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Dr. Jaishree Tukaram Kshirsagar
Professor, Department of
Periodontics, Tamilnadu
Government Dental College and
Hospital, Chennai, Tamil Nadu,
India

Dr. Kokhila S
Post Graduate Student,
Department of Periodontics,
Tamilnadu Government Dental
College and Hospital, Chennai,
Tamil Nadu, India

Corresponding Author:
Dr. Kokhila S
Post Graduate Student,
Department of Periodontics,
Tamilnadu Government Dental
College and Hospital, Chennai,
Tamil Nadu, India

Standard dental operating protocol in COVID-19 pandemic

Dr. Jaishree Tukaram Kshirsagar and Dr. Kokhila S

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Abstract

Coronavirus belong to a large family of virus called Coronaviridae predominantly affects respiratory system. Virus that cause COVID-19, spreads mainly by droplet infection from oral or nasal secretions. Clinical presentation starts with fever, headache, cough, malaise and gastro- intestinal symptoms. Loss of taste and smell have been reported. Most of the patients recover with milder symptoms, few reported organ dysfunction and death. Dentistry is facing its toughest time with the spread of COVID-19 and the dental practice has been affected significantly in this pandemic. Most dental procedure require close contact with patient's oral cavity and treatment interventions generate aerosol, chance of cross infection is more in a clinical set up. Dentists and the patients have to follow strict measures to prevent the spread of pandemic. All patients visiting a dental office must be treated with due precautions.

Keywords: Dental protocol, fomites, tele dentistry, pandemic

Introduction

Coronavirus outbreak has created fear and panic among people all over the world and it is a breaking news with updates every day. On December 2019, cluster of pneumonia cases with unknown etiology were reported in Wuhan, China. WHO declared the outbreak a Public Health Emergency of International Concern on January 30, 2020 [1]. On February 11,2020 WHO collaborated with World Organisation for Animal health, Food and Agricultural Organisation of the United Nations named the disease as COVID-19, abbreviation for Coronavirus disease 2019 [2]. Previously called novel coronavirus 2019 now WHO in collaboration with International Committee on Taxonomy of virus, ICTV named it as SARS - COV-2, Severe Acute Respiratory Syndrome Coronavirus-2 [3]. On March 11, 2020 WHO announced that COVID-19 can be characterized as a Pandemic [4]. All over the world, Health care professionals are at increased risk of acquiring COVID-19. As dental professionals are working in close proximity to oropharyngeal region, the risk of exposure to Coronavirus is high. Face to Face communication between the dentist and patients puts both at risk of cross infection.

Structure of coronavirus

Coronavirus belong to the family Coronaviridae and sub family Coronaviridae. Four genera, namely Alpha coronavirus, Beta coronavirus, Gamma coronavirus, Delta coronavirus exist [5]. Coronaviridae species are widespread among animals causing mild – respiratory infection, Coronavirus are single stranded envelope RNA virus, diameter ranges from 60-140nm [6]. They are named after presence of pointed structure on surface, resembling crown [7]. Coronavirus species are circulating in bats, subspecies Rhinolophus [8, 9]. Until 2002, Coronavirus were considered only minor pathogens of humans, SARS-COV Outbreak occurred in 2002 [10]. MERS-COV Middle East Respiratory Syndrome Coronavirus caused infection in 2014 [11, 12].

Classification of coronavirus

Table 1: Coronavirus can be classified ^[13] as

Human coronavirus	Incubation period
229E	2-5 days
OC43	2-5 days
NL63	2-4 days
HKU1	2-4days
SARS-CoV	2-11days
MERS-CoV	2-13 days
2019-nCoV	1-14 days

Transmission mode

Possible modes of transmission include Contact, Droplet, Airborne, Fomite, Fecal -oral, Blood borne, Mother to Child and Animal to Human transmission ^[14]. Respiratory secretion (or) droplets expelled by infected individuals can contaminate surfaces and objects creating fomites (contaminated surfaces) ^[15].

Clinical presentation

Disease expression varies from people to people, in terms of age, gender and underlying comorbid illness. The clinical picture varies from country to country. Most common symptoms are fever, cough, myalgia or tiredness, headache, Diarrhea and some people have reported loss of smell and taste ^[16]. Mild respiratory infections occur in about 80% of those infected; about 50% will have pneumonia, another 15% of patients develop severe illness, while 5% need critical care treatment ^[17].

Diagnosis

Confirmation of COVID-19 is based on the detection of unique sequence of virus RNA by NAAT (Nucleic Acid Amplification Test) technology such as Real Time Reverse Transcriptase polymerase chain reaction (rRT-PCR) ^[18]. Chest X ray and CT finding may be helpful in diagnosis of COVID-19. Non-contact thermal scanning sensor is routinely used in public places. WHO does not recommend the use of Antibody -detecting rapid diagnostic test for patient care but encourages the continuation of work to establish their usefulness in disease surveillance and epidemiologic purpose ^[19].

Dental health care set up

Dentist are constantly exposed to body fluids such as saliva and blood during dental procedure. Saliva is a known mode of transmitting infected droplets. Dentist are in danger of getting COVID-19 infection.

Tele dentistry in COVID-19

Tele dentistry is defined as the provision of real time and offline dental care such as diagnosis, treatment planning, consultation and follow-up through electronic transmission from different sites ^[20]. In this wide spread pandemic, advanced technology help us to manage patients who needs urgent dental care. All appointments and consultations are fixed through Tele dentistry. Patients who need intervention will get an appointment based on their clinical presentation. Appointments are scheduled appropriately to avoid crowding in a hospital environment. Attenders accompanying the

patients shouldn't be encouraged, unless there is a valid reason.

Patient arrival

Sanitization and Social distancing norms are followed through the entire procedure. Patients are advised to fill their complete contact details and COVID-19 Screening form given by CDC (figure1) ^[21]. Complete medical history is evaluated. Dental Assistant should document the patient body temperature using Non- contact mode thermal sensor. Patient who has fever (or) susceptible of COVID-19, has been referred to Health care system. Patients are advised to wear a mask and hand sanitization is strictly followed.

Waiting room

Adequate ventilation and Social distancing norms should be strictly followed while waiting for the consultation. Appointments for patients should not overlap. Poster displaying Hand hygiene importance, cough etiquette, social distancing, COVID-19 Symptoms are made available for patient education.

Disinfection and cleaning protocol in hospital

Environmental surroundings inside hospital are likely to get highly contaminated with COVID-19, as medical procedure are carried out regularly. These contaminated surface should be thoroughly cleaned to remove dirt and organic load and then disinfected flowingly. Studies have evaluated the persistence of the COVID-19 on different surfaces, found that virus remained viable up to 1 day on cloth and wood, up to 2 days on glass, 4 days on stainless steel and plastic and up to 7 days on the outer layer of a medical mask ^[22].

Standard operating procedures (Sop) for cleaning and disinfection

WHO have mentioned the cleaning and disinfecting protocols ^[22] (table 2).

Chemicals such as

1. Ethanol 70 to 90%
2. Chlorine – based products (Hypochlorite) at 0.1% (1000ppm) for general environmental disinfection
3. 0.5% (5000ppm) Hypochlorite for blood and body fluid large spills
4. Hydrogen peroxide

Fresh solution should be prepared on a daily basis. Proper concentration and volume of the disinfectant should be strictly prepared following the manufacturer's guidelines. Cleaning should progress from cleanest surface to dirtiest area, from higher level to lower place, so that debris may fall on the floor and cleaned last.

Clinical set up

Health care professionals (HCP) should follow safety precautions to avoid getting infection, as patients in incubation period or asymptomatic carriers may spread the disease to dentist. Dentist are one among the high risk category group under the health care professionals ^[23].

TODAY'S DATE: _____

CDC FACILITIES COVID-19 SCREENING

Accessible version available at <https://www.cdc.gov/screening/>

PLEASE READ EACH QUESTION CAREFULLY	PLEASE CIRCLE THE ANSWER THAT APPLIES TO YOU	
Have you experienced any of the following symptoms in the past 48 hours: <ul style="list-style-type: none"> fever or chills cough shortness of breath or difficulty breathing fatigue muscle or body aches headache new loss of taste or smell sore throat congestion or runny nose nausea or vomiting diarrhea 	YES	NO
Within the past 14 days, have you been in close physical contact (6 feet or closer for at least 15 minutes) with a person who is known to have laboratory-confirmed COVID-19 or with anyone who has any symptoms consistent with COVID-19?	YES	NO
Are you isolating or quarantining because you may have been exposed to a person with COVID-19 or are worried that you may be sick with COVID-19?	YES	NO
Are you currently waiting on the results of a COVID-19 test?	YES	NO
Did you answer NO to ALL QUESTIONS?	Access to CDC facilities APPROVED . Please show this to security at the facility entrance. Thank you for helping us protect you and others during this time.	
Did you answer YES to ANY QUESTION?	Access to CDC facilities NOT APPROVED . Please see Page 2 for further instructions. Thank you for helping us protect you and others during this time.	
 cdc.gov/screening	 cdc.gov/screening/further-instructions.html	<small>#EV20200727</small>
		

Fig 1: CDC Facilities COVID 19 screening

Patient area	Frequency ^a	Additional guidance
Screening/triage area	At least twice daily	<ul style="list-style-type: none"> Focus on high-touch surfaces, then floors (last)
Inpatient rooms / cohort – occupied	At least twice daily, preferably three times daily, in particular for high-touch surfaces	<ul style="list-style-type: none"> Focus on high-touch surfaces, starting with shared/common surfaces, then move to each patient bed; use new cloth for each bed if possible; then floors (last)
Inpatient rooms – unoccupied (terminal cleaning)	Upon discharge/transfer	<ul style="list-style-type: none"> Low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, bed thoroughly cleaned and disinfected
Outpatient / ambulatory care rooms	After each patient visit (in particular for high-touch surfaces) and at least once daily terminal clean	<ul style="list-style-type: none"> High-touch surfaces to be disinfected after each patient visit Once daily low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, examination bed thoroughly cleaned and disinfected
Hallways / corridors	At least twice daily ^b	<ul style="list-style-type: none"> High-touch surfaces including railings and equipment in hallways, then floors (last)
Patient bathrooms/ toilets	Private patient room toilet: at least twice daily Shared toilets: at least three times daily	<ul style="list-style-type: none"> High-touch surfaces, including door handles, light switches, counters, faucets, then sink bowls, then toilets and finally floor (in that order) Avoid sharing toilets between staff and patients

^a Environmental surfaces should also be cleaned and disinfected whenever visibly soiled or if contaminated by a body fluid (e.g., blood); ^b Frequency can be once a day if hallways are not frequently used.

Recommends use of easily decontaminated physical barriers, local exhaust ventilation to capture and remove aerosols generated during treatment; and use of directional airflow to remove workplace hazards.

Recommends strategies such as telephone triage and teledentistry to determine the need for care. Within the office, screening for signs and symptoms, limiting the number of people in the treatment area, and minimizing aerosol-generating procedures used in dental treatment.

Dental emergency

Patients with Acute Oro dental Infections, Swelling and bleeding, Space Infections in Oro-Facial region, severe pain not manageable with Analgesics, Trauma to the dentition, Trauma involving facial bones require urgent or emergency dental intervention. If not manageable by General Dentist patient should be referred to higher speciality with precautions.

Patients with dental emergencies suspected of COVID-19, should be referred to COVID specialized oral health services, where appropriate urgent or emergency oral health care interventions are provided. Home visit by a dedicated oral health care team following strict infection prevention and control measures as locally prescribed could also be provided. The following approaches to treatment are recommended:

Conditions	Various Treatment Approaches
Dent alveolar or periodontal abscess, acute episodes of pain	Incision and drainage, antibiotic therapy
Bleeding Gums, Gingivitis	Hand scaling and cleaning, antiseptic mouth rinse
Pain due to acute periodontitis	Under local anesthesia, hand scaling, antibiotic therapy, antiseptic mouth rinse
Acute pain due to carious tooth	Devitalisation of deep and open carious lesion with hand excavation and temporary restoration
Extensive carious tooth	Dental extraction only if non-restorable
Fractured teeth	Under local anesthesia, removal of the broken part or non-invasive restoration, splinting if necessary
Broken orthodontic appliances	Removal and fixation of the appliances
Broken denture or prosthesis	Relining (Laboratory Repair)
Acute pain due to mobile tooth	Splinting if prognosis is good a traumatic extraction
Pericoronitis	Antibiotic therapy debridement of the flap antiseptic mouth rinse
Apthous Ulcer	Topical analgesics antiseptic mouth rinse nutrition supplementation

Dental emergencies exacerbate in a short period of time, need immediate treatment care. Rubber dams and high-volume saliva ejectors can minimize aerosol generation or spatter in dental procedures. Face shields and goggles are essential during treatment with use of high or low-speed drilling. During the pandemic, a carious tooth with symptomatic irreversible pulpitis is treated under local anaesthesia with the usage of rubber dam isolation and a high-volume saliva ejector, pulp devitalization procedure is performed to reduce the pain. It is recommended to rinse the wound slowly and use the saliva ejector to avoid spraying. Life-threatening cases should be admitted to the hospital immediately, and chest CT should be prescribed if available to exclude suspected infection because the RT-PCR test is time-consuming.

Aerosol Generating Procedures (AGPS)

Definition

All clinical procedures that use spray generating equipment such as three-way air/water spray, dental cleaning with ultrasonic Scaler and polishing; periodontal treatment with ultrasonic Scaler; any kind of dental preparation with high or low-speed hand-pieces; direct and indirect restoration and polishing; definitive cementation of crown or bridge; mechanical endodontic treatment; surgical tooth extraction and implant placement [24].

Pratice Four Handed Dentistry [25], Use of high-speed suction and rubber dam are advised. Use of appropriate PPE – including a fit tested N95 or FFP2 respirator, or higher is adviced during AGPs.

Guidelines for personal protective Equipment for health care professional

OSHA recommended

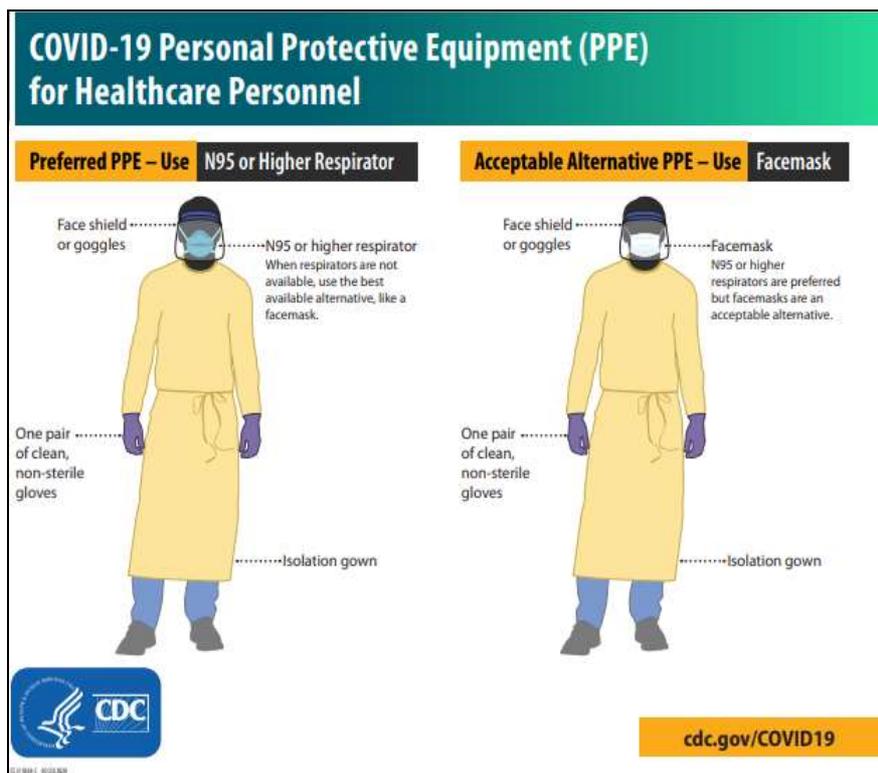
OSHA PPE recommendations when providing dental treatment to well patients during the COVID-19 pandemic

Treatment not involving aerosol-generating procedures	Treatments that may or are known to generate aerosols
<ul style="list-style-type: none"> • Work clothing, such as scrubs, lab coats, and/or smocks, or a gown • Gloves • Eye protection (e.g. goggles, face shield) • Face masks (e.g. surgical mask) 	<ul style="list-style-type: none"> • Gloves • Gown • Eye protection (e.g., goggles, face shield) • NIOSH-certified, disposable N95 filtering facepiece respirator or better.

Very high risk category includes treatment generating aerosol on known or suspected COVID-19 patients. High risky group includes treatment providing emergency dental care, not involving aerosol-generating procedures, to a known or suspected COVID-19 patient. Medium risky group are those who provide urgent or emergency dental care, not involving aerosol-generating procedures, to well patients (i.e., to members of the general public who are not known or suspected COVID-19 patients). Low risk category performing administrative tasks in non-public areas.

WHO have given guidelines regarding the usage of Personal Protective Equipment [26]

Table 3: Personal Protective Equipment must be used and that PPE differs depending on whether the work involves providing well patient care or care to a patient with suspected or confirmed COVID-19. “Dentistry works must use proper PPE when exposed to patients.



My Five Moments for Hand Hygiene principle given by WHO [27]

1. Moment one – before patient contact
2. Moment two - before aseptic task
3. Moment three – after body fluid exposure
4. Moment four – after patient contact
5. Moment five – after contact with patient surrounding

Facemask

Facemask is a barrier device used in infection control to prevent health care providers from breathing or coughing on patients.

Types of Facemask

1. Surgical or Medical mask
2. Surgical N95 mask
3. Homemade mask
4. Face covering

Facemask Do's and Don'ts
For Healthcare Personnel

When putting on a facemask

Clean your hands and put on your facemask so it fully covers your mouth and nose.



DO secure the elastic bands around your ears.



DO secure the ties at the middle of your head and the base of your head.

When wearing a facemask, don't do the following:



DON'T wear your facemask under your nose or mouth.



DON'T allow a strap to hang down. DON'T cross the straps.



DON'T touch or adjust your facemask without cleaning your hands before and after.



DON'T wear your facemask on your head.



DON'T wear your facemask around your neck.



DON'T wear your facemask around your arm.

Proper hand hygiene should be followed strictly. Wash hands before putting the mask. Do not touch your mask while wearing it. If you touch your mask wash/ sanitize your hand immediately. Do not remove mask while talking to others. Do not use dirty mask, change often.

When removing a facemask
Clean your hands and remove your facemask touching only the straps or ties.



DO leave the patient care area, then clean your hands with alcohol-based hand sanitizer or soap and water.



DO remove your facemask touching ONLY the straps or ties, throw it away*, and clean your hands again.

*If implementing limited-reuse: Facemasks should be carefully folded so that the outer surface is held inward and against itself to reduce contact with the outer surface during storage. Folded facemasks can be stored between uses in a clean, sealable paper bag or breathable container.



1:39:48PM June 2, 2020 11:30 AM

Additional information is available about how to safely put on and remove personal protective equipment, including facemasks:

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html>.

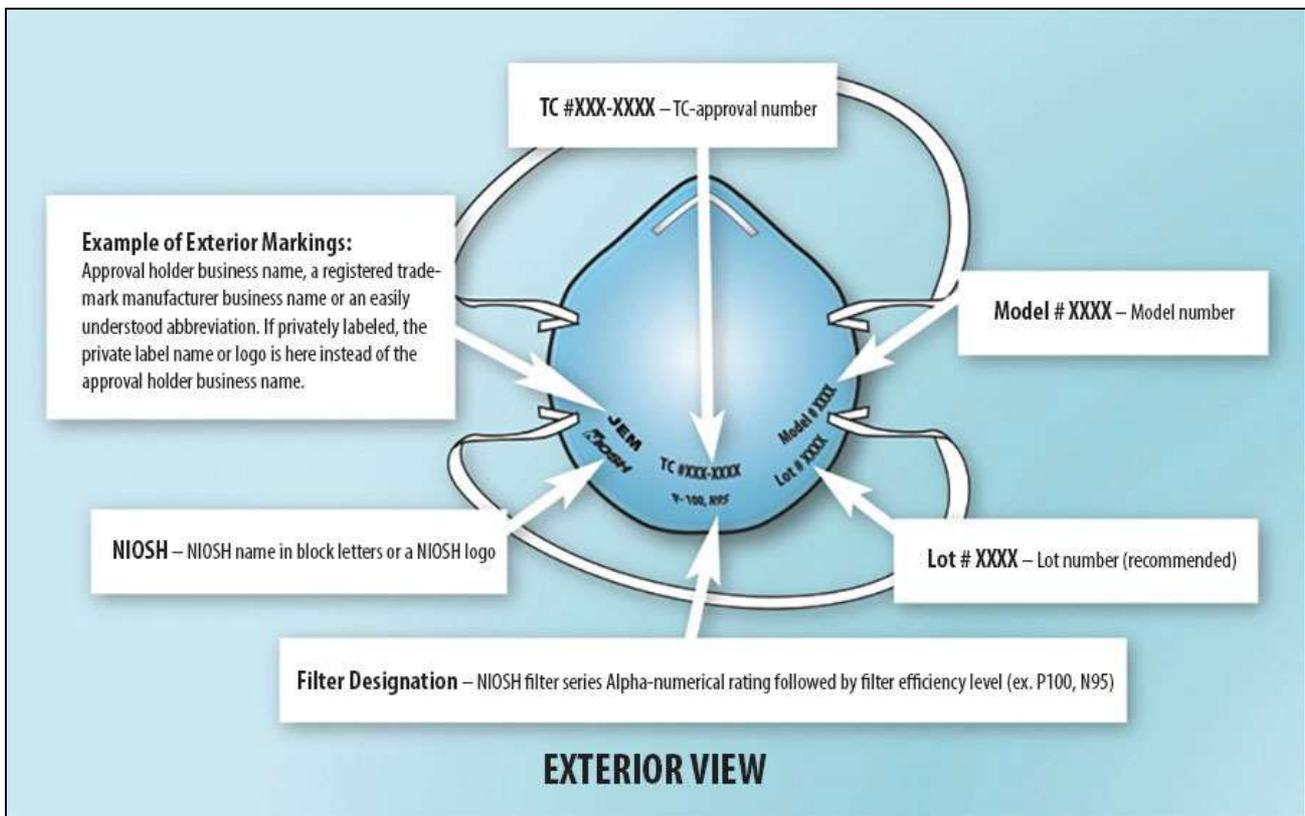
[cdc.gov/coronavirus](https://www.cdc.gov/coronavirus)

To remove mask, take straps and pull forward. Wash hands before and after removing mask. Place mask in a plastic bag. Reusable cloth mask should be wash with hot water and detergent, it should be completely dry before next use. Surgical mask should be discarded by following biomedical waste management.

Respirator

Respirator is a mask or device worn over the mouth and nose to protect the respiratory system by filtering out the dangerous substances from inhaled air.

Parts of respirator



Parts of respirator include

1. Face piece,
2. Head straps,
3. Valves,
4. Connecting tubes,
5. Cartridge,
6. Filters.

Types of respirator

1. Air- Purifying Respirators
2. Remove contaminants from the air

Particulate respirators

Gas mask respirators

3. Air – supplying respirators
4. Provides clean source of air
 - a. Supplied air respirator
 - b. Self -contained breathing apparatus

Select a type of respirator to see all approved models:

[N95](#) – Filters at least 95% of airborne particles. Not resistant to oil.

(N95 Manufacturers Index: [3M](#) [A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#))

[Surgical N95](#) – A NIOSH-approved N95 respirator that has also been cleared by the Food and Drug Administration (FDA) as a surgical mask.

[N99](#) – Filters at least 99% of airborne particles. Not resistant to oil.

[N100](#) – Filters at least 99.97% of airborne particles. Not resistant to oil.

[R95](#) – Filters at least 95% of airborne particles. Somewhat resistant to oil.

[P95](#) – Filters at least 95% of airborne particles. Strongly resistant to oil.

[P99](#) – Filters at least 99% of airborne particles. Strongly resistant to oil.

[P100](#) – Filters at least 99.97% of airborne particles. Strongly resistant to oil.

Guidelines for usage of respirator

Inspect all parts of the respirator before use . The respirator must be put on correctly and worn during the exposure. The respirator must fit snugly against user’s face to ensure that there are no gaps between thr user’s skin and respirator seal.

Respirator On / Respirator Off

When you put on a disposable respirator

Position your respirator correctly and check the seal to protect yourself from COVID-19.



Cup the respirator in your hand. Hold the respirator under your chin with the nose piece up. The top strap (on single or double strap respirators) goes over and rests at the top back of your head. The bottom strap is positioned around the neck and below the ears.



Place your fingertips from both hands at the top of the metal nose clip (if present). Slide fingertips down both sides of the metal strip to mold the nose area to the shape of your nose.



Place both hands over the respirator, take a quick breath in to check the seal. Breathe out. If you feel a leak when breathing in or breathing out, there is not a proper seal.



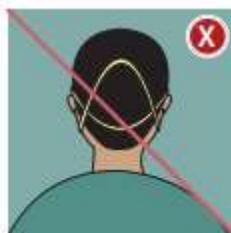
Select other PPE items that do not interfere with the fit or performance of your respirator.



Do not use a respirator that appears damaged or deformed, no longer forms an effective seal to the face, becomes wet or visibly dirty, or if breathing becomes difficult.



Do not allow facial hair, jewelry, glasses, clothing, or anything else to prevent proper placement or to come between your face and the respirator.



Do not crisscross the straps.



Do not wear a respirator that does not have a proper seal. If air leaks in or out, ask for help or try a different size or model.



Do not touch the front of the respirator during or after use! It may be contaminated.

When you take off a disposable respirator



Remove by pulling the bottom strap over back of head, followed by the top strap, without touching the respirator.



Discard in a waste container.



Clean your hands with alcohol-based hand sanitizer or soap and water.

Employers must comply with the OSHA Respiratory Protection Standard, 29 CFR 1910.134, which includes medical evaluations, training, and fit testing.

Additional information is available about how to safely put on and remove personal protective equipment, including respirators: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html>



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[cdc.gov/coronavirus](https://www.cdc.gov/coronavirus)

Cleaning and disinfecting all the surfaces in clinic on a daily basis is a tough task and there may be chance of getting infection from fomites. So primary prevention is the better way to avoid getting infected. Hand Hygiene measures, social distancing norms, avoid frequent touching on facial surface should be practiced on a daily basis in this pandemic.

Conclusion

COVID-19 is a pandemic which puts both the patient and dentist at risk for cross infection. Nevertheless, we cannot avoid dental practice during COVID-19 pandemic, because dental complaints may be an emergency. Nasal and or pharyngeal secretions are the prime source of infection and the dentist is exposed to this in close proximity during dental

procedure. Dental procedures consisting of both aerosol and non-aerosol generating treatment adequate protection will be provided by dentist for patients following WHO and CDC guidelines. Dentist are advised to follow the standard guidelines and keep himself updated to protect his life and society. Research on infection control in the dental setting needs to be advanced.

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