

Dental Practice during COVID-19 Pandemic: An Observational Study

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ABSTRACT

Introduction: Occupational Safety and Health Administration (OSHA) classified health care professionals and exposure risk to Coronavirus, identifying Dental Professionals in very high risk group due to specificity of dental procedures and instrumentations used. As per guidelines from relevant bodies to provide only emergency and urgent dental treatment has led majority of dental practice to stop, instilling apprehension in profession and fear in public.

Aim: To narrate the experience from Department of Dentistry, on how to safely and effectively practice dentistry that would provide guidance to practicing dental professionals without major environment alteration and capital items requirement.

Materials and Methods: This was an observational study from Department of Dentistry from May to August 2020, attached to a rural tertiary care medical teaching institute, following customised protocol after reviewing available guidelines in relation to Coronavirus Disease-2019 (COVID-19) and dentistry. Data collection was done from Institutional Electronic Medical Record System for patients receiving dental treatment during the study period. It used descriptive narrative analysis to

provide chronology of experiences for practicing dentistry as per various unlock phases declared by Government of India.

Results: The Department of Dentistry was able to manage four Non-Aerosol Generating Procedures (Non-AGP), three Aerosol Generating Procedures (AGP) and eighteen Outdoor Patient Department (OPD) consultations on an average for a working day, from May to August 2020. During the tenure while providing dental care, none of the member of dental team was detected COVID positive. The result was achieved by simple alteration done by patient, man-power, practice and environment management.

Conclusion: A simple alteration in practice and practice area ensuring safety of all members of dental team was made by department. It included the effective use of Personal Protective Equipment (PPE) during all dental procedures including oral examination. Special emphasis on history of patients, facility and environment management along with regular training for hand hygiene, donning-doffing, aerosol appointment and practice was given. An attempt to provide prophylactic and elective dental need of patients were done and department was successfully able to treat seven patients per day on an average during May to August, 2020.

Keywords: Coronavirus disease-2019, Dentistry, Dental instruments, Personal protective equipment

INTRODUCTION

A novel human coronavirus from Wuhan province of China (CoV) lead to a recent pandemic [1], was declared by the World Health Organisation (WHO) an International Public Health Emergency on 30 January 2020. It was named "Coronavirus Disease (COVID-19)" by WHO and Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2) by the International Committee on Taxonomy of Viruses (ICTV) [2]. Dentistry is unique as far as health practice is concerned due to specificity of procedure involving close contact with patient's mouth for longer duration as well as armamentarium leading to aerosolisation. OSHA [3] identified four risk levels, from low to very high for various health workers placing occupation with a high potential for exposure during specific medical or laboratory procedures to known or suspected sources of COVID-19 in a very high-risk group and this includes the field of dentistry [3]. Various guidelines [4-8] advised dental professionals to address only urgent and emergent dental needs of patients and also recommended special equipments like High Efficiency Particulate Air (HEPA) filters, Ultraviolet (UV) light, etc., for dental clinics. Occupational hazards in dentistry (sharp instruments, diseases such as Human Immunodeficiency Virus (HIV), hepatitis B, etc.) is well known since many years; which can be tackled with proper knowledge and protection [9] and the same is relevant during the current pandemic. While there are guidelines on what and how to practice dentistry during COVID-19 pandemic, no study is available that projects the result after following these protocols. This article shares experience of Department of Dentistry providing guidance to the practicing dental professionals on how to safely and effectively practice and provide optimum dental care in current times.

MATERIALS AND METHODS

This was the cross-sectional observational study conducted in Department of Dentistry, Pramukh Swami Medical College, Karamsad Anand, Gujarat which was also a designated COVID centre. It has six dental chairs on a single floor and a single chair unit with separate arrangement and both are well ventilated. Dental team comprises of seven consultants, three paramedic staff, one staff nurse and one dental technician. A customised protocol after reviewing available guidelines in relation to COVID-19 and dentistry [4-8] was presented to Infection control committee of the Institute in April, 2020 by the Department. Lockdown was declared in India on 25th March, 2020. Unlock-1 guidelines were declared for public on 31st May, 2020 with consecutive unlocks with their specific guidelines declared every month thereafter. An attempt towards elective dental procedures (tooth preparation, restorations, implant dentistry, oral prophylaxis and curettage) after triaging patients is done. Approval for the same from Institutional Ethical Committee (IEC/HMPCMCE/2020/Ex.42/183/20) was taken. Data collection was done from Institutional Electronic Medical Record System for patients receiving dental treatment from May-August 2020.

Protocol

A. Pre-treatment preparation

1. Teledentistry was provided to patients with dental complaints through ED during lockdown period from last week of March and April [10,11]. A subsequent follow-up call was requested from patients after 48 hours and were called for oral examination if complains persisted. Patients in Outpatient Department (OPD) were managed first by consultation, self-help and advice which might include antimicrobials and analgesics [5,8].

2. Hydroxychloroquine (HCCQ) prophylaxis was provided for entire dental team. (consultants, dental technician, staff nurse and paramedics of department) [4].
3. Clarity to entire dental team regarding reporting to Flu clinic, if he/she experienced influenza like illness (ILI) was provided [5,7].
4. Personal Protective Equipment (PPE) inventory was managed by Staff Nurse of Dentistry department so that supplies were maintained [7].
5. Stationery and other objects like patient informative materials, appointment slips and post-procedure instructions from waiting area of OPD which could not be easily disinfected were removed [4,5,7,8].
6. Signage for instructing patients on standard recommendations for cough etiquette and social distancing in OPD as well as other strategic places in hospital were made available. Social distancing was followed by re-arranging sitting arrangement in waiting area for patients [4,7].
7. Upon patient's arrival, the body temperature of the patient was measured using Infrared thermometer [4,5].
8. Disposable mask and alcohol based hand rub was provided to patient before entering the operatory [4].
9. Patients were well informed not to bring companions to their appointment, except for category of patients requiring assistance [5,7].
10. A detailed questionnaire was filled from the patients who were given appointments for treatment: (a) Complaints like fever, cough, breathlessness, loss of smell or taste, headache, diarrhea, or sore throat within 14 days?; (b) Recent visit to containment zone declared by local body from time to time or have you come into contact with people belonging to such zone?; (c) Have you come into contact with a patient with confirmed or suspected SARS-CoV-2 infection within the past 14 days?; (d) Have you recently participated in any large gathering or meeting? [12].
11. Extraoral dental radiographs were preferred diagnostic radiographic alternative to intraoral radiography [5,7,8].
12. In order to minimise contact within patients in waiting area, appointments were scheduled for each patient [7].
13. Non-AGP was appointed altogether in morning sessions for a specific unit. AGP was practiced such that maximum work was done for a patient requiring multiple procedures in a single visit. This ensured productivity and effective use of PPE.
14. Manpower Management
 - (a) One supervising consultant inside operatory;
 - (b) One nursing staff outside the operatory;
 - (c) One dental assistant inside the operatory;
 - (d) One treating consultant.

B. During treatment

1. Standard Precautions were strictly followed:
 - a. Hand hygiene- Dental professionals and the dental assistants washed their hands before examining a patient, before performing any dental procedures, after touching the patient, after touching the surroundings and equipment without disinfection, and after touching the oral mucosa, blood, damaged skin, or wound [12] with soap solution or alcohol-based hand rubs with at least 60% ethanol or isopropanol [13].
 - b. Others- respiratory hygiene, sharp safety, safe injection practice, sterile instruments and disinfection of environmental surfaces were strictly followed [7].
2. Apart from that transmission based precautions, which were patient placement or isolation, adequate room ventilation and high level respiratory protection (N-95/FFP2), were used [5,7].

3. Dental team was educated and trained on proper selection and use of PPE for various procedures [5] as mentioned in [Table/Fig-1].
4. N95 masks or FFP2 respirators were used for all dental procedures and examination. N95 used for OPD were decontaminated with Ethylene oxide (EtO) [14] and reused for Non-AGP. N95 respirators used during AGP were discarded [15].
5. Dental professionals and assistants had to change to scrubs when clinically posted and change to personal clothing before returning home [4,5,7].
6. Preprocedural mouth rinse with 0.5-1% hydrogen peroxide or 0.2% povidone-iodine was used [16].
7. Rubber dam wherever possible was used [17].
8. Roster for Dental professionals with separate time slots for OPD, Non-AGP and AGP was followed. For AGP, it was scheduled as the last appointment of the day [12]. During AGP the operatory was practically inaccessible to other patients and staff other than those involved in the procedure. Four-handed dentistry was practiced for AGP [18] with high volume suction along with regular low volume suction. Additional measures such as improving the quality of water and flushing of water from dental unit water lines were also followed to prevent cross infection [19].
10. Sterile airtor handpiece with anti-retraction valve were used for each patient [4,7].
11. Standard sequence of donning and doffing of PPE was strictly followed [6]. Periodic training of staff was undertaken followed by step-wise evaluation by other colleague to expertise the procedure.
12. A protocol for disinfection of impressions and prostheses to be sent/received from dental laboratory [20] was strictly followed [Table/Fig-2,3]:

Personal protective equipment	Nursing station	Non AGP	AGP
Surgical cap	√	√	√
Surgical mask	√	-	-
N95 mask	-	√	√
Face shield	-	√	√
Gown	-	√	√
Surgical gloves	-	√	√
Disposable shoe cover	-	√	√

[Table/Fig-1]: Dental procedure and PPE selection.

AGP: Aerosol generating procedures

Protocol
To wash impression or prostheses in running water and keep it in 2% glutaraldehyde for 10 minutes.
Stock metal trays for taking impression are preferred compared to plastic trays.
If burs, polishing points, etc., are used on contaminated prosthesis they should be autoclaved. If any instruments cannot be autoclaved chemical sterilisation should be done with glutaraldehyde.

[Table/Fig-2]: Protocol to disinfect impressions and prostheses.

Protocol
Delivery person to wear mask and avoid entering the clinic area.
Disinfected impressions to be sealed in single use plastic bag with lab instruction sheet visible over the bag.
Dental technician to wear gloves while sending/receiving the work from delivery person. The work to be kept in enamel tray which is to be handled to the delivery person.
The clinic staff not to come in contact with delivery person.
The dental impressions, casts, prosthesis or appliances received from lab to be thoroughly disinfected with 2% glutaraldehyde for 10 minutes. The container, impression from trays and casts to be properly discarded according to Biomedical Waste (BMW) management protocol.
Articulator to be disinfected by spraying with hospital level disinfectant followed by rinsing.
Dental prosthesis to be washed with saline and running water before insertion

[Table/Fig-3]: Protocol for sending/receiving materials from dental laboratory.

C. Post-treatment

1. Environment and BMW management: Disinfecting parts of dental chair and surrounding was done with intermediate level of disinfectant especially after procedure. Mopping the floor with 1% sodium hypochlorite and disinfecting waterlines with 0.01% sodium hypochlorite were done to reduce the risk of cross infection [21]. All BMW pertaining to patient care was carefully disposed from time to time through an authorised biomedical disposal agency.
2. Instruments management: Dental assistant followed Standard Operating Protocol (SOP) for disinfection, cleaning and sterilisation of instruments used during dental procedure.

STATISTICAL ANALYSIS

Descriptive narrative analysis was done to provide chronology of experiences of practicing dentistry periodically by the department.

RESULTS

Practice initiated and followed by Department of Dentistry for providing dental care to the patients as per various unlock phases is given in [Table/Fig-4].

Period	Dental procedure levels
Lockdown (25 th March, 2020 to April, 2020)	Teledentistry and emergency dental procedures
Unlock 1 (May-June, 2020)	Emergency as well as urgent dental procedures majorly Non-AGP
Unlock 2 (July, 2020)	Emergency as well as urgent dental procedures, elective dental procedures for patients after thorough evaluation
Unlock 3 and beyond (August, 2020)	All dental procedures

[Table/Fig-4]: Dental practice as per various unlock phases.
AGP: Aerosol generating procedures

Single consultant as per roster was available in the Department for teledentistry practice (25th March to April, 2020). Total patients consulted through teledentistry were 14 while 4 were recalled to Department and managed by antibiotics and analgesics. In Unlock phase-1 (May to mid-June, 2020), for providing dental care, the roster comprised of 2 units (one unit with 3 and other with 4 consultants) and practiced such that a single unit was responsible for OPD consultation as well as procedures (majorly Non-AGP) for the specific day to ensure safety. In Unlock phase-2, the OPD schedule was followed for consultations. For procedures, all operatories were made operational for AGP and Non-AGP by consultants as per planned roster due to increase in patients requiring dental treatment and inclusion of elective treatment provision. A 36.31% of patients consulted from May to August 2020, were provided dental treatment. The details of number of consultations and procedures are shown in [Table/Fig-5,6].

Patients attended	Frequency (n)	Percentages
Patients consulted through teledentistry from 25 th March to April 2020	14	
Patients examined in Dental OPD from May-August 2020	1886	
• Non-Aerosol generating procedures	365	19.35% of total OPD
• Aerosol generating procedures	320	16.96% of total OPD

[Table/Fig-5]: Dental OPD and procedures from May to August 2020.
OPD: Outpatient department

The department was able to manage four Non-AGP and three AGP, and 18 OPD consultations on an average for a working day as per given workflow. Additionally, two rounds of designated COVID duty were managed by deputed consultants of the department. During the entire tenure mentioned in study, none of the member from dental team reported COVID positive.

Non-aerosol generating procedures		Aerosol-generating procedures	
Maxillofacial prosthesis	5	Tooth preparation	99
Extraction	300	Restoration	47
Recementation-Repair of prosthesis	46	Disimpaction-Open method Extraction	53
Removable prosthesis	12	Implant procedures	4
Post and core	2	Root canal treatment	116
		Gingival curettage	1

[Table/Fig-6]: Details of dental procedures from May to August 2020.

DISCUSSION

Dentistry by its nature have a high risk to COVID-19 infection due to specificity of its procedures which involves face to face communication with patients, frequent exposure to saliva and blood, duration and longevity of treatment, handling of sharp instruments and armamentarium producing visible and invisible aerosols [22-25]. Ultrasonic scalers, dental handpieces, 3 way syringe and air polishers and air abrasion units in given sequence produce the most visible aerosols with potential to travel 18 inches from operative site [18]. Saliva has been proven to be reservoir for COVID-19 [26,27]. This means that even Non-AGP can be the source of infection transmission [23]. It has been shown that the virus remains stable up to 72 hours on plastic surfaces and up to 48 hours on stainless steel surfaces, although the viral count as well as virulence is significantly reduced. SARS-CoV2 remains viable in aerosols for at least 3 hours from procedure done [28]. However, there is no significant evidence regarding airborne transmission (particles diameter <5 µm) of COVID-19 with the exception of aerosol-generating procedures [29,30]. As a matter of fact, dental professionals have to work in potentially hazardous environments and treat patients with infectious diseases regularly. Key to contagion is the presence of enough virus particles to start an infection. The study aims on how to safely and effectively practice dentistry without major environment alteration and capital items requirement. With man-power and patient management as well as change in practice of AGP, it ensured safety of dental professionals. Key is to reduce aerosols during AGP which were achieved by high vacuum evacuator and use of rubber dam. Environment management through frequent disinfection of operatories plays crucial role in prevention of transmission of infection. Even during community transmission of COVID-19 in China, the demand for urgent dental care reduced by merely 38% [31]. Also, it showed that 36.31% of total patients consulted during study period required dental treatment. Thus, the profession should not be demoted by avoiding dental care to patients or by classifying dental care into emergency or elective. Not being able to provide and cater to the dental needs of the patients will increase the oral problems of the people. This might aggravate their problems in the future and cause them more inconvenience [32,33].

In the school and Hospital of Stomatology at Wuhan University, 0.47% of the dental staff and students that worked became infected, although usual dental treatment was carried out with protective gear for several weeks in the middle of outbreak and it seems none of the healthcare staff transmitted the disease with use of standard protective gear [32]. A study from University Hospital Dental School, Messina- Italy shared two months of experience based on workflow to provide elective and urgent dental treatment with none of the staff detected positive for COVID-19. They achieved it by patient-operator management with special emphasis on environment management [33]. Yet, another study from Department of General and Emergency Dentistry, Wuhan University School and Hospital of Stomatology resumed clinical practice for all types of dental procedures by preparing a weekly protocol naming Soft-Opening, Transition and Normal stage based on operatories management, patient triaging, use of PPE and treatment recommendations [34].

There is an interesting nomenclature named as "layering of protective procedures". It is the combined efficacy of one of the

above mentioned step added to another and further which reduced the risk of transmission until the time when transmission becomes minimal [18].

CONCLUSION(S)

Within the limitation of descriptive analysis of this study, it can be concluded that the proposed workflow ensured safety of all members of dental team. With knowledge of transmission for SARS-CoV2, practicing dentistry with proper PPE use and appointment management for AGP proved practical and fruitful. Practice management like single visit practice would not only increase productivity but ensure patient's safety as well. Nevertheless, absence of environment management would nullify the positive results of the above mentioned management and its importance cannot be denied. Regular training of staff for hand hygiene practice and donning-doffing not only reduces chances of error but instills a habit by positive reinforcement. The study was effective and straightforward and allowed approximately seven patients to be treated per working day for given study period.

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