

# Cross- Infection Control in Dental Practice and Oral Self-Care during Corona Virus (COVID-19) Pandemic

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ABSTRACT

COVID-19 pandemic has adversely affected all spheres of life, dental practice inclusive. It is therefore important to have a definite protocol to prevent cross infection or formulate a contingency plan with recommendations to minimize the spread in the dental healthcare. Many dental associations and the World Health Organisation have proposed useful guidelines for dental practice during the COVID-19 pandemic. Some of these guidelines are helpful in our environment while some are outrightly not practicable. This paper attempts to provide modifications of the existing guidelines which would be practicable in our environment. Apart from the standard infection control measures, strategies to control cross- infection in the dental practice during the COVID-19 pandemic will include optimising oral self-care, preparation of dental parents before and during dental visits, the use of preprocedural antimicrobial mouth rinses and modification of dental procedures. It is strongly advised that all dental practitioners should be abreast with the latest news and guidelines and protocol specified by the regulatory bodies and the recommended protocol in dental practice should be insisted on because many cases may still exist in the communities for months

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**Keywords:** COVID-19 pandemic, dental practice, preprocedural mouth rinses, oral self-care

## INTRODUCTION

The corona virus (COVID-19) infection ravaging the world is of a huge public health importance because of the nature of the virus (World Health Organisation, 2020). Among the coronaviruses generally known to cause disease in humans and animals, human coronaviruses 229E, NL63, OC43 and HKU1 typically infect only the upper respiratory tract, causing relatively minor symptoms (Ng and Hiscox, 2020; Centers for Disease Control and Prevention, 2020). However, severe acute respiratory syndrome coronavirus 1 and 2 (SARS-CoV-1 & 2) and Middle East respiratory syndrome coronavirus (MERS-CoV), which are known to replicate in the lower respiratory tract and cause pneumonia, can be fatal (Sharme et al, 2020). COVID-19 infection is specifically caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which belongs to the betacoronavirus genus (Pal et al., 2020).

SARS-CoV-2 has been known to be transmitted directly when infected secretions, droplets or aerosolized droplet nuclei from a contaminated person reach the oral, nasal and/or conjunctival mucosa of a susceptible host.<sup>6,7</sup> Indirect transmission is also possible when the virus is transferred by hand from contaminated objects or surfaces (fomites) to oral, nasal and/or conjunctival mucosa (World Health Organisation, 2020b; Peng et al., 2020). A faecal-oral

route from an infected subject has also been suggested (Aboubakr et al., 2020).

**Citation:** Ehizele AO (2020). Cross- infection control in Dental Practice and Oral Self-Care during Corona Virus (COVID-19) pandemic *Nig J Res Orofac Infect Oncol*; 3(2):37-44.

The average incubation period before the onset of symptom is 4–5 days and majority of those infected develop symptoms within 11 days (Saeralaathan et al., 2020). These symptoms may include fever, dry cough, sudden loss of smell or taste, difficulty in breathing, muscle and/or joint pain, headache, dizziness, diarrhoea, nausea and haemoptysis (Tay et al., 2020). The peak viral load of SARS-CoV-2 is reached within 5-6 days after onset of system and this faster than SARS-CoV 1, where viral load peaks at about 10 days after symptom onset (Huang et al., 2020). Severe COVID-19 cases progress to acute respiratory distress syndrome (ARDS) in about 8–9 days after symptom onset. Moderately infected persons can stay infectious for a period of 10 days while the critically ill or severely immunocompromised may remain infectious for about 20 days (Tay et al., 2020). It has been reported that even after recovery, SARS-CoV-2 detectable RNA can still be found in the upper respiratory tract for up to 90 days after the onset of the disease (Tay et al., 2020).

The severity of symptoms depends on the host response to the disease process (Huang et al., 2020). The infection results in aggressive inflammatory response causing damage to the airway, difficulty in breathing and low blood oxygen level. This may be worsened by other secondary bacterial and fungal infections. ARDS leads to respiratory failure and this is usually the cause of death in many of the fatal COVID-19 cases (Zhang et al., 2020). The fatality has been attributed to Immune response to the primary viral and the secondary bacterial or fungi infection which cause cytokines storm, sepsis and multi-organ damage leading to the failure of the cardiac, hepatic and renal systems (Zhang et al., 2020).

It is no longer in doubt that COVID-19 pandemic has adversely affected all spheres of life, dental practice inclusive. All dental practitioners and dental patients are always at high risk of cross infection from pathogenic microorganisms and viruses derived from the oral cavity and airways. It is therefore important to have a definite protocol to prevent cross infection or formulate a contingency plan with recommendations to minimize the spread in the dental healthcare. This would involve specifying what should be done prior to patients' visit, during in-office dental treatment, and post-treatment, during the pandemic and even afterwards.<sup>10</sup> Many dental associations and the World Health Organisation have proposed useful guidelines for dental practice during the COVID-19 pandemic. Some of these guidelines are helpful in our environment while some are outrightly not practicable. This paper attempts to provide modifications of the existing guidelines which would be practicable in our environment.

#### **Why is the dental practice particularly at risk?**

There is evidence that the corona virus accumulates in the oral mucosa in the first 10 days of infection and then subsequently accumulates in the lungs (Cevik et al., 2020). Therefore, the oropharynx may be an important reservoir for SARS-CoV-2. The oropharyngeal tissues and fluids act as a reservoir of SARS-CoV-2. It has also been suggested that salivary glands may act as reservoirs for asymptomatic infections and transmission (Xu et al., 2020). The transmembrane protein angiotensin-converting enzyme (ACE2) was identified as the main host cell receptor of SARS-CoV-2 and entrance portal of the virus into the cell and there is also a high expression of ACE2 in salivary glands, especially in minor salivary glands (Saeralaathan et al., 2020). High viral load is detected in the saliva, oral cavity and the throat and this may be one of the factors which contribute to easy transmission, even when symptoms are mild.

When dental devices such as high-speed turbines, air-water syringes, ultrasonic instruments and lasers are used in the patient's oral cavity, a large amount of aerosol and droplets mixed with the patient's saliva and blood will be generated (Nulty et al., 2020). The

aerosolized droplet nuclei (particles  $\leq 5 \mu\text{m}$  in diameter) are more dangerous than the respiratory droplets (particles  $> 5 \mu\text{m}$  in diameter) which are released when a person coughs, sneezes, breathes or talks (Dhand and Li, 2020). While droplets settle on the ground or surfaces quickly after travelling a short distance ( $\leq 1 \text{m}$ ), droplet nuclei can be suspended in the air for longer period and may travel longer distances (Atkinson et al., 2009). The highest levels of aerosol contaminants were found within 60 cm from the patient's head which is where the operator or assistant are likely to be located. The aerosol generated by dental device can remain suspended in the air for 30 minutes post procedure (Peng et al., 2020; Gallagher, 2020). Sars-CoV-2 can maintain viability in the air for at least 3 hours and its viability half-life is nearly 1 hour (Ren et al., 2020). Furthermore, Sars-CoV-2 adheres to various surfaces to a maximum of 9 days (Cirriuncione et al., 2020). Therefore, all surfaces and instruments in a dental clinic can be considered potential sources of virus transmission

#### **What are the strategies for cross- infection control in the dental practice?**

##### **1. Optimise oral self-care during the Covid-19 pandemic**

###### **Rationale for oral self-care**

Oral self-care is an integral part of personal hygiene practices and should not be neglected. Patients should be encouraged to pay more attention to this aspect of personal hygiene in the COVID-19 pandemic period because it is essential in reducing infection from the oral cavity, and thus, its transfer to the upper and lower respiratory tract. Standard oral self-care measures consist of thorough cleaning of all surfaces of teeth, interdental areas, and tongue daily. Oral health-care providers should emphasise its importance. The mantra, "Two Times for Two Minutes in a day," is a good reminder for a thorough toothbrushing (Bains and Bains, 2020). It has been reported that self-driven standard oral hygiene practices can reduce the rate of complications that may occur secondarily due to the aspiration of oropharyngeal microorganisms (Ames, 2020).

###### **Recommendation for oral self-care**

###### **A. Special care of toothbrushes-**

Toothbrushes should be disinfected to prevent them from re-contaminate the mouth, since they have been known to retain microbes even after cleaning (Naik, et al., 2015). It has been reported that after a single use for a duration of 30 s to 4 min, toothbrushes may become contaminated by various microorganisms such as bacteria, viruses, yeasts, and fungi (Tomar et al., 2014). This is possible because toothbrushes are usually stored in warm and moist bathrooms/toilet which are ideal for the growth of microorganisms (Karibasappa et al., 20). It is therefore advisable to dip the toothbrushes for 10 to 30 minutes in an antiseptic

solution after every use. The following solutions have been found to be effective: Chlorhexidine (0.12 % or 0.2%), Hydrogen peroxide (3%), White vinegar (50%), Sodium hypochlorite (2%), Essential oils and alcohol and Povidone-iodine (10%) (Bains and Bains, 2020). It has also been recommended that toothbrushes can also be sanitized with UV rays for 2 h (Bains and Bains, 2020).

Furthermore, it is advisable that toothbrush handles, floss containers and floss holders should also be disinfected with an alcohol-based sanitizer should be done after use, toothbrushes of family members should not be kept in a common holder and never be shared, powered toothbrushes and water-piks/oral irrigators may have the potential to produce more aerosols than manual toothbrushes and should be avoided and only disposable interdental cleaning aids should be used for cleaning interdental spaces that toothbrushes cannot get to (Bains and Bains, 2020).

#### **B. The use of detergent based toothpaste**

The use of toothpastes containing the detergent-based cleaning agent, sodium lauryl sulfate (SLS), should be encouraged. SLS has both antimicrobial and plaque inhibitory properties. This anionic surfactant imparts foam which dissolves and inactivates various nonenveloped as well as enveloped viruses. It inactivates viruses by denaturing the viral envelope and capsid protein and it is reported to have a moderate substantivity of 5–7 h (Vannet et al., 2015). However, in patients allergic to SLS or patients with diseased-sensitive oral and gingival tissue, SLS-free toothpaste is recommended.

#### **C. The home use of antiseptic mouthwashes**

The home use of antiseptic mouthwashes as oral rinses is also recommended in both healthy and diseased individuals. The routine use of the mouthwashes may help in reducing the viral load of saliva and oropharyngeal cavity but this must be done with caution. Any of the following groups of antimicrobials may be recommended: Phenols, Quaternary ammonium compounds, Sanguinarines, Bisbiguanides, Delmopinol hydrochloride (0.2% perio shield) and Povidine iodine. Sodium hypochlorite (NaOCl), a highly active cytotoxic oxidant is an effective antiseptic and disinfectant agent against bacteria, fungi, and viruses can also be used for oral self-care. The recommended dosage is 8–10 ml (2 teaspoonfuls) of 6% household bleach, diluted in 250 ml of glass water, yielding 0.25% of sodium hypochlorite rinse to be used orally for 30 s for about 2–3 times a week. It reacts with proteins, nucleic acids, and lipids, and inactivates enzymes essential in the energy-yielding metabolism of microorganisms (Galvin et al., 2014).

#### **2. Pre-dental office visit Screening**

To prevent exposure to infected persons, telephone screening should be the first point of contact between

the patient and the dentist. Detailed medical history regarding the symptoms of COVID-19 must be taken and in case of any positive replies, in-office dental care should be delayed for 3 weeks, except in dental emergencies (Kochhar et al., 2020). Consultation done via telephone allows sharing of useful health information such as photographs, radiographs and test results, helping the practitioner to evaluate the patient's condition and provide virtual first aid or palliative management (Kochhar et al., 2020). This may be challenging in our environment where internet connectivity is still unsteady and not generally available and affordable. Many patients also do not have access to the telephone contact of their caregivers or the dental office. Therefore, for teledentistry to have a chance to work in our environment, it is recommended that all patients' appointment card must bear a phone number of a contact person so that patients can always have access to their caregivers. The issue of affordability of internet connectivity can only be centrally addressed. Providing a toll-free telephone service for health consultation will be very helpful and may be a good place to start. Also, as part of the social services expected to be rendered to the public, government facilities and established private sector can provide free Wi-Fi connectivity in their premises which would be accessible by anyone within or in close proximity to such premises.

#### **3. Dental Office Visit Preparation/ Evaluation**

Any patient deemed to be safe enough for a dental office visit should be informed via telephone calls or short message service what is expected of them at the dental office as well as what to expect. Appointments should be staggered, and accompanying persons should not be encouraged to come into the dental office, except for children or people with special needs. Before allowing any patient into the dental office, a contact-free forehead thermometer should be used to measure the body temperature of every patient anyone who is in the acute febrile phase of the disease should not be allowed to enter the dental office. Hand sanitizers and face masks should be made available for persons to be seen in the dental office. A negative pressure/airborne infection isolation room with a portable high-efficiency particulate air (HEPA) filter should be provided for treatment of any suspected COVID-19 patients to prevent spread of infection (Kochhar et al., 2020).

#### **4. Hand hygiene**

The report of the possibility of a faecal–oral transmission of COVID-19-infection makes hand hygiene in dental practice even more important (Aboubakr et al., 2020). Although appropriate hand hygiene is expected to be routine in dental practice, hand-washing compliance is still relatively low (Omogbai et al., 2011; Cheng et al., 2019). This poses a great challenge to infection control during this

pandemic period. A 'two-before and-three-after' hand hygiene guideline has been proposed to reinforce the compliance of hand washing (World Health Organisation, 2009). This implies that dental professionals should wash their hands before patient examination, before dental procedures, after touching the patient, after touching the surroundings and equipment without disinfection, after touching the oral mucosa, damaged skin or wound, blood, body fluid, secretion, and excreta or whenever hands are visibly soiled. More caution should be taken by the dental professionals to avoid touching their own eyes, mouth, and nose. The use of 80% ethanol or 75% 2-propanol as Alcohol-Based Hand Rub (ABHR), has been found to be effective (Berardi et al, 2020). Their use should therefore be encouraged to compliment hand washing in the dental practice.

#### 5. Personal protective measures for the dental professionals

Based on the evidence that airborne droplet transmission of infection is considered the main route of spread in the dental practice (Peng et al., 2020), the recommendation of barrier-protection equipment, including protective eyewear, masks, gloves, caps, face shields, and protective outwear for all dental professionals in the pandemic period of COVID-19 is non-negotiable. The use of fit-tested N95 masks, gloves, over gown, and face/eye protection as well as the use of the double gloving technique with long sleeved gloves, eyewear, including side shields or full-face-shields and hair covers/hoods is highly recommended during aerosol generating procedures (Hirschmann et al., 2020). Every dental office should have a designated separate area for putting on and removing the Personal Protective equipment (Kochlar et al., 2020; Hirschmann et al., 2020; Nigeria Centre for Disease Control, 2020).

#### 6. The use of preprocedural antimicrobial mouthrinses

Preprocedural antimicrobial mouthrinses are generally believed to reduce the number of oral microbes. They may not be effective to kill SARS-CoV-2 but they are recommended for the purpose of reducing the salivary load of the virus. The justification for the use of preprocedural mouthrinses is that if mouthrinses are effective in reducing the viral load of SARS-CoV-2 in the oral cavity, they may reduce cross-contamination related to aerosol-generating dental procedures and be beneficial to dental professionals as well as the patients. A preprocedural mouthrinse would be most useful in cases when rubber dam cannot be used.

#### Chlorhexidine (CHX)

Chlorhexidine is a synthetic cationic biguanide with a broad spectrum of antibacterial activity. It has a bactericidal effect against a wide variety of Gram-positive and Gram-negative bacteria, both aerobic and

anaerobic as well as yeasts and viruses (Fiorillo, 2019). CHX is effective against enveloped viruses (*herpes simplex virus 1 [HSV- 1], cytomegalovirus, influenza A, parainfluenza, and hepatitis B*) in the oral cavity (Bernstein et al., 1990). The probable mode of virus inactivation is its interaction with the virus lipid envelope (Reis et al., 2021). CHX was reported to alter protein features of bacterial and fungi cells by increasing drastically the cell membrane permeability, causing precipitation of macromolecules into the cytoplasm and eventual cell death (Fiorillo, 2019).

There is evidence to show that CHX presents high substantivity in the oral cavity, releasing its active form up to 8–12 h after its use and still detectable in saliva after 24 h (Reis et al., 2021). This accounts for its long-lasting antimicrobial effect on oral microorganisms. The most used concentrations are 0.12% and 0.2%, and the two concentrations have been found to be effective (James et al., 2017). The documented adverse events associated with prolonged use of CHX are tooth staining, taste and mucosal alterations while but it is associated with CHX prolonged use (Reis et al., 2021). Allergic reactions have also been reported even after a single mouth rinse (Reis et al., 2021). There is therefore a need for caution even in single pre-procedural use.

A recent clinical prospective study with patients diagnosed with COVID-19 showed that chlorhexidine mouthwash (0.12%, 15 mL) was effective in reducing SARS-CoV-2 viral load in saliva for 2 h after gargling, although the viral load increased again 2–4 h post-mouthwash (Yoon et al., 2020). This shows that CHX may reduce the viral load during dental procedures and so potentially reduce the cross-contamination in the dental office.

#### Essential Oils (EO)

It has also been documented that EO mouthwashes containing eucalyptol, menthol, methyl salicylate and thymol have antiviral effects in the oral cavity (Reis et al., 2020). There is evidence that EO exhibited potent antiviral activity against coronavirus SARS-CoV through inhibition of viral replication (Loizzo et al., 2020). A recent in vitro study showed that different SARS-CoV-2 strains can be effectively inactivated under conditions mimicking nasopharyngeal secretions, supporting the idea that a pre-procedural mouth rinse with EO may be effective to reduce SARS-CoV-2 load in saliva (Meister et al., 2020).

When used for a prolonged duration, EO mouthwash can cause a mild burning sensation and palatal erythema which is usually reversible (Tartaglia et al., 2019). Allergic reactions to single use on EO as pre-procedural mouthwash can also occur rarely. Systematic allergic reactions, allergic

stomatitis and chemical gastritis have been reported (Vlachojannis et al., 2013).

#### **Cetylpyridinium chloride (CPC)**

CPC, a quaternary ammonium compound from the group of surfactants soluble in alcohol and in aqueous solutions, acts as a neutral pH detergent and antiseptic that can form a barrier preventing contact between the virus and the host mucosa (Mukherjee et al., 2017). It has been reported to have a virucidal effect within 10 min when used in concentrations between 5 and 20 µg/mL (Popkin, 2017).

While short-term and single use of CPC have not been associated with adverse effects, burning sensation on the tongue, and extrinsic staining of the teeth can result from prolonged use of CPC mouth rinses (Reis et al., 2021).

#### **Povidone-Iodine (PVP-I)**

PVP-I is a broad-spectrum disinfectant, rapid bactericidal, fungicidal, tuberculocidal, virucidal and sporicidal agent. A study to show its effectiveness against viruses revealed that lipid enveloped viruses are more sensitive to its action than nonlipid viruses (Reis et al., 2021). Apart from disrupting the surface proteins of enveloped viruses, PVP-I also disrupts membrane fatty acids by reacting with the unsaturated carbon bonds (Reis et al., 2021). Since PVP-I is an oxidative agent, it is effective against SARS-CoV and MERS-CoV which are vulnerable to oxidation (Eggers et al., 2018). PVP-I (1%) has been considered to be superior to ethanol because it was able to inactivate SARS-CoV-2 on inanimate surfaces in 15 seconds (Reis et al., 2021). It was also reported that it inactivated SARS-CoV-2 under conditions mimicking nasopharyngeal secretions within 30s contact time (Meister et al., 2021). PVP-I mouthwash is highly effective against the virus in dosage of 15 mL of 1% PVP-I for 1 min (Martínez et al., 2021).

PVP-I can cause temporary burning sensation, local irritation and allergic reactions, too. It is therefore contraindicated in patients with allergy to active ingredients, with thyroid disease, with renal insufficiency, on lithium therapy, in pregnant women and during breastfeeding (Lachenmeier, 2019).

#### **Hydrogen peroxide (HP)**

HP is a strong oxidizer used for disinfection, sterilization, and antiseptics because of its broad-spectrum effect against microorganisms. Essential cell components such as lipids, proteins, and DNA of viruses are destroyed by the hydroxyl free radicals (OH) produced (Reis et al., 2021). Since it disrupts lipid membranes, it has been found useful as a preprocedural mouth rinse for reducing the salivary load of SARS-CoV-2 (Kampf et al., 2020).

Although HP can be toxic at high concentrations (>5%), its use in low concentrations (1–3%) is associated with fewer adverse effects. There is also possibility of rapid

inactivation of HP due to the presence of host and bacteria-derived catalase activity in saliva and other endogenous peroxidases when hydrogen is present in the mouth. A combination of CHX and HP can be used to maximize the benefit of the two agents, i.e. to minimize their side-effects and reduce the concentration used (Reis et al., 2021).

### **7. Modification of procedures**

#### **The use of Single-Use or Disposable Devices**

A single-use or disposable device is designed to be used on one patient, properly discarded and never reprocessed for use on another patient (i.e. not cleaned, disinfected or sterilized). Examples include syringe needles, prophylaxis cups and brushes, and plastic orthodontic brackets, saliva ejectors, high-volume evacuator tips, and air/water syringe tips. Single-use items such as cotton rolls, gauze, and irrigating syringes, must be sterile at the time of use.

#### **Rubber dam isolation**

The use of rubber dams can significantly minimize the production of saliva and blood contaminated aerosol or spatter, particularly in cases when high-speed handpieces and dental ultrasonic devices are used. It has been reported that the use of rubber dam could significantly reduce airborne particles in ~3-foot diameter of the operational field by 70%. When rubber dam is applied, extra high-volume suction for aerosol and spatter should be used during the procedures along with regular suction. In this case, the implementation of a complete four-hand operation is necessary.

#### **The use techniques to minimize aerosol generation**

If rubber dam isolation is not possible or available, other less aerosol generating methods should be considered. Manual devices should be used to any extent possible. Minimally invasive method of cavity preparation and the use of hand scaler are recommended for caries removal and periodontal scaling respectively, in order to minimize the generation of aerosol as much as possible.

#### **The use of anti-retraction handpiece**

The high-speed dental handpiece without anti-retraction valves may aspirate and expel the debris and fluids, including bacteria and virus, during the dental procedures. Anti-retraction high-speed dental handpieces have been reported to significantly reduce the backflow of oral bacteria and viruses. Therefore, the use of dental handpieces without anti-retraction function should be prohibited during the epidemic period of COVID-19. Even with anti-retraction valves, flushing devices for a minimum of 20–30 seconds after each patient is recommended.

Patient material (oral microorganisms, blood, and saliva) can also enter the dental water system during patient treatment. Dental unit water that remains

untreated or unfiltered is unlikely to meet drinking water standards. Simply using source water containing <500 CFU/mL of bacteria (e.g., tap, distilled, or sterile water) in a self-contained water system will not eliminate bacterial contamination in treatment water if biofilms in the water system are not controlled. Removal or inactivation of dental waterline biofilms requires the use of chemical germicides. Nanoemulsion has been reported to have extensive bactericidal, sporicidal, and virucidal effects (Ramalingam et al., 2013).

#### **Cautious use of Saliva Ejectors**

Backflow from low-volume saliva ejectors occurs when the pressure in the patient's mouth is less than that in the evacuator. Backflow in low-volume suction lines can occur and microorganisms present in the lines can be retracted into the patient's mouth when a seal around the saliva ejector is created (e.g., by a patient closing lips around the tip of the ejector, creating a partial vacuum). This backflow can be a potential source of cross-contamination. Gravity can also pull fluid back toward the patient's mouth whenever a length of the suction tubing holding the tip is positioned above the patient's mouth or during simultaneous use of other evacuation (high volume) equipment

#### **Infection control in Dental Radiology**

When taking radiographs, the potential to cross-contaminate equipment and environmental surfaces with blood or saliva is high if aseptic technique is not practiced. Gloves should be worn when taking radiographs and handling contaminated film packets. Other PPEs should be used if spattering of blood or other body fluids is likely. Heat-tolerant versions of intraoral radiograph accessories (e.g., film-holding and positioning devices) should be heat sterilized before patient use. After exposure of the radiograph and before glove removal, the film should be dried with disposable gauze or a paper towel to remove blood or excess saliva and placed in a container (e.g., disposable cup) for transport to the developing area. Radiography equipment (e.g., radiograph tube head and control panel) should be protected with surface barriers that are changed after each patient. If barriers are not used, equipment that come in contact with gloved hands or contaminated film packets should be cleaned and disinfected after each patient use. Digital radiography sensors and other high-technology instruments that come in contact with patient's mucous membranes and are considered semicritical devices. They should be given high level disinfected between patients. Extraoral radiography may be favoured over intraoral techniques where there increased saliva production and gag reflex

#### **8. Disinfection of the clinic settings**

All nonessential items such as dental display models, brochures, and magazines should be removed. Chairs

in the waiting area should be placed 6 feet apart. Cleaning and disinfection and sterilization of the reception, waiting area, and equipment must be ensured, including door handles, chairs, and desks. Before start of everyday practice, bioburden should be reduced by mopping the floor and clinic area with a regular disinfectant. A second round of general clinic area disinfection should also be done with water containing 2% sodium hypochlorite. At the time of closure of practice, a defogging with silver hydrogen peroxide should be done

#### **9. Management of medical waste**

The medical waste (including disposable protective equipment) should be transported to the temporary storage area of the medical institute timely. The medical and domestic waste generated by the treatment of patients with suspected or confirmed 2019-nCoV infection are regarded as infectious medical waste. Double-layer yellow color medical waste package bags and "gooseneck" ligation should be used. The surface of the package bags should be marked and disposed according to the requirement for the management of medical waste. Waste disposed into appropriate color-coded bags should be handed over to designated bio medical waste disposal authorities.

#### **10. Other special protocol for the workforce**

**Doffing of PPE:** An appropriate doffing sequence and disposal in designated bags should be followed. Glasses and face-shields must be washed and disinfected after each procedure. **Follow-up:** all patients must be followed up after 7 days for any flu-like symptoms. **Employee care:** daily log for employees' temperature and symptoms must be made and reviewed periodically. Where possible, an in/out daily log book needs should be kept to monitor who entered and left the dental office (with the date and time). Dental health practitioners must be constantly monitored and they should work on rotation basis with 2-3 days off in between if possible. They should be trained and re-trained on patient management and infection control procedures. Dental practice should be made paper free and digital payment options must be made available.

#### **CONCLUSION**

In this unprecedented time, events are unfolding rapidly and so all dental practitioners should be abreast with the latest news and guidelines and protocol as specified by the regulatory bodies. Asking patients about symptoms during reminder calls and rescheduling nonurgent appointments should be incorporated till the situation stabilises. Dental operatory should be well prepared, and stringent infection control and waste management protocols should be followed to reduce cross infection. The recommended protocol in dental practice should be

insisted on because many cases may still exist in the communities for months.

## REFERENCES

- Aboubakr HA, Sharafeldin TA, Goyal SM (2020). Stability of SARS-CoV-2 and other coronaviruses in the environment and on common touch surfaces and the influence of climatic conditions: A review. *Transbound Emerg Dis*; 30:10.1111/tbed.13707. doi: 10.1111/tbed.13707.
- Ames NJ (2011). Evidence to support tooth brushing in critically ill patients. *Am J Crit Care*; 20: 242-250.
- Atkinson J, Chartier Y, Pessoa-Silva CL, et al., editors (2020). *Natural Ventilation for Infection Control in Health-Care Settings*. Geneva: World Health Organization; Annex C, Respiratory droplets. Retrieved from: <https://www.ncbi.nlm.nih.gov/books/NBK143281/> (Accessed on 01/04/21)
- Bains VK, Bains R (2020). Is oral hygiene as important as hand hygiene during COVID-19 pandemic? *Asian J Oral Health Allied Sci*; 10: 5
- Berardi A, Perinelli DR, Merchant HA, Bisharat L, Basheti IA, Bonacucina G, Cespi M, Palmieri GF (2020). Hand sanitisers amid CoViD-19: A critical review of alcohol-based products on the market and formulation approaches to respond to increasing demand. *Int J Pharm*; 584: 119431
- Bernstein D, Schiff G, Echler G, Prince A, Feller M, Briner W (1990). In vitro virucidal effectiveness of a 0.12%-chlorhexidine gluconate mouthrinse. *J Dent Res*; 69(3):874-876.
- Centers for Disease Control and Prevention. Common Human Coronaviruses (2020). Retrieved from <https://www.cdc.gov/coronavirus/general-information.html> (Accessed on 01/04/21)
- Cevik M, Kuppalli K, Kindrachuk J, Peiris M (2020). Virology, transmission, and pathogenesis of SARS-CoV-2. *BMJ*; 37:m3862
- Cheng HC, Peng BY, Lin Lichen SL (2019). Hand hygiene compliance and accuracy in a university dental teaching hospital. *J Int Med Res*; 47(3): 1195-1201
- Cirincione L. et al. (2020). COVID-19 Pandemic: Prevention and Protection Measures to Be Adopted at the Workplace. *Sustainability*; 12: 3603. doi:10.3390/su12093603
- Dhand R, Li J (2020). Coughs and Sneezes: Their Role in Transmission of Respiratory Viral Infections, Including SARS-CoV-2. *Am J Respir Crit Care Med*; 202(5):651-659.
- Eggers M, Koburger-Janssen T, Eickmann M, Zorn J (2018). In Vitro Bactericidal and Virucidal Efficacy of Povidone-Iodine Gargle/Mouthwash Against Respiratory and Oral Tract Pathogens. *Infect Dis Ther*; 7(2):249-259.
- Fiorillo L (2019) Chlorhexidine Gel Use in the Oral District: A Systemic Review. *Gels*; 5 (2): 31
- Gallagher JE, K.C S, Johnson IG. et al (2020). A systematic review of contamination (aerosol, splatter and droplet generation) associated with oral surgery and its relevance to COVID-19. *BDJ Open*; 6: 25. Retrieved from <https://doi.org/10.1038/s41405-020-00053-2> (Accessed on 01/04/21)
- Galván M, Gonzalez S, Cohen CL, Alonizan FA, Chen CT, Rich SK, et al (2014). Periodontal effects of 0.25% sodium hypochlorite twice-weekly oral rinse. A pilot study. *J Periodontol Res*; 49:696-702
- Hirschmann, M.T., Hart, A., Henckel, J. et al. (2020). COVID-19 coronavirus: recommended personal protective equipment for the orthopaedic and trauma surgeon. *Knee Surg Sports Traumatol Arthrosc*; 28: 1690-1698
- Huang C, Wang Y, Li X, et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*; 395: 497-506
- James P, Worthington HV, Parnell C, Harding M, Lamont T, Cheung A, Whelton H, Riley P (2017). Chlorhexidine mouthrinse as an adjunctive treatment for gingival health. *Cochrane Database of Systematic Reviews*, Issue 3. Art. No.: CD008676
- Kampf G, Todt D, Pfaender S, Steinmann E (2020). Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hosp Infect*; 104(3):246-251.
- Karibasappa GN, Nagesh L, Sujatha BK (2011). Assessment of microbial contamination of toothbrush head: An in vitro study. *Indian J Dent Res*; 22:2-5
- Kochhar AS, Bhasin R, Kochhar GK, Dadlani H (2020). COVID-19 Pandemic and Dental Practice. *Int J Dent*. doi.org/10.1155/2020/8894794
- Lachenmeier W (2019). Antiseptic drugs and disinfectants. *Side effects of Drugs Annual*; 41:251-256.
- Loizzo M, Saab A, Tundis R, et al (2008). Phytochemical analysis and in vitro antiviral activities of the essential oils of seven Lebanon species. *C&B*; 5(3): 461-470.
- Martinez L, Diz P, P'erez M, et al (2020). Is Povidone-Iodine Mouthwash Effective Against SARS-CoV-2? First in Vivo Tests. *Oral Dis*. doi: 10.1111/odi.13526.
- Meister TL, Brüggemann Y, Todt D, et al (2020). Virucidal Efficacy of Different Oral Rinses Against Severe Acute Respiratory Syndrome Coronavirus 2. *J Infect Dis*; 222(8):1289-1292.
- Mukherjee PK, Esper F, Buchheit K, et al (2017). Randomized, double-blind, placebo-controlled clinical trial to assess the safety and effectiveness of a novel dual-action oral topical formulation against upper respiratory infections. *BMC Infect Dis*; 17(1).
- Naik R, Mujib BR, Telagi N, Anil BS, Spoorthi BR (2015). Contaminated tooth brushes-potential threat to

- oral and general health. *J Family Med Prim Care*; 4: 444-448.
- Ng L F P, Hiscox J A (2020). Coronaviruses in animals and humans *BMJ*; 368: m634
- Nigeria Centre for Disease Control (2020). Personal Protective Equipment recommendation during health care for patients with suspected/confirmed COVID-19 infection. Retrieved from [https://ncdc.gov.ng/themes/common/docs/protocols/171\\_1583044010.pdf](https://ncdc.gov.ng/themes/common/docs/protocols/171_1583044010.pdf) (Accessed 02/04/21)
- Nulty A, Lefkaditis C, Zachrisson P. et al. (2020). A clinical study measuring dental aerosols with and without a high-volume extraction device. *Br Dent J*. [doi.org/10.1038/s41415-020-2274-3](https://doi.org/10.1038/s41415-020-2274-3)
- Omogbai JJ, Azodo CC, Ehizele AO, Umoh A (2011). Hand Hygiene Amongst Professionals in a Tertiary Dental Clinic. *Afr J f Cln Exper Microbiol*. 20;12(1):9-14
- Pal M, Berhanu G, Desalegn C, Kandi V (2020). Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2): An Update. *Cureus*;12(3): e7423.
- Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B (2020). Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science*. 2020; 12: 9. [10.1038/s41368-020-0075-9](https://doi.org/10.1038/s41368-020-0075-9).
- Popkin DL, Zilka S, Dimaano M, et al (2017). Cetylpyridinium Chloride (CPC) Exhibits Potent, Rapid Activity Against Influenza Viruses in vitro and in vivo. *Pathog Immun*; 2(2): 253–269
- Ramalingam K, Frohlick NC, Lee VA (2013). Effect of nanoemulsion on dental unit waterline biofilm. *J Dent Sci*; 8: 333e336
- Reis INR et al (2021). Can preprocedural mouthrinses reduce SARS-CoV-2 load in dental aerosols? *Medical Hypotheses*;146: 110436
- Ren SY, Wang WB, Hao YG, et al. (2020). Stability and infectivity of coronaviruses in inanimate environments. *World J Clin Cases* ;8(8):1391-1399.
- Saeralathan S, Balaji SK, Lavu V (2020). Dental practice management and research during the COVID-19 pandemic- An overview. *J Anal Pharm Res*;9(3):91-95.
- Sharma A, Tiwari S, Deb MK, Marty JL (2020). Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2): a global pandemic and treatment strategies. *Int J Antimicrob Agents*;56(2):106054.
- Tartaglia GM, Tadakamadla SK, Connelly ST, Sforza C, Martín C (2019). Adverse events associated with home use of mouthrinses: a systematic review. *Ther Adv Drug Saf*; 10: 2042098619854881.
- Tay MZ, Poh CM, Renia L, MacAry PA, Ng LFP (2020). The trinity of COVID-19: Immunity, Inflammation and Intervention. *Nature Reviews Immunology*. 2020;20: 363-374
- Tomar P, Hongal S, Saxena V, Jain M, Rana K, Ganavadiya R (2014). Evaluating sanitization of toothbrushes using ultra violet rays and 0.2% chlorhexidine solution: A comparative clinical study. *J Basic Clin Pharm*; 6:12-8.
- Vannet BV, DeWever B, Adriaens E, Ramaeckers F, Bottenberg P (2015). The evaluation of sodium lauryl sulphate in toothpaste on toxicity on human gingiva and mucosa: A 3D in vitro model. *Dentistry*; 5: 1000325.
- Vlachojannis C, Winsauer H, Chrubasik S (2013). Effectiveness and safety of a mouthwash containing essential oil ingredients: effectiveness and safety of listerine. *Phytother Res*;27(5):685–91.
- Walsh KA, Jordan K, Clyne B, et al. (2020). SARS-CoV-2 detection, viral load and infectivity over the course of an infection. *J Infect.*;81(3):357-371.
- World Health Organisation (2009). WHO Guidelines on Hand Hygiene in Health Care: a Summary (2009). Retrieved from [https://www.who.int/gpsc/5may/tools/who\\_guidelines-handhygiene\\_summary.pdf](https://www.who.int/gpsc/5may/tools/who_guidelines-handhygiene_summary.pdf) (Accessed on 02/0/21)
- World Health Organisation (2020a). Coronavirus disease 2019 (COVID-19) Situation Report –59. Retrieved from [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200319-sitrep-59-covid-19.pdf?sfvrsn=c3dcdef9\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200319-sitrep-59-covid-19.pdf?sfvrsn=c3dcdef9_2) (Accessed on 01/04/21)
- World Health Organisation. Transmission of SARS-CoV-2: implications for infection prevention precautions (2020b). Retrieved from <https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions> (Accessed on 01/04/21)
- Xu J, Li Y, Gan F, Du Y, Yao Y (2020). Salivary Glands: Potential Reservoirs for COVID-19 Asymptomatic Infection. *J Dent Res*; 99. 002203452091851. [10.1177/0022034520918518](https://doi.org/10.1177/0022034520918518).
- Yoon JG, Yoo J, Song JY, et al (2020). Clinical Significance of a High SARS-CoV-2 Viral Load in the Saliva. *J Korean Med Sci*; 35(20): e195.
- Zhang B et al (2020). Clinical characteristics of 82 death cases with COVID-19. Preprint at medRxiv [doi.org/10.1101/2020.02.26.2002819](https://doi.org/10.1101/2020.02.26.2002819)