

Noval Covid-19 Global Outbreak and a Need for Proactive Dental Care- A Review

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Abstract

The global pandemic novel coronavirus and its associated disease (COVID-19), which first originating in Wuhan (China), has affected the countries all around the world and has been declared as a public health emergency worldwide by the World Health Organization. It was found that because of the exclusive features of dental healthcare set-ups, the risk of cross-contamination is much greater between patients and dental personnel due to high chances of getting in contact with suspected or asymptomatic COVID-19 patients. Preventive and protective infection regulatory measures are essential in order to avoid furthermore spread of the nosocomial infection. Thus, the objective of the present article is to provide a brief overview on COVID-19 and nosocomial infection in dental settings and also provides recommended protocols for screening/assessment, patient management and precautions for dental health care professionals.

Keywords: Novel Coronavirus Disease 2019, COVID-19, Dental health care professionals, SARS-CoV-2, Personal protective equipment, Precautions

Introduction

An Ounce of prevention is a worth a pound of cure. - Benjamin Franklin

Coronavirus disease 2019 - novel viral pneumonia, also designated as COVID-19 (the name declared by World Health Organization on 11th February 2020).¹ This novel pneumonia outbreak commenced in Wuhan City (China), in December 2019 which has expeditiously spread from Wuhan to other countries of the worlds.^[1-3] Due to its rampant spread, World Health Organization (WHO) on 30th January 2020 announced COVID-19 as worldwide public health emergency and global pandemic of international concern.^[4,5] The causative agent responsible for this novel disease is the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)^[6] which is the scientific name given by the International Committee on

Taxonomy of Viruses (ICTV) due to the phylogenetic and taxonomic analysis^[7] (Figure 1)^[8]. As of 20 April, 2020, a total of 2,314,621 cases have been reported out of which 157,847 deaths have been occurred worldwide according to WHO COVID-19 situation report.^[9] The dashboard of the Center for Systems Science and Engineering (CSSE) situated at Johns Hopkins University can be used to identify high risk areas as well as live global tracking of reported cases (Figure 2).^[10]

On 15 March 2020, the New York Times published an article entitled “**The Workers Who Face the Greatest Coronavirus Risk**”, where an striking schematic figure described that dentists are at greater risk of being affected by COVID-19 (Figure 3).^[11] Dental health care personnel (DHCP) poses high risk for the this pnemional infection and also there can be greater risk of cross contamination between the DHCP and patients due to the exclusive characteristics of the dental procedures such as direct communications with patient’s oro-pharyngeal region (including saliva and blood), handling of sharp equipments and most importantly aerosol generation.^[1,12]

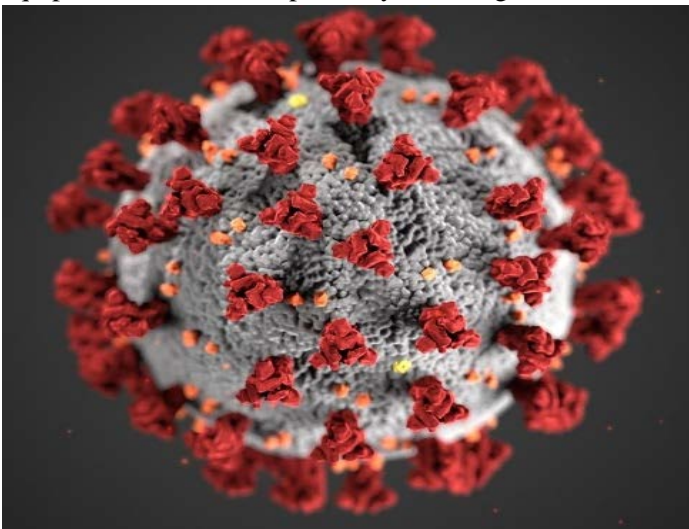


Figure 1: This illustration, created at the Centers for Disease Control and Prevention (CDC), reveals ultrastructural morphology exhibited by coronaviruses. Note the spikes that adorn the outer surface of the virus,

which impart the look of a corona surrounding the virion, when viewed electron microscopically.^[8]

Image courtesy: Released by CDC/Alissa Eckert & Dan Higgins <https://phil.cdc.gov/Details.aspx?pid=23311>

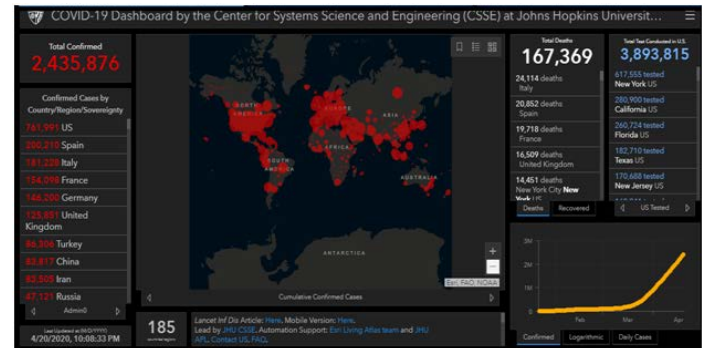


Figure 2: A screenshot of an interactive map of the global cases of COVID-19 by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University.^[10] This dashboard is continually updated and can be accessed at <https://coronavirus.jhu.edu/map.html>. Site accessed April 20, 2020.

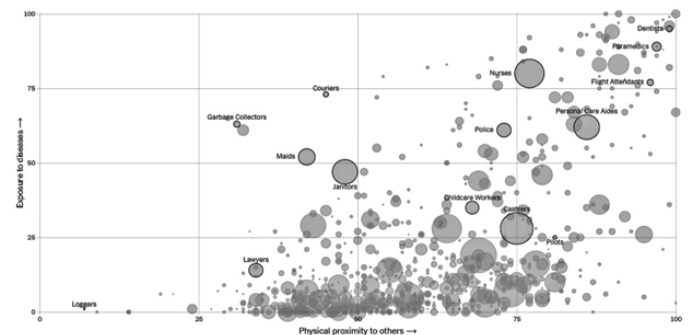


Figure 3: Image courtesy- NYT article: The Workers Who Face the Greatest Coronavirus Risk¹¹ and can be accessed on <https://www.nytimes.com/interactive/2020/03/15/business/economy/coronavirus-worker-risk.html>

The DHC professionals might get exposed to this virus after operating aerosol-generating procedures in the asymptomatic COVID-19 patients and become the potential carriers for the disease. The standard protective measures won't be as efficacious to impede the rapidly spreading disease specifically when the patients are asymptomatic and undergoing latency period unaware of

being infected.^[4] Keeping in mind the evolvement of this novel coronavirus and potential risk of cross infection, the dental health care professionals should make themselves aware and prepared for handling such disease, otherwise can be life-threatening. Meticulous and efficient infection control measures need to be adopted promptly, therefore in this present article we hereby summarize recommended management measures for dental health care professionals.

Transmission Route of SARS-CoV-2

There are various transmission modes of the nosocomial outbreak based on the findings of genetic and epidemiological research. This outbreak commenced with the single animal to human transmission, followed by sustained human to human transmission.^[13,14]

1) Airborne spread

a) Via cough, sneeze or respiratory droplets inhalation^[15]

b) Via aerosols generation in the dental care settings^[16]

2) Contact transmission

a) Direct conjunctival^[17], nasal^[1] or oral-mucosal (saliva)^[18] contact via droplets/aerosols

b) Indirect contact via contaminated dental equipments and dental healthcare settings^[19]

3) Fecal-oral route of transmission^[20]

Clinical Presentation

Most of the patients may present with the following signs and symptoms of SARS-CoV-2:^[21]

- Fever (83–99%)
- Cough (59–82%)
- Fatigue (44–70%)
- Myalgias (11–35%)
- Short breath (31–40%)
- Anorexia (40–84%)
- Sputum production (28–33%)

- Headache, confusion, rhinorrhoea, sore throat, haemoptysis and diarrhoea (<10%)

The average latency period of novel coronavirus disease is approximately 5-6 days, but it could be as long as 14 days. This 14 days' time duration is nowadays being considered for medical observation and to quarantine the persons exposed to this virus.^[22]

Diagnosis

The diagnosis of COVID-19 can be made according to regulations and provisions of either National Health Commission of China or WHO with combination of following:^[23,24]

1. Epidemiological information (travel history within 14 days)
2. Clinical symptoms
3. Laboratory tests (Reverse Transcriptase Polymerase Chain Reaction- RT-PCR)
4. CT imaging findings

Prevention and Recommended Management Protocols For Dental Health Care Professionals

With due consideration into the severity of COVID-19 Pandemic the dental health care professionals must have prior knowledge on the spread of the disease and identification of the infected patients. Dentists have been suggested to postpone elective procedures and instead provide dental emergency treatment only. Therefore, it is of the utmost importance for dentists to adopt new preventive and extra-protective strategies to avoid the COVID-19 infection.^[25,26]

Patient Evaluation

Tele-screening and triaging- Whenever the appointments are scheduled, COVID-19 suspected patients should be initially screened telephonically. The patients must be asked for history of travel to COVID-19 affected areas and symptoms showing respiratory illness. If patient response is positive to any of the above two questions,

then the elective care should be procrastinated for the next 2-3 weeks and patient should be encouraged to self-quarantine immediately and refer to local health department if necessary.^[24,27]

Upon arrival of the patient in dental setting-

- The patient should follow appropriate social distancing at least 6 feet/2meters from each other in the waiting area.^[28]
- Measuring the body temperature of every patient with the contact free infrared forehead thermometer is advised.^[1,4]
- The patient should be provided with alcohol-based hand rub and surgical or face mask.^[29]
- The patients should be educated for the respiratory hygiene/cough etiquette. Patients must be encouraged to use disposable tissues or handkerchiefs while coughing or sneezing and immediately discard into no-touch receptacles for disposal available at the health care facility entrance.^[30]
- Complete medical history form and screening questionnaire must be filled by the patient before undergoing any procedure and after that, questionnaire must be assessed by the dentist (Figure-4).
- Only after proper assessment, dentist should proceed with the treatment (Figure-5).

| COVID-19 SCREENING QUESTIONNAIRE | | | |
|----------------------------------|---|------------------|----|
| PATIENT NAME- | | ADDRESS- | |
| AGE/SEX- | | CONTACT NUMBER- | |
| SR. NO. | QUESTIONS | PATIENT RESPONSE | |
| | | YES | NO |
| 1. | Have you or any of your family member travelled to countries or provinces having known cases of Covid-19 in the past 14 days? | | |
| 2. | Have you or any of your family member had close contact with or cared for someone diagnosed with Covid-19 in the past 14 days? | | |
| 3. | Have you been in close contact with anyone who has travelled to the Covid-19 affected areas in the past 14 days? | | |
| 4. | Have you experienced any of the symptoms in the past 14 days such as fever, cough, sore throat, respiratory illness, difficulty breathing, loss of taste sensation and smell? | | |
| 5. | Do you have uncontrolled dental pain, infection, swelling, bleeding or any facial trauma? | | |

Figure 4: COVID-19 Screening questionnaire

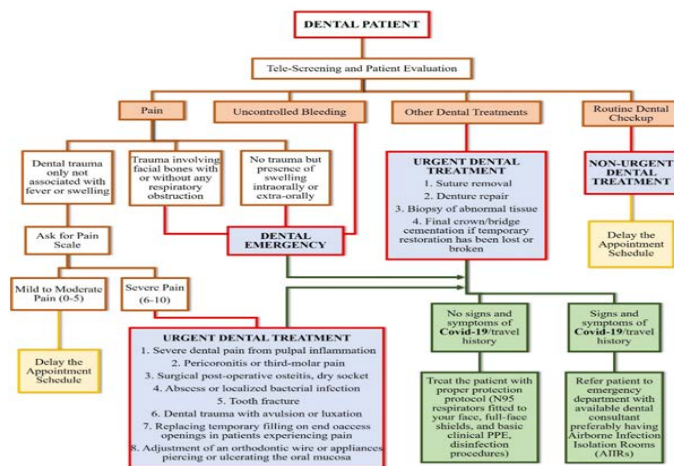


Figure 5: An overview of patient screening for COVID-19 and dental management.

Precautions Before Dental Care

- Health care workers who are directly or indirectly engaged in the care of confirmed or suspected patients of coronavirus are recommended to take Hydroxy-chloroquine as a prophylaxis of COVID-19 infection. Recommended dose- 400mg two times a day on first day followed by 400 mg once a week for next consecutive 7 weeks.^[31]
- DHCP's experiencing influenza like illness should be encouraged to stay home.
- Self-monitoring to any of the respiratory symptoms and temperature check is must for DHCP's.
- Dental staff should be encouraged to maintain respiratory etiquette and hand hygiene practices.^[30]
- Place the signage in the waiting area for instructing the patient about respiratory hygiene/ cough etiquette and social disinfectant.
- Remove the magazines, reading material, toys and other objects from the waiting area in order to avoid being touched by anybody.
- While scheduling the appointments, there should be enough time interval to reduce the possible contact of the patients with each other in the waiting area.

- The standard precautions for the DHCP's includes hand hygiene practices, Personal Protective Equipment (PPE), cough etiquette/respiratory hygiene, safe injection practices, proper sterilization of devices and instruments, disinfection of all environmental surfaces.^[32]
- Transmission-Based preventive measures include: placement of patient in isolation, adequately ventilated room, respiratory protection aided by N-95 masks.^[32]
- Figure-6 illustrates the CDC guidelines for donning and doffing of PPE.^[33]
- Moreover, if you ever suspect a COVID-19 patient at your clinic then you must immediately contact your local health for preventing any transmission to DHCP's or other patients.
- Only the dental patients should be allowed in the dental care units, not the companions until or unless patient requires assistance especially in case of elderly patients, paediatric patients and patient with special needs



Figure 6: Centers for Disease Control and Prevention recommendations for putting on and removing personal protective equipment for treating COVID-19 patients.³³

From: <https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf>.

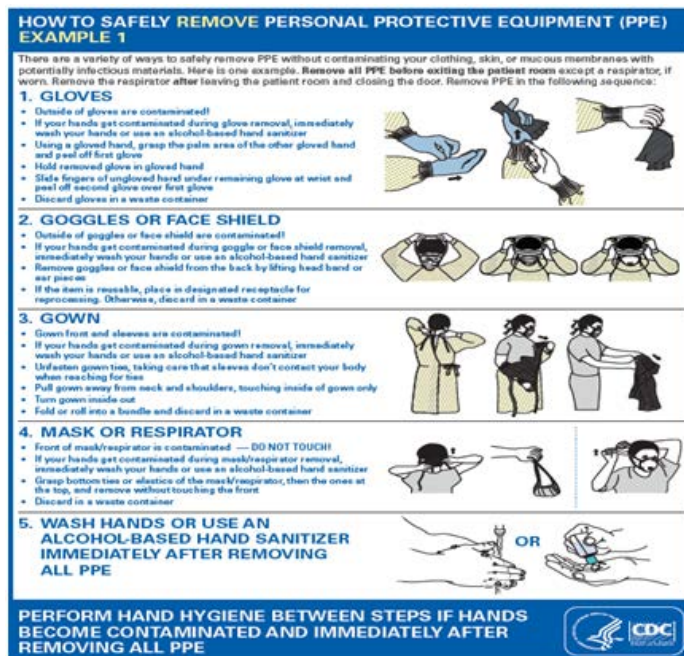


Figure 6: Continued

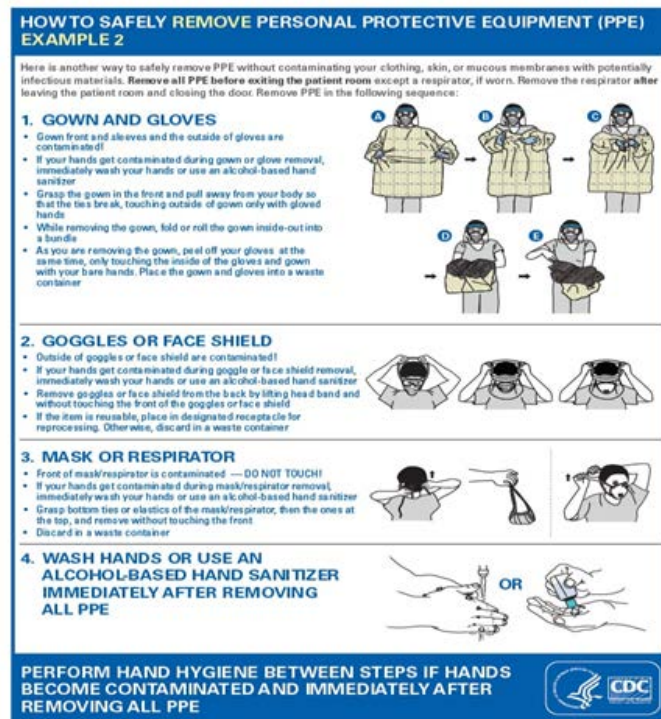


Figure 6: Continued

Precautions during dental care

- DHCP should follow the minimum infection prevention protocols in any dental healthcare setting,

irrespective of suspected or confirmed COVID-19 patient.

- Only essential health care workers (dentists and assistants) must be in the dental chair settings and that too wearing entire PPE. Any accompanying person with the patient should not be allowed in the dental operatory.
- Preprocedural mouth rinse using 0.2% povidone or 1.5% hydrogen peroxide is recommended to minimize the salivary load of oral microbes as SARS-CoV-2 is vulnerable to oxidation.^[1,12]
- Extraoral dental radiographs such as Panoramic radiograph or CBCT must be preferred as the alternative to Intraoral Periapical (IOPA) Radiographs to avoid stimulation of salivary secretion and coughing. Whenever IOPA is mandatory, imaging sensors must be double barriered for avoiding any perforation and risk of cross-infection.^[4]
- Whenever possible, disposable devices like examination instruments, syringes and blood pressure cuff must be preferred.
- Use of hand-instrumentation is prioritized instead of ultrasonic instrumentation if necessary.
- Minimization of the use of a 3-in-1 syringe and high-speed handpieces are recommended to reduce the aerosol production.
- Use of anti-retraction dental handpieces with anti-retractive valves are strictly advised for additional protection against cross contamination.^[34]
- Any aerosol generating procedures if necessary, should be performed in good ventilated room preferably Airborne Infection Isolation Rooms (AIIR's)^[35]
- While performing aerosol generating procedure use of rubber dam should be preferred in order to minimize

the saliva and blood contaminated aerosol or spatter generation

- DHCP should prefer 4-handed dentistry to avoid infection.
- Use of high-volume evacuators is preferred.
- Resorbable sutures should be preferred to avoid the follow up appointment.

Precautions After Dental Care

- Between every patient, perform hand hygiene practice, clean PPE with soap and water, clean and disinfect reusable facial protective equipment.
- The reusable instruments should be pre-treated, cleaned, sterilized and properly stored.
- Non autoclavable equipment's such as dental chair, light and x-ray unit should be prioritized for disinfection.
- Non-disposable equipment's such as handpieces should be swiped to get rid of debris, followed by autoclaving by the method of heat-sterilization between every patient.
- Patient care areas, handles of doors, elevators, stools and washrooms must be disinfected on frequently basis as it has been reported that virus remains viable on the inanimate surfaces up to 9 days.^[19]
- The medical waste along with disposable PPE must be transferred to the provisional storage area.^[1]

Patients with a resolved COVID-19 infection can be seen in a dental setting.^[37]

1. At least 3 days (72 hours) since COVID-19 infection symptoms resolved.
2. At least 7 days since their symptoms first appeared (defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms).

Pharmacological management

The patients who are in need for urgent dental assistance with complain of irreversible pulpitis, tooth fracture, intraoral or extraoral swelling, luxation/ avulsion, pharmacologic approach in the form of antibiotics (Amoxicillin 500mg or Metronidazole 400 mg three times/day) and analgesics (Paracetamol 500mg or Diclofenac 50mg or combination of both twice a day) is a substitute which would offer symptomatic relief to the patients.^[38,39]

Discussion

The widespread pandemic outbreak of coronavirus and its associated disease (COVID-19) have become a major concern worldwide and poses a solemn threat to human well-being, health and survival. As depicted, the dental health care professionals are at the highest risk for contracting SARS-CoV-2 infection.^[11] The worldwide rampant spread of this coronavirus disease increases the probability that the DHCP's might encounter asymptomatic COVID-19 infected patients because of the longer incubation period leading to development of only mild symptoms and they might treat those patients unknowingly, therefore, each and every one must be taken into consideration as likely to be infected by the coronavirus.^[12] To contain and limit the spread of coronavirus, protective and preventive measures must be taken as the keystone protocol. Adherence to standard preventive protocols during day-to-day clinical work won't be as efficacious to prevent the spread, therefore, in our present article we have discussed the further precautions and management recommendations for dental emergencies which are pre-requisite for every DHCP before giving any dental care. As suggested by American Dental Association, elective dental care should be deferred and only emergency care must be focused which will lead to drastic fall in interpersonal contact.^[26] As the vaccine is

not available till now, so, in the initial phase PPE plays a vital part in control of the disease.^[40] Also, all the dental health care settings must upgrade the infection control policies, engineering control and supplies.^[12] Dental professionals must be aware and up-to-date about this progressing dreadful disease. They should also give training to their staff adequately to encourage numerous screening levels and protective protocols, giving allowance to the dental care to avoid the outbreak of this novel coronavirus disease.

Conclusion

In conclusion, due to this drastic intervention of the life-threatening disease it's the first most priority of the health care professionals for the protection and betterment of the natives and to curb the rapidly spreading disease. Therefore, until a vaccine or a drug becomes available, the policies and other protective and preventive measures adopted by the government are directed to every dental association, indicating the proper guidelines for preventing and controlling SARS-CoV-2 infection in daily practice.

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