

**Safety Standards: As We Reconsider Dentistry during Covid-19**

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**Abstract**

Dentistry is facing its catastrophic yet, with the growth and spread of the Coronavirus pandemic. Dental surgeons are at the high risk of exposure, alongside paramedics, nurses, and other healthcare workers. Dental clinics across the country had been shut for over 3 months. Because social distancing protocol is still impossible to follow & also due to various aerosol procedures.

The COVID-19 situation has led to only emergency care, as per the government’s advice. Urgent care is being offered at dedicated centers to which it has delegated such facilities, due to which both patients and dentists are suffering.

With no way to predict when Normalcy will be restored. However, drastic changes are bound to occur once patient

treatment recommences. So futuristic dentistry will be bent more towards role of robotics & dental digital technology platform for some selective procedures.

**Keywords:** COVID-19, Dentistry, Protocols, Safety.

**Introduction**

The highest risk of viral spread is during any procedure in which upper respiratory aerosols are generated. In such a setting, it is mandatory that all workers involved in such procedures are adequately protected with PPE & other safety protocols.

Further recommendations have been made on urgent dental care which includes many high-risk Aerosol Generating Procedures (AGPs) with the small size of the virus particles, at an average of 0.125 microns. This is the

primary obstacle to the resumption of routine dental practice.

Some steps that will be inevitable before this happens include widespread testing of dentists, clinical staff, and patients, unless an effective mass vaccine is available before that time, or unless effective ways to suppress or shield workers from aerosols.

Many people predict that routine dental practice will probably not return to 'Normal,' in terms of the pre-COVID-19 levels, at least until 2021 has passed.

Orthodontic treatment procedures has come to halt as it has been advised that no consultation should be done by going to others clinic owing to travel risk, sterilization variability which may lead to cross contamination. Most of Orthodontic practice fall under moderate risk category and due to covid-19, every month follow up of patient which is necessary in orthodontics is impossible since last few months. The AAO (American Association of Orthodontists) recommends that its members adhere to all emergency orthodontic care as that will relieve pain and/or infection, trauma-related, and critically necessary to prevent harm to the patient.

## **METHODS**

Mitigation will play a key role in enabling recovery of the dental sector. The physical risk due to AGPs can be reduced by using PPE, sophisticated air filtration and decontamination systems, high-speed air evacuation systems, and disinfection/antimicrobial procedures equipment for DHSP and patients.

This will have a heavy impact on current dentistry models. Not only will there be a need to invest in new air-cleaning and disinfection technologies, but new ways to avoid invasive treatments may be the focus of attention. The greatest challenge will be with respect to invasive and AGPs and the provision of dental implants.

The following protocols must be followed for both dentist and patient safety:

Pre procedural mouth rinses (PPMR)

- There is no published evidence regarding the clinical effectiveness of PPMRs to reduce SARS-CoV-2 viral loads or to prevent transmission. PPMRs with an antimicrobial product (chlorhexidine gluconate, essential oils, povidone-iodine or cetylpyridinium chloride) may reduce the level of oral microorganisms in aerosols and spatter generated during dental procedures.

### **Patient placement**

- Ideally, dental treatment should be provided in individual patient rooms whenever possible.
- For dental facilities with open floor plans, to prevent the spread of pathogens there should be at least 6 feet of space & physical barriers between patient chairs. Easy-to-clean floor-to-ceiling barriers will enhance effectiveness of portable HEPA air filtration systems (check to make sure that extending barriers to the ceiling will not interfere with fire sprinkler systems).

### **Patient volume**

Ensure to account for the time required to clean and disinfect operatories between patients when calculating your daily patient volume.

Minimum waiting time or give prior appointment or tell patient to wait outside only and come inside when called or prior patient leaves. Sometimes, whenever needed on call consultation for non-emergency dental procedures can be given.

### **For Patient**

Mobile and keys should be kept in polythene and in separate designated area,

Patient must have Arogya Setu application in mobile, and fill pre treatment consent form for COVID-19 screening

After cleaning his/her hands with ABHR (Alcohol Based Hand Rub), patient must do pre procedural mouth rinses with 0.2 % povidone iodine.

**Ensure DHSP practice strict adherence to hand hygiene**

Before and after all patient contact, contact with potentially infectious material, and before putting on and after removing PPE, including gloves is important to remove any pathogens that might have been transferred to bare hands during the removal process.

Use ABHR with 70-95% alcohol or wash hands with soap and water for at least 60-80 seconds. If hands are visibly soiled, use soap and water before returning to ABHR.

Dental Health Service Provider must wear a surgical mask, eye protection (goggles, protective eyewear with solid side shields, or a full-face shield), a gown or protective clothing, and gloves during procedures likely to generate splashing or spattering of saliva and/or blood.

There are multiple sequences recommended for donning and doffing PPE. One suggested sequence by ICMR has to be followed.

Strict effective and efficient sterilization protocols must be followed for used instrument such as rapid cycle of autoclave for 3-6 min at 134°C , rapid cycle of hot air oven 190°C 6–12 min twice or thrice depending on critical, semi-critical or non-critical type of instruments.

Among the various technologies being considered,

ultraviolet light (UV-C) disinfection has gained favour due to its efficacy against a broad range of microbial and viral agents as the light destroys the molecular bonds that hold together the DNA of viruses and bacteria found in a variety of environments including dental office. UVtorch can sterilize 300 surfaces in 30 minutes. UV light kills bacteria regardless of drug resistance and without toxic chemicals.

**Discussion**

Due to lack of evidence based standard protocol, dental care provision has significantly decreased in several affected countries. In addition to ongoing affected populations suffering, this will also incense the burden on emergency departments which is already struggling with pandemic and already existing diseases. This lack of guidelines can also increase the nosocomial COVID-19 spread through dental health care facilities.

Dentist should not panic in this situation and Protocols must be followed for any dental screening or treatment as per WHO/DCI. As rightly said, we have to start practicing, living with this virus in routine. Pre-screening dental team must ensure that to maintain 6 feet distance. Ask for dental problem, classify as Emergency or Non-emergency, we can take help of telephonic consultation for few selected cases with due precautions. Below mentioned safety protocols must be followed:

Safety protocols

Risk Levels	Steps for Examinations	Equipment Required
<b>Low Risk</b> <b>(Level 1)</b> Pre-Dental Screening and chief Complaints Record Room Triage Area	<ul style="list-style-type: none"> <li>Maintain 6 feet distance, Ask for Covid 19 symptoms(History of fever, cold/cough, Shortness of breath, Runny Nose, Fatigue etc), Take previous travel history, In residential area</li> <li>Record of Body temperature by thermal scanner, SPO2 level <math>\geq 95</math></li> <li>Classify as Emergency or Non-emergency.</li> <li>Give medicines and recall the patient depends on procedure.</li> </ul>	Surgical Cap, Mask, Gloves Thermal scanner, Pulse oximeter, Alcohol Based Hand Rub
	<ul style="list-style-type: none"> <li>Maintain the OPD record, Patient contact details and address, Refer patient to COVID 19 OPD Hospital and record them if suspected.</li> </ul>	
	<ul style="list-style-type: none"> <li>If patient seeks any dental examination then detailed dental and medical history of the patient, Allow only patient with no accompanying person except for pediatric patient.</li> <li>Minimum exposure and avoid cross infections.</li> <li>Examine the patient to establish the diagnosis and Refer for required treatment based on priority to Aerosol /Non Aerosol Generation area</li> </ul>	Triple layer surgical mask/ N95 Face Shield and protective eyewear Surgical Gown Sterilization Facility BMW Disposal facility
<b>Moderate Risk</b> <b>(Level 2)</b> Non- Aerosol Generation Procedures	<ul style="list-style-type: none"> <li>Perform Dental Treatment with less contamination</li> <li>Use 0.2% povidine as a pre-procedural mouth rinse.</li> <li>Radiographs if required only OPG to avoid Salivary contamination</li> <li>Use hand instruments.</li> <li>Use of high-volume suction or saliva ejectors.</li> </ul>	Disposable Shoe covers Saliva Ejector Rubber Dam Sterilization facility BMW Disposal facility
<b>High Risk</b> <b>(Level 3)</b> Aerosol Generation Area	<ul style="list-style-type: none"> <li>Minimize the use of a 3-in-1 syringe</li> <li>Use of rubber dam</li> <li>Recall patient as per treatment need and priority</li> </ul>	

<p><b>General</b> Infection Control</p>	<ul style="list-style-type: none"> <li>• Patient who enters and exits the clinic should be provided hand sanitizers.</li> <li>• Patients should be scrubbed with Ethyl/ Iso Propyl Alcohol extra orally prior to any dental procedure</li> <li>• Scheduling and appoint the patients to avoid crowd</li> <li>• Use sterile instruments</li> <li>• Disinfect dental chair before and after procedure</li> <li>• The waiting room/clinic including the handles and doors as well as dental chairs and othersurfaces should be wiped several times in a day with alcohol based disinfectant.</li> <li>• Sanitize the area pre and post treatment with Standard infection protocol</li> <li>• Change of surgical gowns and PPE for each and every patients</li> <li>• Daily routine Check of staffs and Regular Fumigation of triage</li> <li>• Before and after clinic hours , 2 times in a day</li> </ul>	<p>ABHR PPE kit BMW waste disposal</p>
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Be it any specialty of dental patient, Triage method must be followed i.e. priority to emergency dental care.

**Emergency (E) VS Non-Emergency(NE) Dental Care**

Branches & Procedure	E	NE
Oral Medicine & Radiology		
-TMJ problem with symptoms, Any viral, fungal, bacterial lesions. Ulcers, Oral precancerous and malignant condition	✓	
-Extra oral radiograph as per need	✓	
Conservative Dentistry And Endodontics		
-Fillings/Restoration		✓
-Incipient Mild Decay		✓
-Moderate Decay	✓	
-Severe Decay	✓	
-Cosmetic Restoration		✓
-Pulp and periapical lesions	✓	
-Patient in pain with fracture tooth	✓	

-Fracture tooth without pain		✓
Oral Surgery		
Extraction		
-Active infection, Pain, Swelling	✓	
-Third molar with above symptoms	✓	
-Third molar without symptoms		✓
-Fracture, Orofacial Trauma	✓	
Orthodontics		
-New bandings, bonding		✓
-Patient complications (wire/ bracket fractures/ broken appliance)		
-Follow up of ongoing/ old case & Debonding	✓	
		✓
Periodontics		
Initial Therapy Srp Or Maintenance		
-Patient has additional risk factors (Diabetes, Cardiac disease or any systemic disease)	✓	
-Non-inflammatory, Non-infectious Planned Surgery		✓
Pediatrics		
-Restorative & Endodontic procedure, Extraction & Space maintainers	✓	
-Preventive & Interceptive orthodontics		✓
Prosthodontics		
-New RPD, FPD and Implants		✓
-Broken fixed/ removable prosthesis	✓	

The guidelines developed in this work are general guidelines and the final decision will always be provided through the practitioner's judgment. For instance, if the required treatment cannot be provided for the patient due to his/her category; the practitioner's judgment and evaluation of the case can provide for other alternative

methods of management. Otherwise, the treatment should be postponed and pharmacologic management of the pain and/or infection should be considered. Or else we can take help of already existing Robotics in different speciality of dentistry like:

Branches & Role Of Robotics
Endodontics
Endo Micro Robot: Sense accurate canal length and root apex, Vacuum attachments
Dental Nanorobots: Precise cavity preparation, Control tooth sensitivity
Oral Surgery
Surgical Robots: Local surgery, Telesurgery, Audiovisual telecommunication for telemedicine and teleconsultation
Prosthodontics

Sensor Equipped Implant Setup: Preoperative procedure-3 dimensional image of target area, Intraoperative procedure-3 dimensional orientation of position of surgical instrument

Tooth Arrangement Robots

Sobczak Concept with Straumann Pro Arch is a unique fully digital treatment protocol in rehabilitation of edentulous patient that form the healing period with temporary bridge, achieve optimal esthetics with proper tissue support and occlusal plane.

Orthodontics

Sure Smile Technology: Designed to reduce error in treatment resulting from appliance management.

Bending Art System(BAS): First developed robotic CAD /CAM system for fabrication of customized orthodontic archwires. Used for both labial and lingual orthodontic wires.

Orthorobot: Robots which places bracket on model with accuracy of 0.02mm

LAMDA (Lingual Archwire Manufacturing And Designing Aid)

### Limitation

There are many limitations:

- There are different guidelines by different organization, which to adhere is difficult,
- Expenditure of PPE, ABHR, soap etc increased, which lead to increased financial load on dentist and patient.
- Changing PPE after every patient generate lots of Biomedical waste and its disposal will be a burden

Not only these steps are costly and complex, making their implementation much more limited in scale and therefore reducing the number of compliant dental practices, but they increase the timeframe of treatment, and reduce the number of procedures that can be carried out every day.

### Conclusion

This is an undesirable situation, we have to survive with this and confront this pandemic condition with best possible efficient and cost effective alternatives for tackling dental/oral problems. Perform Dental Treatment with best possible less contamination. Dentistry must not be the victim and carrier for transmission/spread of pandemic COVID-19.

With the coming new technologies the future of dentistry can't be predicted and is uncertain and main concern would be its acceptance by the people and use of this technologies in our routine day to day practice.

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### List of Abbreviation

PPE	Personal Protective Equipment
AGPs	Aerosol Generating Procedures
DHSP	Dental Health Service Provider
PPMR	Pre Procedural Mouth Rinses
ABHR	Alcohol Based Hand Rub
ICMR	Indian Council Of Medical Research