COVID-19 and changes in protocols of dentistry practice throughout the globe and significant challenges faced in India: MOHFW guidelines and review of literature

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ABSTRACT

Aim SARS-CoV-2 virus primarily attacks the upper and lower respiratory tract of the individuals leading to common cold-like symptoms and pneumonia in immunocompromised patients. Also, the virus replicates in the intestinal epithelial cells and causes cytopathic alterations leading to gastric upset and diarrhoea. Dentists, auxiliaries as well as patients undergoing dental procedures are at high risk of cross-infection since most dental procedures require close contact with the patient's oral cavity, saliva, blood, and respiratory tract secretions. Ministry of health and family welfare (MOHFW) released unified guidelines regarding dentistry practice in India on 19rd May 2020. The article presents challenges faced in practising dentistry in India during the pandemic and review on various protocols released worldwide regarding the same.

Conclusion Post pandemic dental practices may be accompanied by changes in products, delivery systems, communication and technologies regarding treatment protocols along with healthcare systems but proper behavioural counselling and efficient management of patients pre- and post-treatment can lead to better outcome during this challenging time of the pandemic.

KEYWORDS SARS CoV-2; Coronavirus; COVID-19;, Dental practice; Challenges; Health care; Guidelines; Pandemic; WHO; Indian Ministry of Health and Family Welfare.

INTRODUCTION

Public health faces major challenges due to various pathogens which emerge and re-emerge from time to time (1). Coronaviruses have enveloped RNA viruses with a positive-sense single-stranded genome that are broadly distributed throughout the globe out of which 6 species are identified so far that causes respiratory, enteric, hepatic and neurologic diseases in humans (2,3,4). Four viruses (229E and NL63 classified under antigenic group 1, and OC43 and HKU1 classified under antigenic group 2) are prevalent and typically cause common cold symptoms in immune-competent individuals (4). The two other strains Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) which had outbreak in 2002-2003 in Guandong Province in China and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) which had an outbreak in the Middle East in 2012 are zoonotic in origin and have been related sometimes to fatal illnesses. Coronaviruses possess large genetic diversity and frequently recombine their genomes. They are widely distributed among the animals, mammals as well as human beings and because of increasing animal-human interface activities, novel coronaviruses are likely to emerge periodically in humans owing to frequent cross-species infections and occasional spillover events (5-10).

The novel coronavirus was identified in Wuhan, China in December 2019 in patients presenting with pneumonia of unknown origin. On January 9, 2020, WHO declared the discovery of new coronavirus first called 2019-nCoV and then officially named SARS-CoV-2 by International Committee on Taxonomy of Virus. On February 11, 2020, the respiratory disease derived from SARS-CoV-2 infection was named COVID-19 (Coronavirus disease) (11,12).

The name recalls the microscopic appearance of the virus characterized by the presence of pointed structures on the surface resembling a crown (13).

In January 2020, WHO announced the disease as a Public Health Emergency of International Concern (PHEIC) that was further declared as a pandemic in March 2020 after violent and fast spread worldwide (14).

COVID-19 affects 207 countries and territories around the world and two international conveyances: the Diamond Princess Cruise Ship harboured in Yokohama

Japan and the Holland America's MS Zaandam Cruise Ship (15).
The current population of India is 1,380,004,385 by mid-year, 2020 (according to United Nations data) which is equivalent to 17.7% of the total world population. India ranks 2nd in the list of the countries by population. The population density of India is 464 persons per KM square (1202 people per mile square) (16).
The total number of cases reported till date worldwide according to situation report no. 183 issued by WHO on July 21, 2020, is 14562550 cases with total reported deaths of 607781 patients affected with COVID-19. India reported with total confirmed cases of 1,155,191 with total deaths of 28084. The state of transmission in India has been classified as Clusters of Cases: Experiencing cases, clustered in time, geographic location and/or common exposures (17).
So far, 753050 cases have been recovered in India from the disease. Cumulative rate for new cases is 3.27%, with a recovery rate of 3.39% and the death rate of 2.31% (till July 21, 2020) (18).

PATHOGENESIS

The viruses are inhabited in peridomestic animals which act as intermediate hosts nurturing recombination and mutation events as well as developing the genetic diversity among the coronaviruses (19). Their helical symmetry nucleocapsid is approximately 26-32 kb in size making it largest investigated genome among RNA viruses (20,21). The spike glycoprotein (S glycoprotein) attaches virions to the host cell membrane leading to host range restriction (22). Thus the virus primarily attacks the upper and lower respiratory tract of the individuals leading to common cold-like symptoms and pneumonia in immuno-compromised patients (23,24,25). Also, the virus replicates in the intestinal epithelial cells and causes cytopathic alterations leading to gastric upset and diarrhoea (26).

CLINICAL MANIFESTATIONS

The incubation period of the virus has been estimated to be 14 days but it may extend up to 28 days and the carrier may remain asymptomatic for more than a month and then exhibit the signs of the disease. A study reported that temperature-based screening at the airports at the early outbreak phase detected only 46% of the carriers and others were found during the self-isolation period after immigration (27). The lack of serious illness in youngsters is a characteristic feature of SARS CoV infection which is also observed in SARS CoV-2 infection (28). Increased exposures to the virus due to occupational requirements is another reason for the high risk of infection among health care workers. In India, more than 100 doctors and numerous healthcare workers have died so far from the infection of SARS-CoV-2 (29). This figure is increasing on a daily basis which is presenting major concern among the professionals.

TRANSMISSION DYNAMICS

The two main routes of transmission reported initially were direct transmission (through coughing, sneezing and inhalation of droplets) and contact transmission (through contact with nasal, oral and ocular mucosa). Studies have confirmed direct and indirect transmission of the virus through saliva (30). The remarkable feature of SARS CoV-2 is that its RNA is detectable via qRT-PCR in stool samples after the first week of infection (31).

Transmission dynamics in dental practice

SARS CoV-2 uses ACE receptors for cell invasions which are the main reason for human to human transmission (32). The transmission in dental settings may occur via four major routes.

1. Direct exposure to respiratory droplets, blood saliva or other patient materials.
2. Indirect contact with contaminated surfaces and/or instruments.
3. Inhalation of suspending airborne viruses.
4. Mucosal (nasal, oral and conjunctival) contact with infection containing droplets or aerosols that are propelled by coughing or talking without a mask.

It is nearly impossible to reduce the aerosol and droplet production in dental practice to nil (36). Coronavirus can actively maintain their virulence at room temperature from 2 hours up to 9 days. They have significantly higher activity at 50% humidity that was found higher than 30%. Therefore in the dental set-up, clean and dry surfaces will play a significant role in preventing SARS CoV-2 infection (34,35).
There is a potential for transmission of the virus via aerosol, fomites and faecal-oral route that may contribute to the nosocomial spread in the dental office setting (39).

CLINICAL FEATURES

Patients with COVID-19 usually present with clinical symptoms of fever, dry cough and myalgia. Other symptoms include nausea, diarrhoea, reduced sense of smell (hyposmia) and abnormal taste sensation (dysgeusia) have also been reported (36). Chest X-ray and computed tomography scan shows ground-glass opacities in the chest (37). Severe form of the disease have predilection for men with a mean age of 56 years with pre-existing chronic illnesses such as cardiovascular disease or immune-suppression. The higher risk patients present

with symptoms of typical pneumonia and acute respiratory distress syndrome (38,39).
Coughing and sneezing by an infected person can render SARS CoV-2 airborne, potentially infecting individuals in close contact (within a radius of 6 feet). Studies reveal that people touch their faces on an average of 23 times per hour, with 44% of these involves mucous membranes of the mouth and/or nose (39).

MOHFW Guidelines for Dental Practice in India (issued on 19/5/2020)

MOHFW Guidelines For Dental Practice In India (issued on 19/5/2020) (40) Prelude/ Background: in the current COVID 19 pandemic, Dentists, auxiliaries as well as patients undergoing dental procedures are at high risk of cross-infection. Most dental procedures require close contact with the patient's oral cavity, saliva, blood, and respiratory tract secretions. Saliva is rich in COVID 19 viral load. Many patients who are asymptomatic may be carriers. For this reason, it is suggested that all patients visiting a dental office must be treated with due precautions.
Several guidelines have been issued earlier by DCI, IDA and other organizations and hence there is a need to issue unified guidelines. These guidelines address dental services in the country and cover: Health care workers who are required to attend dental ailments in remote locations in the government sector. Dental Surgeons working in PHC/ small towns and different locations. Dental Surgeons working in government and private hospitals set up. Dental surgeons working in cities with solo or multi-specialty practices.

Zones and dental clinics

1. The dental clinics will remain closed in the Containment Zone; however, they can continue to provide tele triage. Patients in this zone can seek ambulance services to travel to the nearby COVID Dental Facility.
2. In the Red Zone, Emergency dental procedures can be performed.
3. The dental clinics in Orange and Green Zone will function to provide dental consults. Dental operations should be restricted to Emergency and Urgent treatment procedures only.
4. All routine and elective dental procedures should be deferred for a later review until new policy/ guidelines are issued.
5. Due to the high risk associated with the examination of the oral cavity, oral cancer screening under National Cancer Screening program should be deferred until new policy/guidelines are issued.

List of emergency and urgent dental procedures

The clinical conditions of dental origin, which require priority care but do not increase the patient's death risk are categorized as Urgent and which increase the patient's death risk are categorized as Emergency (40).

Modifications required for a dental Clinic setup

Modifications required for a dental clinic setup are the following (40).
The dental operatories should gear themselves for readiness to: Preparatory Phase(I), Implementation Phase(II) and Follow up (III).

Phase 1: Preparatory phase for a dental clinic - Doctor and health care prophylaxis against COVID-19

Testing for the Covid-19 before resuming work in the clinics: Health care workers who are asymptomatic and do not fall under the category of being exposed to coronavirus infection are not required to undergo a test before resuming to work in the clinics (41).
As per the advisory given by the MOHFW dated 22.03.2020, all asymptomatic healthcare workers involved in the care of suspected or confirmed cases of COVID-19 are advised to take HCQ prophylaxis after medical consultation (42).

Dental Clinic Ventilation and air quality management in stand-alone dental clinics

I. Maintain air circulation with natural air through a frequent opening of windows and using an independent exhaust blower to extract the room air into the atmosphere.
II. Avoid the use of a ceiling fan while performing procedure.
III. Place a table fan behind the operator and let the airflow towards the patient. A strong exhaust fan to be so located to create a unidirectional flow of air away from the patient.
IV. The window air condition system/ split AC should be frequently serviced, and filters cleaned.
V. Use of indoor portable air cleaning system equipped with HEPA filter and UV light may be used. In central AC buildings, on-recirculatory system: Blocking off the return air vents in the patient area will temporarily stop air circulation provided AHU will have provision to receive adequate outdoor air supply. Allow fresh air into rooms by the opening of windows or doors slightly.43

Clinic entrance, reception and waiting room

1. Display visual alerts at the entrance of the facility and in strategic areas (e.g., waiting for areas or elevators) about respiratory hygiene, cough etiquette, social distancing and disposal of contaminated items in trash cans.
2. Install glass or plastic barrier at the reception desk, preferably with a two-way speaker system.
3. Ensure availability of sufficient three-layer masks and sanitizers and paper tissue at the registration desk, as well as nearby hand hygiene stations.
4. Distant waiting chairs, preferably a meter apart.
5. All areas to be free of all fomite such as magazines, toys, TV remotes or similar articles.

6. Cashless/contactless payment methods are preferred.
7. A bin with lid should be available at triage where patients can discard used paper tissues.

Changing room

Changing room to be available for staff and all workers to wear surgical top and pyjama and clinic shoes
Dedicated area for donning and doffing of PPE.
Dedicated area for sterilization.
A dedicated and trained person should be available to undertake transport, cleaning, drying, packing, sterilization, storage and testing the quality of sterilization as per the standard guidelines and manufacturer's instructions.
Sufficient and dedicated space for storage of additional items of PPE and sterilization and disinfection instruments and chemicals must be ensured.

Washrooms

Sensor taps or taps with elbow handles.
Do not use towels, paper towels are preferred.

Equipment and instrumentation

I. Fumigation systems.
II. High volume extra oral suction.
III. The indoor air cleaning system.
IV. The dental chair water lines should be equipped with ant retraction valves n valves.
V. Used handpieces with anti-retraction valves only.
VI. Chemicals required for disinfection.
VII. Appropriate PPE and ensure it is accessible to HCW.
VIII. Maintain a supply of all consumables related to PPE,

Sterilisation and disinfection training of healthcare workers (HCWs)

I. Train administrative personnel working in the reception of patients on hand hygiene, social distancing, use of facemask, for them and incoming patients.
II. Educate all HCW on proper selection and use of PPE. They may require psychological support and morale-boosting to maintain their level of confidence and strict adherence of guidelines.
III. Staff should rotate more frequently, preferably, should avoid long working hours, should ensure proper nutrition and sleep.
IV. All staff and dentist must use surgical attire in the dental office, and all personal clothing should be avoide (44).

Hand hygiene: As per the WHO guidelines (44).
Donning and Doffing of PPE (45).
Use of N -95 masks (46).
Disinfection of Dental Clinic (40).
COVID-19 virus can potentially survive in the environment for several hours/days. Premises and areas potentially contaminated with the virus are to be cleaned before their re-use. Remove the majority of bio-burden, and disinfect equipment and environmental surfaces.

Environment and surface disinfection

Floors

2-Step Cleaning Procedure (Detergent and freshly prepared 1% sodium hypochlorite with a contact time of 10 minutes. Mop the floor starting at the far corner of the room and work towards the door.
Frequency: after any patient/ major splash or two hourly.

Rest of the surfaces

Freshly prepared 1% sodium hypochlorite (Contact Time: 10 minutes).
Damp dusting should be done in straight lines that overlap one another. Frequency: before starting daily work, after every procedure and after finishing daily work.

Delicate electronic equipment

Should be wiped with alcohol-based rub/spirit (60-90% alcohol) swab before each patient contact.

Phase II Implementation Phase

Tele-consult/Tele-screening

I. Telephone screening is encouraged as the first point of contact between the patient and the dentist or reception office is encouraged.
II. Current medical history and past history particularly pertaining to symptoms of Severe Acute Respiratory Illness (fever AND cough and/or shortness of breath) or All symptomatic ILI (fever, cough, sore throat, runny nose) must be analyzed.
III. Any positive responses to either of the questions should raise concern, and care should be postponed for 3 weeks except in dental emergencies.
IV. Encourage all to download the Arogya Setu App.

Dental history and remote TRIAGE

I. Obtain Mobile Phone-based Oral Health screening about the dental history and try to manage problems with advice and analgesics and local measures.
II. Clinics can evolve a web-based form which can also include a consent form.
III. Comprehend dental treatment according to the urgency of the required treatment and the risk and benefit associated with each treatment.
IV. Only pre-appointed patients should be entertained in the clinic whose history, problems and procedures are already identified to some extent through previous telephone and remote electronic or web-based systems.

What can patients do before arrival at a dental clinic?

I. Minimise or eliminate wearing a wristwatch, hand and body jewellery and carrying of additional accessories (bags etc.).
II. Use their own washrooms at home to avoid the need for using toilets at the dental facility.

III. Have a mouth wash rinse with 10 ml of 0.5% solution of PVP-I solution (standard aqueous PVP-I antiseptic solution based mouthwash diluted 1:20 with water). Distribute throughout the oral cavity for 30 seconds and then gently gargle at the back of the throat for another 30 seconds before spitting out.
IV. Wear a facemask during transport and before entering the premises.
V. Have the body temperature checked and use a sanitizer on the entrance.
VI. Patients consent and declaration to be obtained in a physical print out or electronic system.
VII. Maintain social distance.

Protocols of patient handling in the clinic area

For appointments that do not result in aerosols, and need examination only wear a triple layer surgical mask and protective eyewear/face shield and gloves.
Wear N95 face masks, protective eyewear/face shields and gloves along with coverall for High Risk and very high-risk procedures.
To increase the shelf life of N95 masks, you may cover them with a surgical mask and discard only the surgical mask after use.
When examining patients with moderate risks the treating doctor will require all PPE as high risk except that the coveralls can be substituted with surgical gowns.
Practice non-aerosol generating procedures.
Use of rubber dam is encouraged.
The 4-handed technique is beneficial for controlling the infection.

Patient discharge protocol

I. The patient drape will be removed by the assistant, and the patient is asked to perform hand wash and guided out of the clinic towards reception and handed back his footwears and belongings.
II. The procedures and prescription is recorded only after doffing the PPE.
III. Patient to perform hand hygiene and to be provided with review/follow up instructions.

Patient turn around and disinfection protocol

I. After the patient leaves the treatment room, the Assistant will collect all hand instruments immediately, rinse them in running water to remove organic matter and as per standard sterilization protocol.
II. All 3 in 1 syringe, water outlets, handpiece water pipelines, etc. should be flushed with the disinfectant solution for 30-40 seconds.
III. Remove water containers and wash them thoroughly and disinfect with 1% sodium hypochlorite using clean cotton/gauge piece and then fill with fresh 0.01% sodium hypochlorite solution and attach back to the dental chair.
IV. Then, disinfect the dental chair along with all the auxiliary parts within 3 feet of distance using 1% sodium hypochlorite and clean and sterilized cotton/gauge piece using inner to outer surface approach and leave for drying. New cotton/gauge piece should be used for every surface.
V. The areas include a. Patient sitting area and armrests b. Dental chair extensions including water outlets, suction pipe, handpiece connector, 3 in 1 syringe, etc. c. Dental light and handled. Hand washing area – slab and tap nozzle e. Clinic walls around the dental chair and switchboards f. Hand washing area – slab and tap nozzle.
VI. Handpieces should be cleaned using a handpiece cleaning solution to remove debris, followed by packing in the autoclave pouches for autoclaving. Record to be maintained for the same.
VII. Impressions will be thoroughly disinfected before pouring or sending to the laboratory using an appropriate disinfectant.
VIII. Remove visible pollutants completely before disinfection. Mop the floor with 1% sodium hypochlorite solution through separate mops for the clinical area following unidirectional mopping technique from inner to outer area. Wash and disinfect the mop with clean water and 1% sodium hypochlorite and leave it for sun-drying.

Biomedical waste management

The biomedical waste management area is to be equipped with required bins as per Government of India guidelines (47).

Protocol for clinic closure

Fogging: It is used as 'No-touch surface disinfection' and not for disinfection of air after a large area has been contaminated. The commercially available hydrogen peroxide is 11% (w/v) solution which is stabilized by 0.01% of silver nitrate. A 20% working solution should be prepared. The volume of working solution required for fogging is approximately 1000 ml per 1000 cubic feet.
After the procedure has been completed in the operatory (in case of no negative pressure), exit the room and close the operatory for half-hour for the aerosols/droplets to settle down.
Perform the 2 step surface cleaning followed by fog. The fogging time is usually 45 min followed by contact time/dwell time of one hour.
After that the room can be opened, fans can be switched on for aeration.
Wet surfaces can be dried/cleaned by using a sterile cloth or clean cloth (other surfaces).

Protocol for health care workers on reaching home

On the way back home, follow all precautions and on

return, follow the removal of shoes, change of clothes, having a wash and disinfect your mobile, wristwatch etc.

Phase III patient follow-up and review

The patient should be contacted telephonically 24 hrs and in a week' time to know if he/she has developed any symptoms that should warn the dental staff to undertake appropriate actions.
Patients should be advised to inform back to the dental clinic should there be any adverse symptoms.
Health care workers who are required to attend dental ailments in remote locations in the government sector should provide advice and analgesics and refer the patient to the dental surgeon for further management. These are dynamic guidelines and will be updated from time to time, as required.

WHAT TO DO IN CASE OF ACCIDENTAL EXPOSURE

Performing these procedures with a surgical mask (without N95 respirators), dentists are at moderate risk of COVID-19 transmission. Given that asymptomatic patients could still be infectious, CDC suggests a 14 days quarantine. If the test results positive, dentists should report the exposure to all patients treated afterwards (48).

PHARMACOLOGICAL MANAGEMENT OF THE DENTAL PATIENT

On March 17, 2020, According to the British Medical Journal, the use of Ibuprofen is prohibited due to its interference with immune function. Acetaminophen is a drug of choice for analgesia in treating COVID-19 infected patients. World Health Organization (WHO) endorsed this recommendation on March 18, 2020 (49,50).

DISCUSSION

Limiting the exposure of suspicious or active cases to the rest of society is the only effective way to control the transmission of the infection. Hence the Indian government has imposed total lockdown all over the country from 25th march till 31st May 2020 which was the outbreak phase of the disease in the country. All forms of international and national transport was deferred and thermal screening of the passengers returning from abroad was done at the airport and people were advised for home isolation or isolation at quarantine centres for 14 days according to guidelines issued by Indian Council of Medical Research. This led to a significant reduction in a number of active cases in the outbreak phase and avoidance of community transmission stage of the disease till date. Unavailability of the testing facility worldwide was a major challenge faced at that time and India launched their kit in the month of April 2020. Nowadays, more than 3 lakh tests have been performed on a daily basis in India (18).
WHO has acknowledged 'evidence emerging of air-borne transmission of the virus' on July 9th 2020 (17). Since then, ICMR has declared compulsive use of masks at public places and maintaining social distancing of at least 6 feet, hand sanitization and coughing etiquettes practice every time and spitting at public places is prohibited (18).
In India, with an overall population density of 464 individuals per square kilometer of land (2020), the population of many states or even towns are equivalent to few of the countries of western continents with much less of the proportion of land area (16). This is the major challenge to be faced while implementing the norms of social distancing. Large family size with less accommodation space is the other challenge during home isolation/self-quarantine of suspected/active cases who do not require medical support. This poses the major cause of the spread of the virus in India.
India has more than 50% of population below the age of 25 years (0-14 years- 28.6%; 15-64 years- 63.6%; 65 years and above- 5.3%) (51) and more than 65% below the age of 35 years. In 2020, the average age of an Indian will be 29 years compared to 37 years for China and 48 years for Japan (52). This may account for low mortality and the high recovery rate in Indian population as compared to rest of the world (17,18). Close and repeated contact with positive patients whether symptomatic or not exposes health care workers to high risk of infection, being the reason for the death of doctors at an early age (53).
If it follows the same evolutionary patterns as other corona-viruses, SARS CoV-2 is predicted to persist in the population as a less virulent infection with milder symptoms. Thus it is important to make the informed clinical decision and educate the public to prevent panic while promoting the health and wellbeing of the patients during this challenging time (54).
Basically, there are potentially 4 types of patients who may be presenting dental emergencies (53):

1. Patients with SARS CoV-2 infection;
2. Subjects at potential risk of infection;
3. Subjects with unknown risk of infection;
4. Subjects who have healed from the infection.

Thus every single patient should be considered contagious despite clinical manifestation and all dental practices need to review their infection control practices, engineering controls and supplies (54). Patients with suspected or confirmed COVID-19 disease should not be treated under routine dental practice setting (54,55). According to CDC guidelines suspected or confirmed cases of COVID-19 should only be treated in negative pressure rooms or airborne infection isolation rooms (AIIRs) (50,56).

Ministry of health and family welfare (Government of India) had issued guidelines according to which only urgent procedures should be undertaken in routine practice set-up only after teleconsultation, tele-triage, consent and through pre-fixed appointments only (40). Questions to be asked in tele-screening/consultation should be the following.

1. Exposure to known COVID-19 patient/ suspect.
2. Travel history to the affected area (Red Zone/ Orange Zone).
3. Symptoms of febrile respiratory illness.

In case of any positive response, elective care should be deferred at least for 3 weeks, considering the incubation period of 0-24 days (53).

Government has launched Arogya Setu app (on google play store and IOS) to enable double phase triage of the population (18). Triage and peri-triage are important for the following reasons.

1. Critical in identifying potentially at-risk cases and supporting them in contacting the health authorities for their and community protection.
2. Understanding the real need of a professional consultation and possibly addressing the issue with just pharmacologic prescription (therefore respecting the social measure to limit contagion).
3. Organizing a contagion-reduced treatment for the subjects with unknown risk of contagion who are experiencing an acute dental problem that requires immediate dental treatment (53).

The modifications suggested for clinical set-up modification is described under three-phase. The preparatory phase includes prophylaxis of doctors and health care workers with hydroxychloroquine. Proper ventilation and air-quality management is focused to avoid cross-contamination. Patient education and contact-less system along with plastic barriers, a bin with lids is advised to prevent cross contamination (40). At the entrance of the clinic, measure patients' body temperature using non-contact forehead thermometer or with cameras having infra-red thermal sensors (57). According to CDC guidelines, elective dental treatment should be deferred for patients having fever (temperature >100.4 degrees Fahrenheit/38 degree Celsius) or symptoms of febrile illness (50).

It is recommended to prevent patients from staying long in the waiting room and remove all potentially contaminated objects which could facilitate cross-infection. Important to limit the number of patients in the waiting area and keep the recommended distance of one meter between the chairs. People accompanying patients should be advised to wait outside the dental office (53).

In particular, a protocol involving 5 hand washings (2 before and 3 after treatment) was proposed to re-enforce professionals' compliance (58,59).

Lotfinejad et al. (2020) highlighted the effect of alcohol-based solutions on inactivated enveloped viruses including coronaviruses and suggested that it should contain 60% ethanol for hand sanitization (53,60).

WHO instruction for hand hygiene report that an effective procedure for the use of alcohol-based formulation requires 20-30 seconds, while correct hand washing takes between 40-60 seconds. Shorter sessions are not useful.

It is advised to wash hands for 60 seconds along with a hydro-alcoholic solution for hand hygiene before and after treatment (53).

Pre-operative mouth-rinse with oxidative agents have been suggested. Italian documents suggested 1 minute pre-operative mouth-rinse with 0.2%-1% povidone, 0.05% to 0.1% cetylpyridinium chloride, or 1% hydrogen peroxide (53).

Dexter et al. (2020) suggested chlorhexidine mouth rinse to treat patients in surgical theatre. In the literature, it has been reported to have effective virucidal activity on enveloped viruses such as Herpes simplex 1 and 2, HIV, cytomegalovirus, influenza-A, para-influenza and hepatitis A, but there is lack of systematic data on SARS-CoV-2 load, hence it is not recommended (53,61). Saliva is recognized as a reservoir of SARS CoV-2 in infected patients (62). Hence the reduction of aerosol-generating procedures is recommended (53).

1. Dentists should minimize the use of ultrasonic instruments, high-speed handpieces and three-way syringes to reduce risk of generating aerosols.54 Use of handpiece should be avoided/reduced or the handpieces with anti-retraction valves should be used (36).
2. Rubber dam isolation is recommended (63), as its use creates a barrier in the oral cavity that effectively reduces the droplets and aerosols mixed with patients' saliva and/or blood in 1-meter diameter of the surgical field by 70% (64).
3. The surgical aspiration to control airborne particle diffusion.
4. Extra-oral x-ray to reduce risk of saliva stimulation and coughing (64-66). Sensors should be double barriers to prevent cross-contamination and perforation (54).

The Italian National Institute of Health recommended the use of hand instruments, short sitting time (15 minutes), effective and pragmatic treatment aimed just at the resolution of emergency, 5 minutes air change after each patient (53).

Use of disposable (single use) devices such as mouth mirrors, syringes and blood pressure cuff to prevent cross-contamination should be encouraged (54).

Use of N-95 masks is recommended according to CDC guidelines to prevent inhalation of SARS CoV-2 infectious particles. According to legislation Standard European UNI EN149+A1, use of FFP3 masks is strongly recommended which enables highest achievable protection against high-risk environments (67). FFP2 is recommended in EU and KN95 in China for the same (48).

Biphasic disinfection of dental clinic

Biphasic disinfection of dental clinic (68,69) include the following.

- Phase 1 Cleaning: Recent WHO guidelines deemed water and detergent followed by disinfectants (bleach 1:50) effective against COVID-19 (70).
- Decontamination: Perform flushing of all the instruments under running water at least for 1 minute. Handle only one instrument at a time. Avoid overlapping of the instruments to enable visibility. Discard all disposable material/instruments and discard them according to type of waste (48).
- Detersion: Mechanical brushing followed with flushing with running water is recommended. Cleaning operation should take place from top to bottom finishing with the floor. The detergent solution should be appropriately diluted. High-pressure water jets should be avoided as they generate aerosols (48).
- Phase 2 Disinfection: Similar genetic features of SARS-CoV and SARS-CoV-2 suggested that it is susceptible for the following disinfectants: sodium hypochloride 0.1% for surfaces, 1% for blood spills; hydrogen peroxide 0.5%; ethanol 62-71%; phenolic and quaternary ammonium compounds (35).
- Contact time for non-porous surfaces: 5 minutes and for immersion procedures 30 minutes; tissues and delicate material 70% ethanol or 0.5% hydrogen peroxide with 1 minute of contact time is recommended (48).

WHO recommends cleaning and disinfection of the operating room after every patient to prevent cross-contamination. Other spaces should be sanitized at the end of the working day (70).

Biomedical waste should be considered potentially contagious and should be disposed of in double-layer yellow medical waste package bags with gooseneck ligation (35).

In case of non availability of negative pressure rooms, non contact disinfection such as fogging should be done in the operatory room and doors should be closed. Fogging time is 45 minutes followed by contact time of 1 hour (40).

COVID19 pandemic has led to the complete shutdown of all routine dental practice. Patients were managed only on telecommunication with pharmacological prescription only during the lockdown. Total lockdown in the country has led to no sales of dental materials, equipment or consumables. Customers are also finding themselves unable to pay or are offering delayed payments as socio-economic condition of people has been deteriorated (71). It is not possible to predict when the situation will be normalized, a judicial and conservative approach is needed for self as well as community protection.

Not only are the steps mentioned in the guidelines costly and complex, making their implementation much more limited in scale and availability of the consumables, but they also pose an economic burden on the practitioner and the patient. Stoppage of inter-state and inter-city transport has made the availability of dental materials and services challenging in remote areas. This also affected affordability. Thus, the number of compliant dental practices has been reduced, also the timeframe of treatment is increased which again reduced the number of procedures that can be carried out every day. This has posed an economic burden on the dental practitioner as well.

Because of the prohibition of international trade, Indian government is promoting domestic manufacture, service provision, and trade to boost their financial wellbeing, restoration of the economy on ground level is still a big challenge to be faced. Dedicated teamwork and economic support from the authorities is still required to maintain the dental health services in the country.

CONCLUSION

Pre-COVID-19 normal state for dental practices is difficult to restore soon. Hence the practice and patient management should be aimed at preventing the spread of infection. The pattern of pandemic may lead to second wave in India sooner or later, hence the dental health care professionals should be well equipped with the armamentarium and should be dedicated to reduce the panic among the population. Post pandemic dental practices may be accompanied by changes in products, delivery systems, communication and technologies regarding treatment protocols along with healthcare systems but proper behavioral counselling and efficient management of patients pre- and post-treatment can lead to better outcome during this challenging time.

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Contributions

Er. Shivansh Dwivedi B. Tech. IIT Indore For correction of the article and making the final manuscript.

Conflicts of interests

None

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