

Precautionary Measures for Dental/medical/healthcare Professionals Against COVID-19

Kaushal Gangil^{1*} Ashish Kushwah² Amit Sharma³ Shashank Soni⁴

¹Senior Lecturer, Department of Oral Maxillofacial Surgery, Institute of Dental Education & Advanced Studies, Gwalior, Madhya Pradesh, India.

²Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Institute of Dental Education & Advanced Studies, Gwalior, Madhya Pradesh, India.

³Senior Lecturer, Department of Public Health Dentistry, Institute of Dental Education & Advanced Studies, Gwalior, Madhya Pradesh, India.

⁴Consultant Orthodontist, Gwalior, Madhya Pradesh, India.

ABSTRACT

Background: There is a new public health crisis threatening the world with the emergence and spread of 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus originated in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019. The professional in dental practice expose to high risk of 2019-nCoV infection. Dental professionals have significant values in preventing the transmission of 2019-nCoV. WHO named the novel viral pneumonia as "Corona Virus Disease (COVID-19)". Here we advocate various measures during dental practice to prevent transmission in dental clinics and hospitals. The pandemic is escalating rapidly. This paper aggregates and consolidates the general introduction about virology, transmission ways, clinical symptoms, diagnosis, infection control, precautionary measures.

Keywords: Coronavirus, COVID-19, Dental professionals, Pandemic, SARS-CoV-2.

INTRODUCTION

The recent spread of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) and its associated Corona virus disease (COVID-19), has gripped the entire international community and has caused widespread public health concerns. Despite global efforts to contain the disease spread, the outbreak is still on the rise owing to the community spread pattern of this infection. This is a zoonotic infection that, similar to other corona virus infections, it is believed to have been originated in bats and pangolins, and later transmitted to humans¹

Novel human corona viruses have been associated with severe lower respiratory tract disease and acute respiratory distress syndrome (ARDS) during outbreaks, including the severe acute respiratory syndrome (SARS) corona virus or SARS CoV in 2003², and more recently the Middle East respiratory

syndrome (MERS) corona virus, or MERS CoV. Clinical characteristics of these illnesses are similar to those of progressive respiratory distress and hypoxia³⁻⁵.

Each of the first two decades of the new millennium has seen international concerns about viral pandemic zoonoses. Major examples originating as diseases of animal origin include bats as the primary host, SARS (severe acute respiratory syndrome) in the early 2000s⁶, MERS (Middle East Respiratory Syndrome⁷ and Ebola in the early to mid-2010s⁸ and the Zika virus in the mid-2000s and the mid-2010s with mosquitoes as vectors. Now the start of the 2020s has been marked by a new viral respiratory pandemic out of China. At the end of December 2019, the Chinese authorities reported a new respiratory flu-like syndrome originating in

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*Correspondence Dr. Kaushal Gangil.

Department of Oral Maxillofacial Surgery, Institute of Dental Education & Advanced Studies, Gwalior, Madhya Pradesh, India.

Email: kaushalgangil@gmail.com

Wuhan, a city in Central China with around 11 million inhabitants⁹.

Dental professionals may soon encounter patients with suspected or confirmed SARS-CoV-2 infection and will have to act diligently not only to provide care but at the same time prevent nosocomial spread of infection. Thus, the aim of this article is to provide a brief overview of this novel infection. In addition, specific recommendations for the dental practice are suggested for patient screening, infection control strategies and precaution management protocol.

Virology:

Corona viruses are divided into three genera: Alpha corona virus, Beta corona virus and Gamma corona virus¹⁰. SARS, MERS and 2019 nCoV are members of Beta corona virus, which is divided into the subgenera Embecovirus, Hibecovirus, Merbecovirus, Nobecovirus and Sarbecovirus. All corona viruses have a genome consisting of a positive-sense single-strand RNA molecule.¹¹ A long polycistronic messenger is produced from this that codes for a number of proteins, some of which are post-translational cleaved to produce smaller proteins (Cui et al. 2019)¹².

Common transmission ways:

The common transmission routes of novel corona virus include direct transmission as cough, sneeze, and aerosol inhalation and contact transmission as contact with oral, nasal, and eye mucous membranes¹². The droplets produced when an infected person speaks, cough or sneezes. These droplets can land in the mouth or nose during inhalation of peoples who are nearby. Their droplets are heavy to travel far in the air, they only travel approximately 1 meter and after some time settle on surface. This is the reason person to person spread is happening mainly between close contacts. Respiratory viruses COVID-19 can be transmitted from person to person through direct or indirect contact, or through small droplets, and 2019-nCoV can also be transmitted directly or indirectly through saliva. (Figure 1)

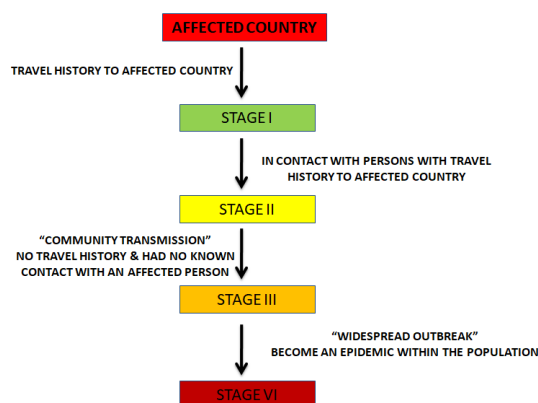


Fig 1. Stages of Transmission.

Dental care settings invariably carry the risk of 2019-nCoV infection due to the specificity of its procedures, which involves face-to-face communication with patients, and frequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. The pathogenic microorganisms can be transmitted in dental settings through inhalation of airborne microorganisms that can remain suspended in the air for long periods, direct contact with blood, oral fluids, or other patient materials, contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing microorganisms generated from an infected individual and propelled a short distance by coughing and talking without a mask, and indirect contact with contaminated instruments and/or environmental surfaces. (Figure 2)

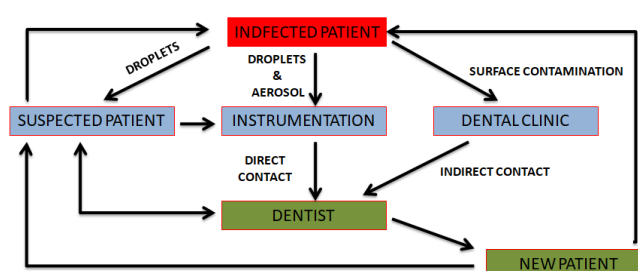


Fig 2. Showing transmission routes of COVID-19 in dental clinics.

Clinical Symptoms

COVID-19 typically causes flu-like symptoms including a fever and cough. In some patients - particularly the elderly and others with other chronic health conditions - these symptoms can develop into pneumonia, with chest tightness, chest pain, and shortness of breath. It seems to start with

a fever, followed by a dry cough. After a week, it can lead to shortness of breath, with about 20% of patients requiring hospital treatment. Notably, the COVID-19 infection rarely seems to cause a runny nose, sneezing, or sore throat (these symptoms have been observed in only about 5% of patients). Sore throat, sneezing, and stuffy nose are most often signs of a cold. 80% of cases are mild. Based on all 72,314 cases of COVID-19 confirmed, suspected, and asymptomatic cases in China as of February 11, a paper by the Chinese CCDC released on February 17 and published in the Chinese Journal of Epidemiology has found that:

1. 80.9% of infections are mild (with flu-like symptoms) and can recover at home.
2. 13.8% are severe, developing severe diseases including pneumonia and shortness of breath.
3. 4.7% as critical and can include respiratory failure, septic shock, and multi-organ failure.
4. In about 2% of reported cases, the virus is fatal.
5. Risk of death increases the older you are.
6. Relatively few cases are seen among children.

Pre-existing illnesses that put patients at higher risk:

1. Cardiovascular disease
2. Diabetes
3. Chronic respiratory disease
4. Hypertension

The Report of the WHO-China Joint Mission published on Feb. 28 by WHO,⁵ which is based on 55,924 laboratory confirmed cases, observed the following median time from symptoms onset to clinical recovery:

- Mild cases: approximately 2 weeks
- Severe or critical disease: 3 - 6 weeks
- Time from onset to the development of severe disease (including hypoxia): 1 week
- Among patients who have died, the time from symptom onset to outcome ranges from 2 - 8 weeks.

All India Institute of Medical Sciences (AIIMS), New Delhi advocated a protocol for medical professionals and healthcare workers to deal with COVID-19 suspects, which mentioned in figure 3.

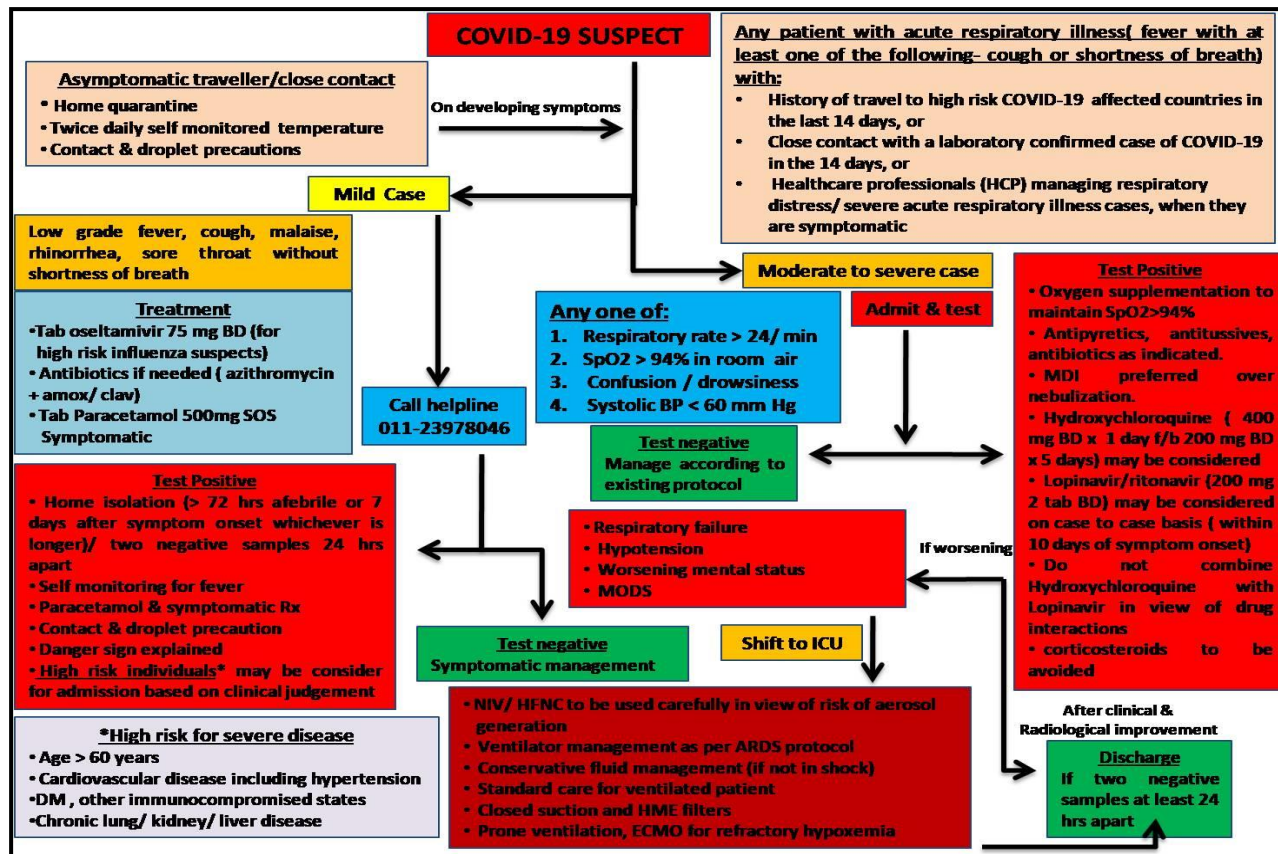


Fig 3: COVID-19 management protocol AIIMS, New Delhi

Minimize Chance for Exposures

1. Post a sign at the entrance to the dental practice
2. Reschedule appointments
3. Take a detailed travel and health history
4. Incorporate questions about the new onset of respiratory symptoms
5. Take temperature readings
6. Take the contact details and address of all patients treated.
7. Install physical barriers (e.g., glass or plastic windows)
8. Use high-speed evacuation for dental procedures producing an aerosol.

Table 1: Proper Questionnaire.

COVID-19 Screening Question	Yes	No
In the past 14 days, have you or any household member travelled to the international area (China, Iran, Italy, Japan, South Korea, and any European country) or anywhere else? If so, please note location:		
In the past 14 days, have you or any household member had any contact with a known COVID-19 patient?		
Have you or any household member have a history of exposure to COVID19 biologic material?		
Have you had any history of fever in the last 14 days?		
Have you had any respiratory illness such as cough or difficulty breathing in the last 14 days?		
Urgent Dental Need Question Do you have uncontrolled dental or oral pain, infection, swelling or bleeding or trauma to your mouth?		

- Hand hygiene:- (figure 4)

The entire process should take 40 to 60 seconds.
The steps are as follows:

- Wet your hands with water.
- Take enough soap to cover all the surfaces of the hand.
- Rub your palms together.
- Place your right palm over the dorsum of your left palm with the fingers interlaced and rub them. Do the same with the left palm over the dorsum of the right palm.
- Rub your palms together with your fingers combined.
- Rub the back of your fingers to the opposite palm while keeping your fingers interlaced.
- Clasp the opposite thumb with the other hand and rub in a rotational direction.
- Rinse off your hands underwater.

9. Clean and disinfect public areas frequently

Infection Control For Dental Practice

A. Before treatment:-

- Patient evaluation:- Dentist should be able to evaluate suspected, quarantine and isolate the case of COVID-19. In general, a patient with COVID-19 who is in the acute febrile phase of the disease is not recommended to visit the dental clinic. Although the body temperature of the patient should be measured in the first place. A contact-free forehead thermometer infrared is advocated for the screening.

- Dry your hands with a towel.
- Use the towel to turn off the tap.

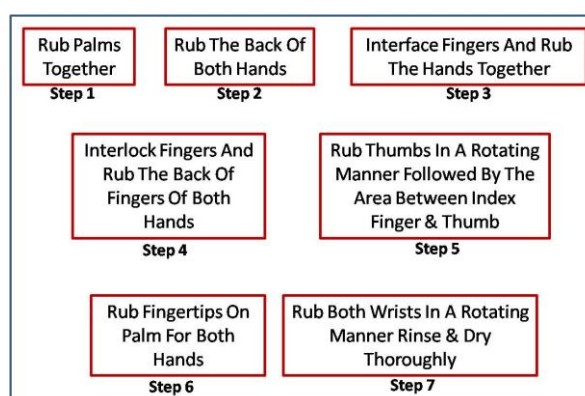


Fig 4: COVID-19 management protocol AIIMS, New Delhi

- Patient care equipment: - Offices also should follow routine cleaning and disinfection strategies used during flu season. Handle

equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment. Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.

- Respiratory hygiene & cough etiquette: Persons with respiratory symptoms should: Cover their nose and mouth when coughing/sneezing with tissue or mask, Provide tissues and no-touch receptacles to throw away used tissues and offering face masks to patients who are coughing. Dispose of used tissues and costumes, and perform hand hygiene after contact with respiratory secretions. Dental personnel should use N95 respirators or respirators that offer a higher level of protection instead of a facemask when playing or present for an aerosol-generating procedure.
- Train & educate personal: Provide task-specific education and training on preventing transmission of infectious agents, including refresher training.
 - Personal protection equipment:

Personal protective equipment and clothing can include:

- Overalls and **protective** aprons.
- **Protective** headgear - safety helmets, wide-brimmed hats to protect against the sun.
- Safety boots or shoes.
- Safety glasses or goggles.
- Gloves.
- Respirators and masks.
- Earmuffs and earpieces

B. During treatment:

- Protective gears for a dentist:- Since airborne droplet transmission of infection is considered as the main route of spread, particularly in dental clinics personal protection equipment, including protective eyewear, masks, gloves, caps, face shields, and protective outdoor,

disposable surgical mask, and impermeable shoe cover should be worn.

- Facial protection:- Avoid touching the eyes, nose, and mouth with unwashed hands. Wear a surgical or procedure mask and eye protection (face shield, goggles) to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.
- Gown:- Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Remove soiled gown as soon as possible, and perform hand hygiene.
- Linens:- Handle, transport, and process used cloth in a manner which: prevents skin and mucous membrane exposures and contamination of clothing. Avoids transfer of pathogens to other patients and or the environment.
- Manual devices:- Manual devices are recommended for caries removal as Carisolv and periodontal scaling as hand-scalar, in order to minimize the generation of aerosol as much as possible.
- Mouth rinse before the dental procedure:- A preoperational antimicrobial mouth-rinse is generally believed to reduce the number of oral microbes. Chlorhexidine may not be competent to kill 2019-nCoV. Since 2019-nCoV is vulnerable to oxidation, pre-procedural mouth-rinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone is recommended, for the purpose of reducing the salivary load of oral microbes.
- Rubber dam:- The use of rubber dams can reduce contaminated aerosol, especially in those procedures where high-speed hand-pieces and dental ultrasonic devices are used. It has been reported that the use of rubber dam could significantly reduce airborne particles in 3-foot diameter of the operational field by 70%⁸.

- Anti retraction handpiece:- The high-speed dental hand-piece without anti-retraction valves may aspirate and expel the debris and fluids during the dental procedures.

C. After treatment:-

- Waste disposal:- Ensure safe waste management. Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with local regulations. Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste. Discard single-use items properly.
- Disinfection of the clinic settings:-
 - Be well-ventilated and illuminated (lighting or window access)
 - Be labelled with a biohazard sign on the door
 - Have an appropriate water supply (hot and cold water access, if feasible)
 - Have a utility sink/floor drain for safe disposal of used solutions
 - Be designed so that, whenever possible, buckets can be emptied into utility sink/floor drains without lifting them or creating splashes
 - Have a dedicated handwashing sink, used only for hand washing
 - Have access to an eyewash station
 - Have appropriate PPE available
 - Be designed/have enough space to keep reprocessing (dirty areas) separate from storage areas for cleaned equipment
 - Be easily accessible in relation to the areas it serves (i.e., easily accessible throughout the facility)
 - Be appropriately sized to the amount of materials, equipment, and chemicals stored in the room/area
 - There should be a separate area for cleaning staff to store these items
 - Have safe chemical storage and access
 - Have locks fitted to all doors to restrict access only to cleaning staff
 - Be free from clutter to facilitate cleaning
 - Have washable surfaces (floors, walls, shelves)

CONCLUSION

We have yet to see whether international lessons on pandemic preparedness have been learned from

the experience of earlier corona virus and other viral epidemics. Containment and proper medical care, including access to high dependency and intensive care support, are the only measures currently available against Wuhan 2019-nCoV. There are already concerns about shortages of high dependence on dental equipment and the barrier clothing needed to treat patients safely and effectively. Hopefully, the initial suggestion that COVID-19 infection is of lower lethality than SARS holds true. Mild illnesses and asymptomatic carriers may be potential sources of contamination, sustaining a local epidemic and global spread. To reduce panic and economic loss, and to manage and save the infected, much remains to be done. The goal is to break the transmission chain of COVID-19. This will require effective programs to trace, diagnose, and cure every infected patient. We all need to be aware of the risks of another zoonotic virus crossing species to infect the human population in the future.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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