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WHO/MOHFW- Guidelines to practice prosthodontics and implant procedures during COVID-19 pandemic

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Abstract

The high infectivity rate of the COVID-19 virus and its variations has had a significant influence on dentists and dental treatment. Because of the proximity of the patient and the prevalence of aerosol-generating procedures, governments and health authorities have implemented rules and regulations for practising dentistry, specifically aerosol-generating procedures in prosthodontics, to protect dentists and patients from infection, cross-infection, and re-infection. The current article focused on the World Health Organization's (WHO) and Ministry of Health and Family Welfare's (MOHFW) recommendations and guidelines for practicing prosthodontics and dental implant operations during the COVID-19 pandemic.
Keywords: Cone-beam computed tomography (CBCT), Neohybrid, ProTaper Next, Remaining Dentin Thickness, TruNatomy.

1. Introduction

SARS-CoV-2, the virus that causes COVID-19, is spread between people in close contact with one another (within 6 feet). Transmission is mainly by respiratory droplets produced when an infected person coughs, sneezes, or talks. Oral fluids and aerosols exhibit a long incubation period of the virus and have proven to be high-risk causatives for the transmission of the virus. Dental healthcare has faced several clinical, psychological and financial repercussions due to the risk involved. The significant reasons for fear and dilemma in the minds of practitioners is due to asymptomatic carriers [1,2]. The use of rotary dental and surgical devices in dentistry, such as airotors, ultrasonic scalers and air-water syringes, produce a visible spray including water, saliva, blood, microorganisms (bacteria, virus, etc.) and other debris. Mucous membranes of the mouth and nose are protected from droplet spatter by a surgical mask, but they do not provide complete protection against the inhalation of infectious agents [3,4]. As a result, during pandemics, modifications to the prosthodontic and implant procedures, as well as pertinent guidelines, are critical [1,5,6]. World health organisation (WHO) and Ministry of Health and Family Welfare (MOHFW) Government of India have given recommendations for the practice of general dentistry and prosthodontics in Covid times to facilitate the governments, institutions and clinics to carry on service effectively and safely.

2. General Considerations [1,7]

2.1 Recommendations for clinic designing set-up

The clinical setup needs separate areas for sterilization rooms. The feasibility depends upon basic infrastructure, the total number of areas available, the number of health care workers, and the number of patients reporting per day. These protocols applied to both private and government clinics.

2.1.1 Zone A: Reception and waiting area [1,2]

The two procedures to be carried out in this zone include,
a) Temperature recording using a digital thermometer, b) Arterial oxygen saturation monitoring using a pulse oximeter.

Facilities like sensor taps and contactless sanitizer dispensers are mandatory. A triple-layer face mask, disposable shoe covers, head cap and gloves should be provided. A glass barrier can be installed between the patient and the staff to prevent the transmission of droplets. The patient should fill out the informed consent in the language of his or her preference. The patient should be asked to remove accessories like jewellery, watch etc., and thoroughly sanitize their hands. Physical distancing and digital payments are a few other recommendations.

2.1.2 Zone B: Screening Area [1,2]

Sterilized instruments are used for initial screening and diagnosis. During the early onset of the disease, a maximum viral load (2.35×10^9 copies per ml of sputum) is present in the upper respiratory tract. The oral preparation of Povidone-iodine for 15 seconds is used as a preprocedural mouth rinse, which completely deactivates the virus. Other chemical preparations that disrupt the viral lipid barrier

include ethanol, chlorhexidine, cetyl pyridinium chloride, and hydrogen peroxide. OPG and CBCT are favoured over intraoral radiographs when taking radiographs to avoid salivary contamination. Digital radiographs are recommended.

2.1.3 Zone C: Non-aerosol generating area [4]

Airoter handpieces and ultrasonic scalers uses minimized. Hand instruments such as spoon excavators and chemical based caries removal agents are preferred. Personal protective equipment (PPE) is effective in preventing the spread of infection. Protocols for donning and doffing should be followed (Tables 1 and 2). Digital workflow is recommended. Double-layer bags are used for COVID waste disposal. Yellow bins are used for PPE disposal and biomedical waste management should be done properly (Table 3).

2.1.4 Zone D: Aerosol generating area [2]

Aerosols are most commonly generated during the use of high-speed handpieces and even after the completion of the procedure remain suspended in the air for 30 minutes and can reach up to 2 feet from the dental chair. Minimize the use of ceiling fans and air conditioners. High volume evacuators and high-efficiency filters (HEPA Filters) are used to filter the contaminated room air. In order to avoid direct contact with the splatter 8'o clock chair position should be avoided. Rubber dams, slow speed anti retraction handpiece and high-volume suction are preferred over chair side suction. 70% of airborne particles are minimized by using a rubber dam during procedures. 99.97% of the dust and other airborne particles are filtered using HEPA filters. Usage of an appropriate mask is mandatory. The Dos and DONTs of wearing the mask are tabulated in Table: 4.

3. Teledentistry/Tele Consultation/ Videoconferencing [5,7]

They are indicated during pandemic times in situations of lockdown for a remote dental screening, making the diagnosis, providing consultation and postponing treatment plans and prescribing medicines.

Table 1. Donning PPE: Step by step procedure [5,7]

Step 1	Put on scrubs
Step 2	Put on shoe covers/trauma boots as indicated
Step 3	Perform hand hygiene
Step 4	Put on N95
Step 5	Put on inner cap
Step 6	Put on surgical mask
Step 7	Put on goggles
Step 8	Put on outer cap
Step 9	Again, perform hand hygiene
Step 10	Put on gown
Step 11	Put on surgical gloves
Step 12	Put on double surgical gloves

Table 2. Doffing PPE: Step by step procedure [5,7]

Step 1	Remove gown and gloves, blending forward.
Step 2	Have gloves removed as one unit with gown. Do not touch outside of gloves with bare hands.
Step 3	Perform hand hygiene.
Step 4	Put on exam gloves.
Step 5	Remove outer cap, bending forward.
Step 6	Remove shoe covers/trauma boots.
Step 7	Remove gloves.
Step 8	Perform hand hygiene.
Step 9	Put on new gloves.
Step 10	Bending forward, remove goggles, surgical mask and cap.
Step 11	Remove N95.
Step 12	Perform hand hygiene and put on new mask and cap.

Table 3. Color coding for segregation of biomedical waste (1998) [2,8]

COLOR	WASTE	TREATMENT
Yellow	Human and animal anatomical waste/ microbiology waste and soiled cotton/ dressings/ linen/ bedding etc.	Incineration/deep burial
Red	Tubing, catheters, Intravenous sets	Autoclave/microwaving/ chemical treatment
Blue/white	Waste sharps (needles, syringes, scalpels, blades etc.)	Autoclave /microwaving/chemical treatment /destruction /shredding
Black	Discarded medicine /cytotoxic drugs, incineration ash, chemical waste.	Disposable in land fields

4. Disinfection protocols for dental clinics and laboratories [1,6,7] (Table: 5)

The clinics and laboratory should be disinfected. Cross infection and transmission should be prevented. The recommended solutions for surface disinfection are sodium hypochlorite solution, ethanol and vaporizer hydrogen. Terminal disinfection for dental clinic and laboratories: UV-C (germicidal effect, wavelength=200-280nm). Biomedical waste management should be done in an appropriate manner as described in Table 3.

4.1 Fumigation versus fogging [1,4]

The two methods which are used for disinfection of clinics and laboratories are fumigation and fogging. Fumigation - formaldehyde solution mixed with potassium permanganate in a fixed proportion is used in fumigation, which is very effective in killing bacteria, fungus and their spores. Fumigation is effective at above the temperature of 20°C and relative humidity of 65%. Step:1 Preparation: Thoroughly clean windows, doors, floors, walls, surgical table, dental

chair, and all washable equipment with soap water. Close windows and ventilators tightly in order to avoid the leak of fumes. Switch off all lights, AC and other electrical and electronic al items. Calculate the required amount of formaldehyde for available space. Step 2: Precaution: formaldehyde is irritant to the eye and nose, and it has also been recognised as a potential Carcinogen. So, the Fumigating person must be provided with personal protective equipment. Paste a warning notice on the front of the door indicating fumigation is in progress. Step 3: Fumigation: For every 1000 cubic feet, 500ml of formaldehyde (40%solution) is added in 1000ml of distilled water in an electric boiler. Switch on the boiler, leave the room and seal the door. After 45 minutes, switch off the boiler without entering the room. Step 4: Neutralisation: the toxicity of formaldehyde vapours should be neutralised by ammonia solution.

Fogging: The mixture of hydrogen peroxide and silver ion solution or third Generation quaternary ammonium compounds are used in fogging. They are effective against viruses and other biological agents in the air and on surfaces. Forty-five minutes are required for these non-touch surface disinfections. Circulation of clean and natural air is recommended for these procedures.

5. Prosthodontic considerations during COVID-19 era

5.1 MOHFW recommendations [1, 5-7]

All elective procedures are indefinitely postponed. Based on the risk profile the districts in India are classified as green, red and orange zones. Green Zone is zero confirmed cases or no confirmed cases for the past 21 days. Red zones or hotspots are districts with increased active cases, a faster doubling rate. Orange zone is districts, which fall between the green and red zones. Emergency procedures alone are managed in red zones. In orange and green zone surgery procedures can be done. All routine and elective procedures should be deferred for a later review until new policy /guidelines are issued. Due to the high risk associated with the examination of the oral cavity screening program should be deferred until new policy/guidelines are issued.

5.2 List of emergency and urgent dental procedures to be carried out

- Mobile/Faulty Prosthesis.
- Fixed faulty prosthesis.
- Infections around prosthesis.
- Periimplantitis.
- Sensitive/caries of abutment underneath fixed prosthesis.
- Fabrication of surgical and interim obturators.
- Dislodged prosthesis needing recementation.

5.3 Recommendations for removable prosthodontics [6-8]

Complete and partial dentures fabrication can be done in removable prosthodontics. Increasing covid – 19 mortality rate and co-morbidities are risk factors for geriatric patients. For geriatric patients thorough medical case history is a must before starting any procedure involving removable prosthodontics.

Table 4. Do's and Don'ts of wearing a medical mask safely [9]

Do's.	Don'ts
Wash your hands before touching the mask.	Do not wear a loose mask
Inspect the mask for tears or holes.	Do not touch the front of the mask
Find the top side, where the metal piece or stiff edge is.	Do not use a ripped or damp mask
Ensure the colored side faces outwards.	Do not wear the mask only over the mouth or nose
Place the metal piece or stiff edge over your nose	Do not remove the mask to talk to someone or do other things that would require touching the mask
Cover your mouth, nose, and chin.	Do not leave your used mask within the reach of others
Adjust the mask to your face without leaving gaps on sides	Do not re-use the mask
Avoid touching the mask.	
Remove the mask from behind the ears or head.	
Keep the mask away from you and surfaces while removing it.	
Discard the mask immedia-tely after use preferably into a closed bin.	
Wash your hands after discarding the mask	

Table 5. Disinfection of various materials and equipment in a dental setting [1,5,6]

Materials	Method and material of disinfection
Alginate and polyether	0.5-1% Sodium hypochlorite (1:10 dilution) or 1:213 iodophors (spray)
Zinc Oxide Eugenol impression paste	2% Glutaraldehyde or 1:213 iodophors: immersion for 10 minutes.
Impression compound	Sodium hypochlorite (1:10 dilution) (immersion)
Elastomers	2% Glutaraldehyde or cidex
Wax rims	Iodophors disinfection sprays
Acrylic appliance	Povidone-iodine/1% Sodium hypochlorite, store in mouth wash before use
Fixed prosthesis	immersion in cidex, or 1% Sodium hypochlorite
Gypsum casts	Microwave irradiation for 5 min at 100 W
Tips of intra oral scanners	Rubbing with alcohol-based disinfectant

5.3.1 Chairside protocol

a. Advise topical analgesic and antiseptic gels for ulceration and mucosal erosion through teleconsultation.
b. The patient should be asked to discontinue the prosthesis for some time in case of any irritation.
c. Before repairing the fractured prosthesis, first, disinfect it thoroughly.
d. A low-speed micro motor should be used for denture adjustment.
e. Snap impression should be done followed by disinfection using glutaraldehyde.
f. Modification of final impression for complete dentures with a single step border moulding technique.
g. Virtual face bow records and jaw relation records can be made.
h. Digital workflow for a precise prosthesis can be adopted.
i. For interim or cast partial denture prosthesis fabrication, CAD/CAM systems, which are precise and require lesser chair side adjustments can be used.

5.3.2 Laboratory protocol for Removable Prosthodontics

Record bases and wax rims should be adjusted before inserting them into the patient mouth. To adjust the occlusion, dentures should be remounted, and processing errors should be minimized. This will reduce the chairside time.

5.4 Recommendations for fixed prosthodontics [9,10]

In fixed prosthodontics crowns and bridges, inlays, onlays, smile designing, veneers, full mouth rehabilitation, post and cores are fabricated. Strict precautions and disinfection protocols are mandatory because these are elective and aerosol-generating procedures. Safe alternative methods such as digital impressions using intraoral scanners could be used. Digital workflow is preferred over conventional workflow.

5.4.1 Chairside protocol

During tooth preparation, the use of a rubber dam and high vacuum suction are recommended. Here supra gingiva margins are recommended. Undercuts, under reduction, should be avoided. A digital spectrophotometer is used for shade selection and consent of the patient should be taken. Crown removers for the removal of the fractured and faulty prosthesis. Frequent rinsing and spitting should be minimized. In 3-way syringes, air pressure should be reduced. 11 – 12 o'clock is recommended chair position to reduce contamination.

5.4.2 Laboratory protocol

Cross-contamination between clinic and lab is most commonly due to impressions. Impressions should be disinfected with sodium hypochlorite 1% for 10 mins and stored in disposable pouches. Computed aided designed and milled restorations should be preferred to avoid contamination. Conventional casting should be avoided during the pandemic time. The prosthesis should be immersed in disinfectant before sending it back to the clinic and before inserting it into the patient mouth.

5.5 Recommendations for implant surgery and prosthesis [6,7]

5.5.1 Chairside protocol

Slow Speed drilling with sharp drills is preferable. Intermittent external irrigation along with high volume suction should be done. The use of ultrasonic devices and piezoelectric surgery should be minimized, whereas the use of osteotomes should be encouraged in order to minimize aerosol formation. Avoid complex full mouth procedures. The digital impression is an alternative to conventional impression making.

5.5.2 Laboratory protocol

Implant impressions and components need to be carefully disinfected/autoclaved before reusing them. Careful impressions making using resin jig and precise pouring of the impressions are a must in order to prevent the repetition of any chairside step.

6. Intraoral and extraoral maxillofacial prosthesis

Fabrication of surgical and interim obturators must be done at this time to restore the function of patients with intraoral defects. Facial defects may act as esthetic urgencies. Additionally, psychological counselling and motivation for the maintenance of the prosthesis can be done through Tele dentistry.

7. Conclusion

In this COVID-19 pandemic, the mental health of the dentist and the dental health of the patient are in question. Care should be taken at every step namely, a collection of the dental impression, pouring of the models, designing and fabrication of prosthesis, finishing and polishing. Disinfection protocols should be followed to prevent the further spread of infection.

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