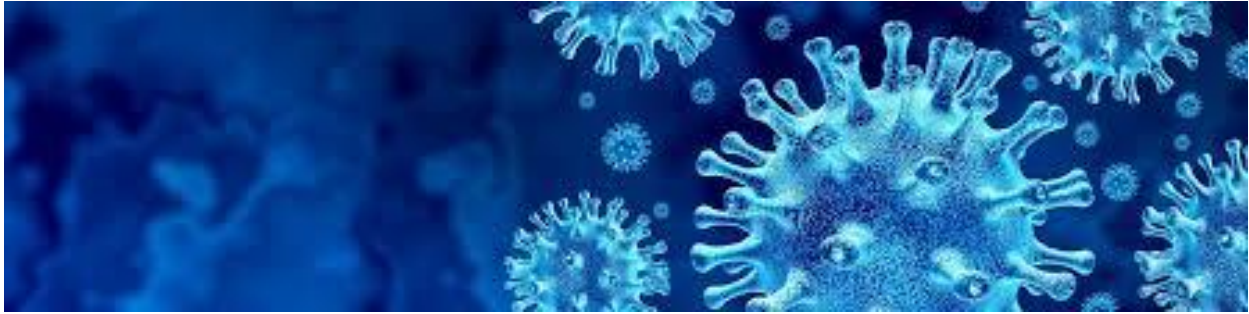


SARS-CoV-2 AND DENTAL PRACTICE



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Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that causes Coronavirus Disease 2019 (COVID-19), is a strain of viral species SARSr-CoV and member of the subgenus Sarbecovirus (beta-CoV lineage B).¹ The virion is 80-220 nm in diameter.² Incubation period is estimated between 2 and 14 days; sometimes as long as 24 days.³

Studies have shown the role of oral mucosa in COVID-19 infection.⁴ Angiotensin-Converting Enzyme 2 (ACE2) is an important receptor for SARS-CoV-2 and it is highly expressed in lung tissue, tongue and salivary glands.⁴

Carriers with the virus who cough or sneeze generate droplets loaded with Covid-19. By coughing, sneezing, talking or just breathing, aerosols are produced carrying water droplets with viruses.²

A coronavirus outside the body remains infectious for about 2-3 hours in dry air and perhaps for up to 3 days in a humid environment.⁵ It is more persistent on smooth non-porous surfaces.⁶

All coronaviruses are highly vulnerable to soap, hydro-alcoholic solutions and common household disinfectants.⁶ Surface disinfection with 0.1% of sodium hypochlorite or 62-71% ethanol significantly reduces coronavirus infectivity on surfaces within 1 minute exposure time.⁶

Dentists are the most exposed professionals to the risk of contamination once using low or high-speed handpieces, lasers, ultrasonic scalers, electrosurgery units, air polishers, air/water syringes.⁷

Air filtration system for dental clinics

The best way to decontaminate the air of the treatment room is to use an extraoral suction system. These machines are made of filters of High Efficiency Particulate Air (HEPA) filters H13 or H14 that are paired with pre-filters and a UV light system. A constant air flow must be maintained into the room by opening windows and doors. The use of air-conditioners is not recommended because they cool or heat the same air that exists without supplying the room with fresh air.⁸

What Personal Protective Equipment is required?

- Protective glasses: Anti-fog goggles, firmly placed to the face.
- Face shields: fitted at the front especially with the use of dynamic instruments⁹.
- Respiratory protection masks:
 - **N95** (regulated by the FDA, filter up to 95% of particles).
 - **FFP2, FFP3** (Filtering Face Piece: certified by the European Union (EU), filter up to 94% and 99% of particles, respectively).
 - **KN95**: They are regulated by the Chinese government, filter 95% of particles.
- Gloves
- Cover-head
- Cover-shoe
- Coverall and Surgical Gowns

How to put on PPE (Don) for high risk aerosol generating procedures^{10,11}

How to put on PPE (Don) for high risk aerosol generating procedures

- 1- Ensure that all the needed PPE are available
- 2- Plan where to put the PPE
- 3- Remove any watch and jewelry
- 4- Tie hair
- 5- Wear scrubs
- 6- Wear rubber boots
- 7- Put on shoe-cover
- 8- Perform hand hygiene
- 9- Put on inner gloves
- 10- Put on cover-all/gown
- 11- Put on respiratory protective mask: position the respirator under your chin with nosepiece up.
 - Pull the top strap over your head resting it high at the back of your head
 - Pull the bottom strap over your head and position it around the neck, below the ears.
 - Note that facial hair (beard) may prevent a proper respirator fit.
 - Perform the seal check
 - Inhale deeply and feel the respirator slightly being sucked in.
 - Exhale sharply and feel the respirator slightly bulge.
- 12- Put hood on. Make sure that it covers all the hair, ears and neck with no skin exposed.
- 13- Put the face shields or goggles.
- 14- Put on outer gloves. Ensure that the cuffs are pulled over the sleeves of the gown/cover-all.

How to safely remove PPE (Doff)^{10,11}

How to safely remove PPE (Doff)

- 1- Avoid self-contamination
- 2- PPE should be taken off in the removal area in a bag for infectious waste.
- 3- Take off contaminated equipment first
- 4- Disinfect outer gloves
- 5- Remove boot covers. Use a « hands-free » approach by stepping on the back of the cover and lifting the foot. Touch only the inner surface of it.
- 6- Disinfect outer gloves and remove them.
- 7- Put goggles and face shield in a separate container to be cleaned.
- 8- Disinfect inner gloves.
- 9- Remove hood without touching its inside.
- 10- Disinfect inner glove and remove coverall: lift the chin and unzip completely by touching only the inside of the coverall.
- 11- Disinfect inner gloves and remove them.
- 12- Perform hand hygiene and put a new pair of gloves.
- 13- Remove N95 (or FFP2) without touching the front of the N95 respirator.
- 14- Disinfect gloves then disinfect washable boots.
- 15- Disinfect and remove gloves.
- 16- Perform hand hygiene and clean the floor of PPE removal area using 1:10 bleach solution.

What is considered dental emergency?

For adults^{12,13}

- Uncontrolled bleeding
- Pulpitis
- Pericoronitis
- Cellulitis
- Surgical postoperative osteitis
- Dental trauma: avulsion or luxation
- Gum infection with pain or swelling
- Postoperative care
- Denture adjustment for medically compromised patients
- Biopsy of abnormal tissue

For children¹⁴

- Presence of a facial swelling
- Traumatic dental injuries: avulsion or severe luxation of an immature permanent central incisor
- Traumatic dental injury to primary dentition
- Pulpitis
- Snipping or adjusting wire of braces that hurts the cheek or the gum.

Protocol for dental care during COVID-19

Patients should be asked if they show symptoms of a respiratory infection, and if they had contact with possible COVID-19 carriers.^{15,16} If the patient is afebrile and asymptomatic, then dental care can be provided.

COVID-19-positive individuals who have completed their isolation can receive emergency dental care if:

- At least 3 days have elapsed since recovery (resolution of fever without medication use and improvement in respiratory symptoms).
- And at least 7 days have elapsed since the first symptoms.
- Negative results of at least two consecutive nasopharyngeal swab specimens collected more than 24 hours apart are a must.¹⁶

Before treatment

1. Give the patient a surgical mask, a cover-head and a shoe cover upon arrival with no hand shaking and rub with a hydro alcoholic solution.
2. Explain on a poster how to be protected.
3. All accessories not needed must be removed. What remains must be covered.
4. Use a protective cover for the dental chair.

During treatment

5. Use an antimicrobial mouth rinse before the treatment^{17,18}. A povidone-iodine mouthwash (Betadine BDB 2%) or a hydrogen peroxide mouthwash (1%)¹⁷.
6. Avoid or minimize procedures that produce droplets or aerosols (ultrasonic scalers, 3-way syringe). Prioritize minimally invasive techniques (hand instruments).
7. If aerosol-generating procedures are unavoidable, use four-handed dentistry, high evacuation suction and rubber dams to minimize spatter and aerosols¹⁷.
8. Reduce intraoral x-rays for not stimulating coughing and saliva secretion. Extraoral dental radiographies, such as panoramic radiography and CBCT are alternatives during COVID-19¹⁹.
9. For surgical procedures, it is advised to use absorbable suture.

10. If we have to use a high-speed handpiece, we can schedule the patient's appointment as the last emergency appointment to reduce the risk of nosocomial infection.
11. Every aerosol-producing procedure should ideally take place in a highly-ventilated room (air flow of at least 160L/s). Air purifiers with HEPA filters or Extra-Oral Vacuum Aspirators (EOVA) may significantly reduce the risk of transmission.²⁰

After treatment

12. After treatment, cleaning of the room must take place. Disinfection and air ventilation for an hour are essential after each patient, because SARS-CoV-2 can be suspended in the air (Fig 1).
13. Water and air should be discharged for 20 to 30 seconds after each patient.^{17,21}
14. Change turbines and handpieces between patients and sterilize them.
15. Breathing without N95 or FFP2 mask, even several minutes after dental care for an infected patient could contaminate the dentist, the next patient, and spread the disease.²² Masks must be removed and discarded after leaving the room of treatment.¹⁹
16. Remove the surgical gown or coverall before leaving the treatment area.¹⁹

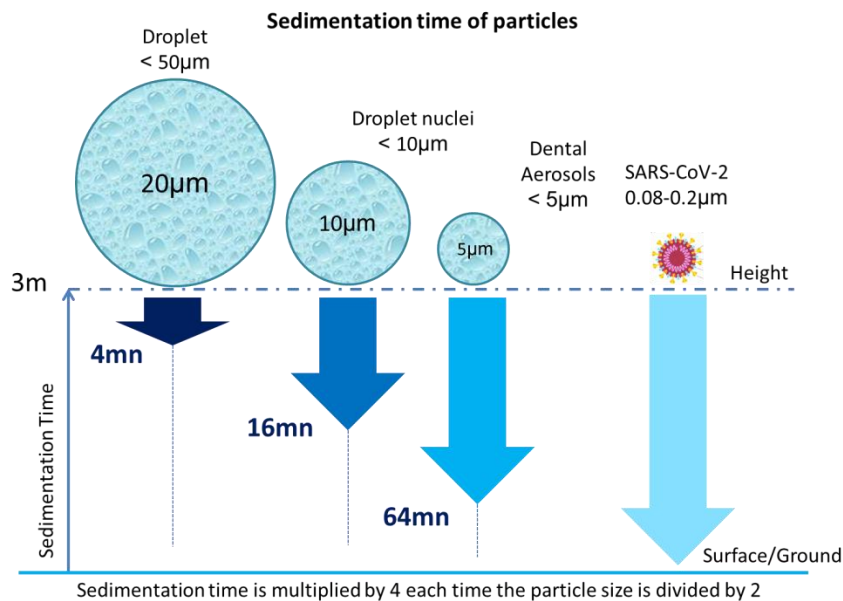


Figure 1: Sedimentation time of particles

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