



Review Article

Dental setup in the covid-ified era – A review

Nikhil Asok^{1,*}, Vipul Srivastava², Ragni Tandon¹, Shally Mahajan¹, Sonal¹, Jasmine Kaur³

¹Dept. of Orthodontics and Dentofacial Orthopedics, Saraswati Dental College, Lucknow, Uttar Pradesh, India

²Dept. of Conservative Dentistry and Endodontics, Saraswati Dental College, Lucknow, Uttar Pradesh, India

³2 Pearls Multispeciality Dental Clinic, Lucknow, Uttar Pradesh, India



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ABSTRACT

Introduction: The infectious agent of this viral pneumonia happening in Wuhan was finally identified as a novel coronavirus (2019-nCoV), the 7th member of the family of coronaviruses that infect humans widely known as Covid-19. The common transmission routes of novel coronavirus include direct transmission like cough, sneeze, and droplet inhalation transmission and contact transmission contact with oral, nasal, and eye mucous membranes. Live viruses (COVID-19) were isolated from the saliva. Hence, healthcare workers particularly the dental professionals are at more risk.

Objective: An overview of how-to setup the dental office so as to minimize the risk of transmission while simultaneously carrying out the necessary treatment procedures.

Conclusion: A proper management and setup of the dental office and treatment planning along with strict categorisation of patients is necessary for a successful and safe practice during Covid times.

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1. Introduction

“The measure of intelligence is the ability to change”- this famous quote by Albert Einstein is the rule for the present era. With the emergence of the COVID-19, dentists face a herculean task of upgrading their dental office by means of incorporating a wide range of measures to enhance the hygiene of the dental office, thereby creating a better clean and safe environment for dental practice. Coronaviruses belong to the family of Coronaviridae, of the order Nidovirales, comprising large, single, plus-stranded RNA as their genome. Coronaviruses have traditionally been associated with mild upper respiratory tract infections throughout the world. In the fall of 2002, a new coronavirus emerged in in Asia causing severe viral pneumonia, i.e., severe acute respiratory syndrome (SARS).¹ Middle East respiratory syndrome (MERS) is a new human disease first reported from Saudi Arabia in September, 2012,

after identification of a novel coronavirus (CoV) from a male Saudi Arabian patient who died from severe respiratory illness. The virus was designated MERS-CoV.² Last year, in late December a pneumonia outbreak emerged in the city of Wuhan, China which spread very rapidly through the city following which WHO declared a public emergency worldwide on January 30, 2020. The typical clinical symptoms of the patients who suffered from the novel viral pneumonia were fever, cough, and myalgia or fatigue with abnormal chest CT, and the less common symptoms were sputum production, headache, hemoptysis, and diarrhea.³ The infectious agent of this viral pneumonia happening in Wuhan was finally identified as a novel coronavirus (2019-nCoV), the 7th member of the family of coronaviruses that infect humans.⁴ On 11th February 2020, WHO named the novel viral pneumonia as “Corona Virus Disease (COVID19)”, while the international Committee on Taxonomy of Viruses (ICTV) suggested this novel coronavirus name as “SARSCoV- 2” relating to the phylogenetic and taxonomic analysis of this novel

* Corresponding author.

E-mail address: nikhilasok@gmail.com (N. Asok).

coronavirus.⁵

2. Mode of Transmission

The common transmission routes of novel coronavirus include direct transmission like cough, sneeze, and droplet inhalation transmission and contact transmission contact with oral, nasal, and eye mucous membranes.⁶ In addition, studies have shown that respiratory viruses can be transmitted from person to person through direct or indirect contact, or through coarse or small droplets, and 2019-nCoV can also be transmitted directly or indirectly through saliva. Notably, a report of one case of 2019-nCoV infection in Germany indicates that transmission of the virus may also occur through contact with asymptomatic patients.⁷

It has been reported by King et al. that after ultrasonic scaling, bacteria could be recovered 6 inches from the mouth of the patient and that the number of colony forming units was significantly reduced when an aerosol reduction device was used during scaling.⁸ Live viruses (COVID-19) were isolated from the saliva.⁹ Hence, healthcare workers particularly the dental professionals are at more risk. Considering that numerous kinds of dental equipments that are used in the clinical practice in the form of handpieces, air-water syringes and ultrasonic scalers considerable amounts of aerosols are produced. Hence, the potential for the spread of infections from patients to dentists or dental assistants is high.¹⁰

Consequently, the air in dental clinics is likely to be contaminated with several microorganisms to which workers are potentially exposed. Because of the high concentration of bacteria in the oral cavity (nearly of 1.0 E+07–1.0 E+08 colony forming units (CFU)/mL of saliva) and due to concerns of cross contamination between dentists and patients, oral bacteria have been identified as components of dental bioaerosols.¹¹

3. Setup of Dental Office

Patient awareness, education and co-operation play a major role in effective implementation of any control measures in a dental clinic. Hence in the wake of the Covid-19 pandemic, the role of the front office and the reception staff assumes a very significant place and forms the first line of defence. This is also the stage where the patient screening is done.

3.1. Note on appointment and scheduling of patients

Patient should be instructed to take an appointment over the phone, if possible, through video calling, which helps in tele-screening. Patients shall be advised to install the “Aarogya Setu” app in their phones to track their contact history with Covid positive individuals. People who have a travel history or relevant respiratory symptoms should be urged to stay at home and do tele-consultation till the stipulated period or symptoms subside. Similarly,

tele-consultations should be done for elderly people and vulnerable group. There should be a policy for walk-in patients in case of an emergency, based on the needs and capabilities of the clinic. There should be a minimum of 15 minutes scheduled between appointments to allow proper disinfection measures. Patients should be requested to wait in their vehicles or any appropriate area for observing social distancing norms in case they arrive early.

3.2. Immunisation to the personnel

Ideally every clinical staff should be adequately immunised. The vaccines recommended are BCG, DT, HBV.

3.3. Front – room setup

3.3.1. Role of reception staff

1. The front office/reception staff should be well trained by the management and made aware of the Covid-19 precautionary measures.
2. The front office staff should always wear 3-ply masks, gloves, when they are in the reception area.
3. Should wear separate foot wear inside the clinic. It is recommended to sprinkle 1% Bleaching solution on the floor mat / carpet or spread a cloth soaked in 1% bleaching solution to disinfect the feet of patients.
4. Should instruct the patients and bystanders to wash their hands with soap and water for 20secs before being seated in the clinic.
5. Should check the temperature of patients using a non-contact infrared scanner thermometer. Treatment for a patient with a measured temperature $\geq 38\text{ C}^\circ$ (100.4° F) should be deferred.
6. They should open the doors for the patients to enter the operatory to minimise contamination.
7. Importance of hand hygiene, social distancing, unnecessarily touching MEN (mouth, eyes, nose) or the T-zone on the face, spitting and putting fingers inside the mouth.
8. Should categorize the patients after having proper communication with the patient. (Figure 2)

3.3.2. Waiting area setup

1. A hand wash facility conveniently placed outside the clinic for the patients as soon as they arrive. A poster depicting the WHO recommended hand wash techniques to be displayed in the wash area.
2. Provide Hand sanitisers in the waiting area.
3. Remove all articles like newspapers, magazines, print material, flower vases, showcase artefacts, toys, carpets etc from the waiting area to reduce areas that are not amenable for disinfection.
4. The seating pattern in the waiting area should be arranged in a manner to ensure physical distancing.

ADVISED TREATMENT MODALITIES SUGGESTED FOR DIFFERENT PRACTICE LEVELS					
LEVEL	TREATMENT MODALITIES				
Level 1	<ul style="list-style-type: none"> No practice restrictions. Follow the standard / universal precautions. 				
Level 2	<ul style="list-style-type: none"> Do screening and patient triage. Use all standard and transmission based precautions. Do aerosol work with all precautions mentioned and exercising professional judgement. 				
Level 3	<ul style="list-style-type: none"> Do Screening and Patient triage. Only Emergency Dental care allowed. Follow all standard and transmission based precautions. 				
Level 4	<ul style="list-style-type: none"> Do Screening and Patient triage. Restrict practice to telephone consultation. Do emergency care only if it's absolutely inevitable Use all standard and transmission based precautions. 				

RECOMMENDED LEVELS OF PRACTICE BASED ON GOVERNMENT CLASSIFIED COVID ZONES					
LEVEL	COVID FREE Declared	GREEN ZONE	ORANGE ZONE	RED ZONE	GENERAL INSTRUCTION
Level 1	✓	✗	✗	✗	wherever and whenever a government advisory exist limiting the practice to emergency or essential procedures the level of practice is Level 3 or 4.
Level 2	-	✓	✗	✗	
Level 3	-	✓	✓	✗	
Level 4	-	✓	✓	✓	
✓ conforms to the level of practice ✗ does not conform to the level of Practice					

Fig. 1: Treatment protocols during the pandemic

- The waiting area should be mopped and disinfected, every two hours, using 1% NaOCl solution.
- Audio/visual alerts can also be used in addition to educate and motivate the patients.

3.4. Consultation room setup

- Restrict entry of bystanders and clinical staff into this area during procedures.
- Keep separate dental chairs or cubicles for examination/minimally invasive procedures and for aerosol generating procedures.
- Disposable bins should be placed within this area so that contaminated waste can be sorted in this same area.
- Keep an alcohol-based sanitizer (>70%) on the side of the dental chair. Soap/Hypochlorite solution should be placed within the area for immediate immersion of instruments post use.
- A minimum of 6 ft distance around the dental chair where aerosol generating procedures are done should be designated as a red (danger) zone. The red zone (danger) area should be cleaned, wet mopped and meticulously disinfected using 1% NaOCl solution after every procedure

- Use of air-conditioners is not recommended and natural ventilation to be promoted during aerosol generating procedures.
- If Air conditioners are used air purifiers with High Efficiency Particulate Air (HEPA) filters and other purifying systems are recommended.
- Position of dentist at 11 o' clock or 12 o'clock and never at an 8 o' clock position to minimise direct contamination and avoid splatter trajectory.
- Time gap of minimum 55 minutes should be kept between appointments.
- Waiting period of 20 minutes post procedure for aerosol to settle.
- Proper cleaning and disinfection of the red zone and the machineries (approx. 10 mins).
- Proper sterilization of instruments (approx. 20 mins)
- Simultaneous fumigation with silver nitrate and hydrogen peroxide. Fumigating time is 15 min, after fogging we can use the room within 15 min.
- Proper management of PPE equipment (approx. 5 mins).

3.5. Personal protective equipment (Figure 3)

- 3-ply masks and a pair of gloves should be worn by dental practitioners always inside the clinic.

CATEGORY	HISTORY	RESPONSE
CATEGORY 1	Patients who are Covid-19 positive.	Should be referred for treatment to an appropriate facility and report to the health dept or contact Disha at 1056.
CATEGORY 2	Patients who have a positive recent travel history or contact with anyone who has come from abroad.	Should be deferred for treatment for 14 days and if warranted, report to the health dept or contact Disha at 1056. Emergency medication can be given with adequate PPE. For eg. N95 masks.
CATEGORY 3	Patients who have recovered from Covid-19 infection or completed quarantine.	Should be asked to submit their medical records and make sure they have completed their 14-day post covid treatment isolation. If so, can be taken up for treatment.
CATEGORY 4	Patients who have answered negative to the relevant questions but show related respiratory symptoms.	Should be given an appointment after 14 days. Emergency medication can be given with adequate PPE, eg. N95 masks.
CATEGORY 5	Patients who have answered negative and have no related respiratory symptoms	Can be taken up for treatment.

Fig. 2: Categorization of the patients

2. N95 masks, head cap, goggles or face-shield, have to be worn by practitioners while doing procedures.
3. A surgical glove worn above the examination gloves is advisable (Double gloves).
4. A gown with long sleeves, Fluid resistant material (Ideally of 70 gsm or above).
5. If reusable, the material should be certified by a recognised body like South India Textile Research Association (SITRA), Defence Research and Development Organization (DRDO) as recommended by Government of India to ensure that the barrier properties are retained even after wash/disinfection) is recommended for additional protection.

3 Tests to check the quality of 3 ply-masks before purchasing – this is necessary because of the duplicate products that are released over this period of time.

3.5.1. Visual test (Figure 4)

1. Cut open the mask and you should see a very obvious 3-layers.
2. Translucent piece (top), White piece (middle), and the coloured piece (Green, Blue, or even White).

3.5.2. Water test

1. The outer layer is designed to be waterproof.
2. Fold the mask such that the outer side forms a funnel and pour some water into it. The mask should be holding up the water properly.

3.5.3. Fire test

1. The middle layer is a filter, not a piece of paper. Therefore, if you were to light it with a flame, it WILL NOT catch fire.

3.6. Sequence of wearing PPE – Centre of Disease Control Guidelines (Figure 5)

3.6.1. Gown

1. Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back.
2. Fasten in back of neck and waist.

3.6.2. Mask or respirator

1. Secure ties or elastic bands at middle of head and neck.
2. Fit flexible band to nose bridge.
3. Fit snug to face and below chin.
4. Fit-check respirator.



Fig. 3: PPE



Fig. 4: Layers of 3-ply mask

Table 1: WHO Classification of health care waste¹²

Waste categories	Description
Infectious waste	Waste suspected to contain pathogens; e.g., laboratory cultures, tissues, swabs, materials or equipment that have been in contact with infected patients, excreta, etc
Pathological waste	Human tissues or fluids; e.g., body parts, blood and other body fluids, fetuses, etc
Sharps	Sharp waste; e.g., needles, scalpels, blades, knives, infusion sets, broken glass
Pharmaceutical waste	Waste containing pharmaceuticals; e.g., pharmaceuticals that are expired or no longer needed, items contaminated by or containing pharmaceuticals (bottles, boxes)
Genotoxic waste	Waste containing substances with genotoxic properties; e.g., cytotoxic drugs (cancer drugs), genotoxic chemicals
Chemical Waste	Waste containing chemical substances; e.g., laboratory reagents, film developer, fixer, disinfectants that are expired or no longer needed, solvents
Wastes with high content of heavy metals	Batteries, broken thermometers, blood pressure gauges, etc
Pressurized containers	Gas cylinders, gas cartridges, aerosol Cans
Radioactive Waste	Waste containing radioactive substances; e.g., unused liquids from radiotherapy or laboratory research, contaminated glassware, packages or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides, sealed sources

Table 2: The proposed simplified biomedical waste segregation scheme for dental clinics¹³

Red bag	Yellow bag	Blue bag	Black carboy
Disposable injection syringes, IV set without needle	Anything contaminated by blood or body fluids	Glass bottles	Used or unused sharps
Saline bottles	Body parts	Broken bottles	Needles without syringes
Plastic suction tips	Any item which have been in contact with the patient	Discarded medicines	Scalpel blades
Toothbrushes, denture brushes	Bandages, cotton	Antiseptics, disinfectants (not contaminated by body fluids)	Metal objects
Disposable plastic/fiber instruments	Teeth (with/without fillings but without amalgam fillings)	Used or unused drug vials	Metal matrix bands
Plastic/rubber tubes	Dressings and swabs	Cartridges and ampoules	Broken metal instrument tips
Rubber lids of any vial	Disposables such as gloves, aprons, masks, drapes, contaminated wipes, throat packs		Burs
Used plastic drapes	Discarded crowns, bridges and cast partial dentures		Endodontic files, broaches, reamers, spreaders, silver points
	Waxes, gutta purcha points, absorbent points		Orthodontic metal brackets, wires, bands
	Disposable impression trays with impression material		Suture needles
	Acrylic partial dentures, complete dentures, denture teeth		Broken/discarded ultrasonic tips
	Plaster/ stone casts		Metallic bars, clasps from partial dentures
	Cheek retractors, tongue depressors, wedges		Metal lids of vials
	Rubber dam material		All metallic dental implants related material
	Plastic X-ray pouches (outer covering)		
	Catheters (after draining)		
	Unwanted laboratory specimens		
	Suture materials without needle		

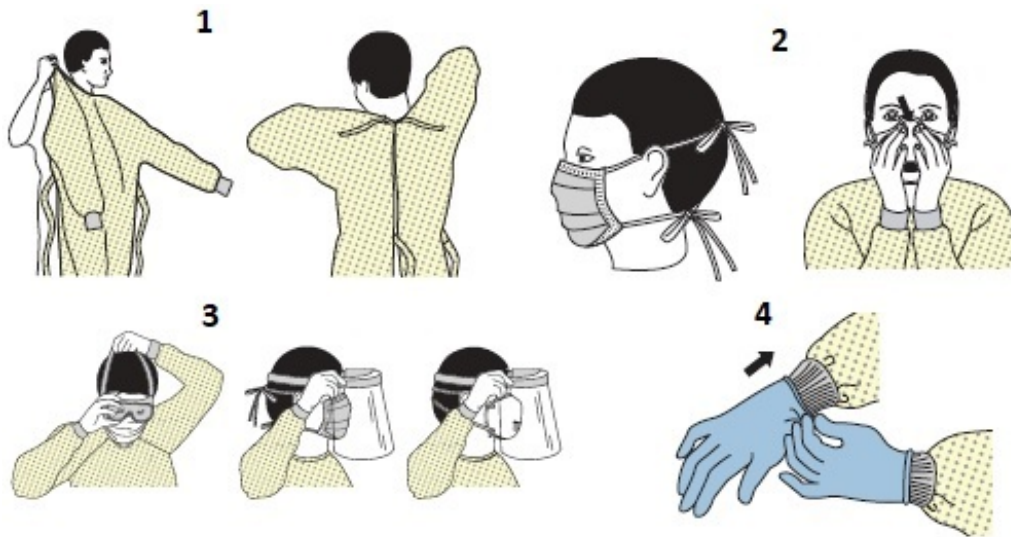


Fig. 5: Sequence of wearing PPE

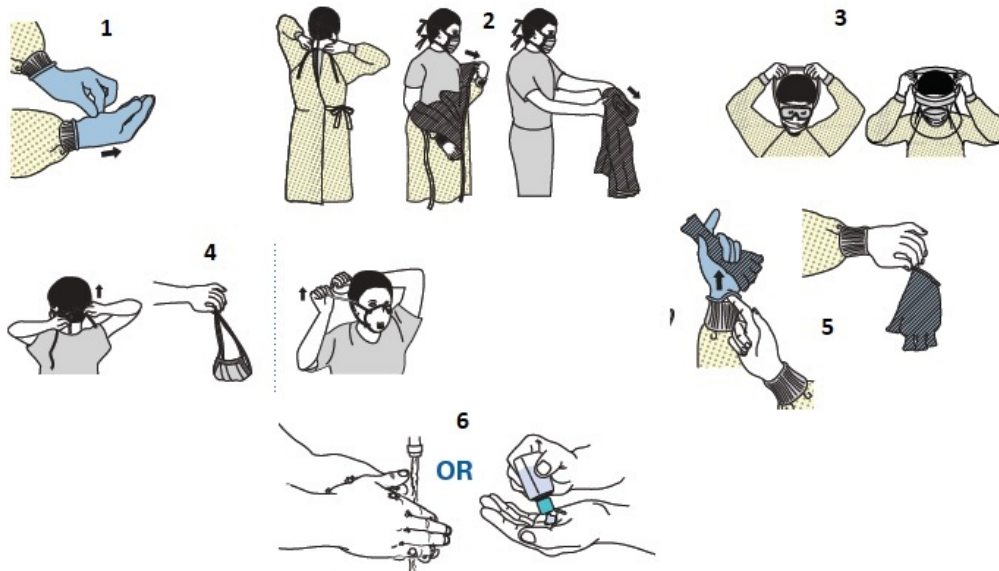


Fig. 6: Sequence of removing PPE

3.6.3. Goggles or face shield

3.6.4. Gloves

Sequence of removal of PPE – Centre of Disease Control Guidelines (Figure 6)

1. Outer Gloves (assume outside of glove is contaminated).
2. Gown (assume gown/apron front and sleeves are contaminated).
3. Goggles or face shield (assume outside is contaminated).
4. Mask (assume front is contaminated).
5. Remove the inner gloves.

6. Perform hand hygiene.

4. Waste Management

As directed by Central Pollution Control Board (CPCB), the guidelines for PPE are as follows

1. Goggles, face-shield, splash proof apron, plastic coverall, hazmat suit, nitrile gloves – RED BAG.
2. Masks (including triple layer mask, N95 mask, etc.), head cover/cap, shoe-cover, disposable linen gown, non-plastic or semi-plastic coverall – YELLOW BAG.

Summarisation of waste management in 2 tables.

5. Conclusion

The working area of a dentist, the dental office, is different from other health professionals in that there is a closer doctor patient interaction and the chances of infection spread is high. In these dark times, especially with every patient being a potential carrier for the novel coronavirus, proper precautions if not taken can result in cross contamination. So a proper maintenance of hygiene, a strict protocol along with great caution is the way to go forward in this profession.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Author biography

Nikhil Asok PG Student

Vipul Srivastava Professor

Ragni Tandon Professor and Head

Shally Mahajan Professor

Sonal Post Graduate Student

Jasmine Kaur Private Practitioner

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