.

- Endodontic treatment on primary teeth (pulpotomy and pulpectomy) can be done at this stage. But where there is acute pain, abscess formation, facial swelling, and cellulitis, then extraction is the treatment of choice.

h. **Paediatric Dentistry**
- Requires rubber dam, HVE and adequate PPE.
- Treatment of cavities causing pain/trauma with direct restorations or paediatric preformed crowns with rubber dam placement.
- Extraction is the treatment of choice for primary teeth associated with acute pain/abscess formation/facial swelling/cellulitis.
- Endodontic treatment on primary teeth (pulpotomy and pulpectomy). Discretion of the treating clinician should be used where multiple pulpectomies or pulpotomies are indicated as to whether treatment should be done in theatre, chair (under sedation) or multiple chairside visits.

i. **Periodontal Treatment/Oral Medicine**
- At this level, ultrasonic scalers or lasers can be used with the appropriate PPE and HVE and with minimum permissible kHz and water coolant output.
- Routine prophylaxis by minimum aerosol generation and aided by hand instrumentation for active and chronic periodontal patients.
- Management of periodontal diseases or infection.
- Supporting Periodontal Therapy not restricted to hand instrumentation for the periodontal maintenance of patients with a history of periodontal disease.
- Oral medicine consultation and, if needed, relevant biopsies of oral lesions not responding to therapy, suspected of malignancy or where only a biopsy can determine the diagnosis and treatment required.
- Palliative care for post-radiation and post-chemotherapy patients. Determine the diagnosis and treatment required.
- Palliative care for post-radiation and post-chemotherapy patients.
- Routine dental implant placement where a further delay of treatment will have a detrimental effect on treatment outcomes.
- Augmentation procedures are allowed to site for planned implant placement.
- Soft-tissue grafts for root coverage procedures.
- Mucogingival procedures: gingivectomy; crown lengthening and frenectomies.
- Management of peri-implant diseases.

j. **Oral Hygiene Related Procedures**
- Scaling with ultrasonic scalers and polishing with the use of low rpm and minimum permissible water coolant together with hand instrumentation can be explored under HVE.
- Use of pit and fissure sealants under rubber dam for highly caries risk group.
- Fluoride treatment where applicable.
- Desensitisation of exposed roots where there are symptoms.
- Vital bleaching.
- Minimum invasive procedures, for example, ART.

2. Orthodontics

Scope of Treatment

Level 3 allows for further relaxation with respect to the scope of procedures that may be performed whilst still acknowledging the patient scheduling protocols outlined for Level 4.

AGPs should still be kept to a minimum where possible with strict adherence protocols outlined in Level 4 regarding appropriate PPE and HVE:

- This includes procedures such as banding, and *especially* debanding and bracket re-bonding—the orthodontic procedures associated with the highest risk of aerosol generation.
- Procedures should take cognisance of treatment protocols that acknowledge the best interest of the patient to ensure treatment continuity. It is imperative that the progress of treatment is not unduly delayed.

3. Periodontology, Implantology and Oral Hygiene

As a reminder: When treating patients, all patients should be treated as potentially being COVID-19 positive. Patients presenting with symptoms or are COVID-19 positive should only be seen with relevant PPE and only for the management of pain and sepsis.

During the delivery of emergency and essential services, all efforts must be made to eliminate and avoid aerosol-producing procedures, including the use of lasers. Strictest PPE guidelines should be followed by the clinician and supporting staff.

All procedures listed at Level 4 will be permitted in Level 3.

The reduction of aerosol production is advocated at all times. However, all aerosol-producing procedures that are allowed at this level must be performed with the correct PPE in place as well as correct surgery ventilation as set out in this document.

All procedures that fall under the scope of practice are allowed under this level, including the use of ultrasonic scalers. Again, it must be reiterated that water levels must be set at a minimum to reduce the amount of aerosol but enough not to damage any of the anatomical structures being worked on.

1. All implant-related procedures including any augmentation techniques
2. Any Mucogingival surgery both on implants and natural teeth, including crown lengthening and gingivectomies.
3. Any other procedure and related procedures that fall under the scope of the practice of the periodontist.
4. All elective procedures may be undertaken at this time.

Oral Hygiene Related Procedures

Ultrasonic instruments may be used but under the same guidelines as per periodontal procedures.

- HVE and adequate PPE are standard requirements.
- Fissure sealants under rubber dam
- Vital bleaching procedures
- Fluoride treatment, where applicable
- Desensitisation of exposed roots where patients are experiencing symptoms.
- Scaling and polishing with limited use of aerosol-producing equipment
- Any other procedures that fall under the scope of practice for an oral hygienist

4. Prosthodontics

The scope of treatment should be performed under the umbrella of **Extensive Care**. Where aerosols will be generated, it is especially important to work under a rubber dam where applicable, using PPE and HVE. *Elective treatment can be done.* Face-to-face consultations with the use of correct PPE are allowed, but telephonic consultations are especially important to gauge the level of need for treatment.

COVID-19-positive patients should be treated in specialised environments such as laminar flow, HEPA filtered (H13, H14) hospital theatres or specially designed AIIR.

Note: All prosthodontic work is to be performed, where appropriate. PPE sterilisation and patient preparation measures are adhered to strictly as defined in the preamble. All aerosol-producing procedures should be performed under a rubber dam. All prosthodontic patients must make use of preoperative oral rinses prior to any procedure being undertaken.

a. **Fixed Prosthodontics**
   - The use of a rubber dam is essential.
   - All fixed prosthodontic work required to comprehensively manage cases, where left untreated will compromise the quality of health (indirect or direct)
   - Exclude elective cosmetic procedures.

b. **Removable Prosthodontics**
   - Repair and fabrication of new of all prosthodontic prostheses.
   - Fabrication of all maxillofacial prostheses.

c. **Implant Therapy**
   - No restrictions on the scope of practice; all procedures are permissible.

d. **Oncology and Craniofacial Trauma**
   - All prosthodontic procedures that are related to the management of malignant and benign maxillofacial lesions that cannot be deferred

e. **TMD**
   - Management of cases that be otherwise managed pharmacologically.

f. **Endodontics**
   - The same as for the general practitioner under this level.

5. Maxillofacial and Oral Surgery

In Level 3, almost all maxillofacial surgical procedures can be offered. These procedures include all facial trauma, orofacial sepsis and associated inflammatory conditions, oncological resection and its appropriate immediate reconstruction, intra- and extra-oral implantology and associated augmentation procedures, orofacial pathology, dento-alveolar and associated oral surgery procedures, myofascial pain disorders and syndromic craniofacial procedures including cleft palate and urgent syndromic conditions and deformities.

Note: During a Level 3 lockdown, procedures that are still **excluded** are any semi-elective or elective surgery (other than oncology and reconstruction) that may require ICU/high-care management post-operatively as the standard of care or as a reasonable complication that may arise from such a procedure.

Level 2 and 1: Guidelines and Restrictions

The standard of sterility as part of the minimum standard of dental care in South Africa should put these two categories at the same level and Dentists should be able to operate normally under the new realm of post COVID-19 preparedness.

Acknowledgement

The South African Dental Association would like to thank the many people who worked on these SADA Dental Clinical Protocols in a such a short period – the sleepless nights, research and robust diversity of information has borne good fruits. Special thanks to Dr LC Swart who had the immense task of coordinating the many teams with differing views from academics, general and specialist practitioners in both public and private sectors, researchers. All has enriched the work that we are all proud to present to the Oral health fraternity.

Main Workstream: Dr LC Swart (Co-ordinator), Prof PJ van der Vyver, Dr M Marishane, Dr H Gluckman, Dr M Bowes and Dr J Oosthuysen

Level 5 ***Co-ordinators:*** Dr L Swart, Dr S Swanepoel. ***Sub-committees:*** Orthodontics: Dr M Coetsee and Dr H Strydom. Maxillofacial Surgery: Dr S Hogendijk, Dr V Rughubar, Dr LC Swart and Dr J Beukes. Periodontics/Oral Hygiene: Dr H Gluckman and Dr R Khamissa. Endodontics: Dr N Williams. Paediatric Dentistry: Dr N Mohammed and Dr M Weakley. General Dentistry: Dr S Swanepoel. Prosthodontics: Dr N Grundling and Dr S Mpungose. Community Dentistry: Prof N Myburgh (UWC).

Level 4 ***Co-ordinators:*** Prof PJ van der Vyver and Dr M Bowes. ***Sub-committees:*** Orthodontics: Dr G Thomadakis, Dr M Wertheimer and Dr J Dancaster. Maxillofacial Surgery: Dr J Beukes and Dr LC Swart. Periodontics / Oral Hygiene: Dr R Garrana, Dr H Gluckman, Dr J Oosthuysen and Ms S Liebenberg. Endodontics: Dr M Vorster (UP) and Dr H Mark. Paediatric Dentistry: Dr N Potgieter (UP) and Dr B Selvan. General Dentistry: Dr B Mathibela and Dr D Herr. Prosthodontics: Dr S Mpungose.

Level 3 ***Co-ordinators:*** Dr M Marishane and Dr H Gluckman. ***Sub-committees:*** Orthodontics: Dr M Mkhize. Maxillofacial Surgery: Dr Nadeem Karachi. Periodontics/Oral Hygiene: Dr F Bhamjee and Dr Howard Gluckman. Endodontics: Prof PJ van der Vyver. Paediatric Dentistry: Dr M Weakley. General Dentistry: Dr S Swanepoel. Prosthodontics: Dr R Haffajee.

All **Dental Specialist Societies** in the South African Dentistry: Orthodontics, Prosthodontics, Maxillo Facial & Oral Surgery and Periodontics. **The South African Committee of Dental Deans:** Prof N Myburgh, Prof SL Shangase, Prof MS Nemutandani and Prof SJH Hendricks

Direct External International Advisors: Dr E Euwe (Italy) and Dr G Orye (Belgium).

These Protocols have been reviewed and recommended for acceptance as the official ***Dental Clinical Protocols for the South African Dental Profession*** by the members of the **SADA Extended Dental Practice Committee (eDPCOM):** Dr S Swanepoel (Chairperson), Dr A McKelvie, Dr A Khoosal, Dr LC Swart, Dr D Schlebusch, Dr J Lochner, Dr K Bennie, Dr M Marishane, Dr M Bowes, Dr M Michael, Dr O van Schalkwyk, Dr S Stander, Dr T Twala, Dr YF Solomons, Dr E Naidoo, Dr F Mansoor, Dr F Meyer, Dr J Beukes, Dr J van den Berg, Mr KC Makhubele, Dr M Weakley, Dr M Wertheimer, Dr N Osman, Dr N Naidoo, Dr NP Metsing, Mr P Govan, Professor PD Moipolai, Dr R Putter, Dr S Sultan, Dr S Pieters and Dr S Aniruth

Approved by **The South African Dental Association Board of Directors**: Dr R Putter (Chairman), Dr N Osman (Vice-Chairman), Mr KC Makhubele (Chief Executive Officer), Dr F Meyer, Dr E Naidoo, Dr SY Pieters, Dr SJ Swanepoel, Mr HY Keshave, Mrs CH Wessels

Managed and released by
KC Makhubele

SADA Chief Executive Officer
on the 10th May 2020

About SADA:

The South African Dental Association (SADA) is the peak national body for the dental profession in South Africa representing the large majority of active registered dentists, both in the public and private sectors in South Africa. It is a non-profit professional association with voluntary membership organisation represented by a total of 11 branches, one in every province of the Republic of South Africa, with Gauteng and Eastern Cape provinces having two branches each. The Association represents the interests of both the oral health profession and its members in South Africa.

Our membership covers General Practitioner dentists, Specialist practitioner dentists (Orthodontics, Prosthodontics, Maxillo Facial & Oral Surgery and Periodontics). Since 2020, our membership is open to all allied oral health practitioners (Oral Hygienists, Dental Therapists, Dental Technicians, and Dental assistants). Membership is open and FREE for all oral health students.

The Association actively encourages continuing professional advancement of dentists and allied oral health practitioners, and to this end, it regularly holds **Branch events** for learning and mentoring purposes, an annual international **SADA Dental & Oral Health Congress and Exhibition.** We are the only oral health professional body in Africa which publishes an internationally accredited professional journal (**The South African Dental Journal - SADJ**) with circulation locally, the rest of Africa and internationally.

The Association is recognised by the public and relevant stakeholders as the authority in providing information and advice about oral health. SADA is affiliated to **The Fédération Dentaire Internationale (FDI) World Dental Federation** and the **FDI African Regional Organisation (ARO).**

Contact:

The South African Dental Association
Postal: Private Bag 1, Houghton, 2041, Gauteng, South Africa
Telephone: +27 (0)11 484 5288
Email: info@sada.co.za
www.sada.co.za