

Redesigning Dentistry To A New Reality In The Era Of COVID-19- A Review Article

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ABSTRACT: *The epidemic of coronavirus disease 2019 (COVID-19) led to unprecedented outbreak in Wuhan, China; has become a major public health challenge for not only China but also countries around the world. The severe global quarantine efforts and social distancing were taken worldwide in response to this global outbreak. This has challenged the health professions and systems evoking heightened reactions around the globe as response to Covid-19. While most heavily impacted, the role of the dental professionals in preventing the transmission and responding to its long-term impacts on dentistry is crucially important. This review article, while outlining the essential knowledge about COVID-19 and nosocomial infection in dental settings, provides recommended strategies for dental practitioners to redesign dentistry to a new reality in a way to combat dental crisis to bridge the gaps in dental settings to overcome this emergency.*

Key words: *Covid-19, Impact on dentistry, Dental professionals, Dentistry, Dental crisis.*

1. INTRODUCTION

The World Health Organization (WHO), in the last decade has declared four diseases as Public Health Emergency of International Concern (PHEIC) i.e., “an extraordinary event which is determined to constitute a public health risk

to other states through international spread of disease.” The diseases are: H1N1 Swine flu (2009), Polio Virus (2014), Ebola virus (2014 and 2019) and Zika virus (2016).^[1]

Over the past 2 decades, coronaviruses (CoVs) have been associated with significant disease outbreaks in East Asia and the Middle East. The severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS) began to emerge in 2002 and 2012, respectively. Recently, a novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), causing coronavirus disease 2019 (COVID-19), emerged in late 2019, and it has posed as a public health emergency of international concern on 30th January, 2020.^[2]

Microbiology Of Sars-Cov-2 Virus

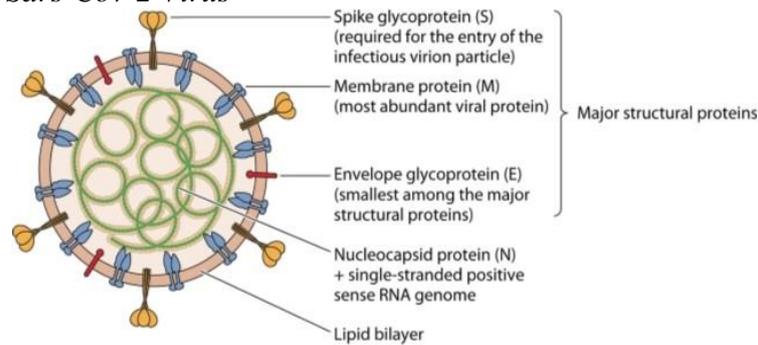


Figure 1: SARS-COV-2 virus structure. [2]

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a member of the order Nidovirales, family Coronaviridae, subfamily Orthocoronavirinae, which is subdivided into four genera, viz., Alphacoronavirus, Betacoronavirus, Gammacoronavirus, and Deltacoronavirus. The genera Alphacoronavirus and Betacoronavirus originate from bats, while Gammacoronavirus and Deltacoronavirus have evolved from bird and swine gene pools.^[2]

Coronaviruses possess an unsegmented, single-stranded, positive-sense RNA genome of around 30 kb. The nucleocapsids forming envelope of the virus are present in a helical symmetry which reflects an atypical attribute in positive-sense RNA viruses. The electron micrographs of SARS-CoV-2 revealed a diverging spherical outline with some degree of pleomorphism, virion diameters varying from 60 to 140nm, and distinct spikes of 9 to 12nm, giving the virus the appearance of a solar corona. The CoV genome is arranged linearly as 5'-leader-UTR-replicase- structural genes (S-E-M-N)-3' UTR-poly(A). Hemagglutinin-esterase gene (HE) is characteristic of some betacoronaviruses, though it is absent in other genera of the virus. The virus encodes four major structural proteins, namely, spike (S), membrane (M), envelope (E), and nucleocapsid (N) (figure 1).^[2]

Pathogenesis

2019-nCoV enters the cell in the same path as SARS coronavirus, i.e., through the ACE2 cell receptor. 2019-nCoV can effectively use ACE2 as a receptor to invade cells, which may promote human-to-human transmission. ACE2+ cells were found to be abundantly present throughout the respiratory tract, as well as the cells morphologically compatible with salivary gland duct epithelium in human mouth. ACE2+ epithelial cells of salivary gland ducts were demonstrated to be a class early targets of SARSCoV infection⁵⁰, and 2019-nCoV is likely to be the same situation, although no research has been reported so far^[3]. Also, patients infected with COVID-19 showed higher leukocyte numbers, abnormal respiratory findings, and increased levels of plasma pro-inflammatory cytokines. The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury. Significantly high blood levels of cytokines and chemokines were noted in the patients with COVID-19 infection that included IL1- β , IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFN γ , IP10, MCP1, MIP1 α , MIP1 β , PDGFB, TNF α , and VEGFA. Some of the severe cases that were admitted to the intensive care unit showed high levels of pro-inflammatory cytokines including IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1 α , and TNF α that are reasoned to promote disease severity^[4].

Incubation Period And Symptoms

The incubation period of COVID-19 has been estimated at 5 to 6 days on average and there is

evidence that it could be as long as 14 days, which is now the commonly adopted duration for medical observation and quarantine of (potentially) exposed persons.^[5]

A recent study led by Prof. Nan-Shan Zhong’s team, by sampling 1099 laboratory-confirmed cases, found that the common clinical manifestations included fever (88.7%), cough (67.8%), fatigue (38.1%), sputum production (33.4%), shortness of breath (18.6%), and sore throat (13.9%), and headache (13.6%).^[6] Patients eventually die of multiple organ failure, shock, acute respiratory distress syndrome, heart failure, arrhythmias, and renal failure.^{47,48,49} We should therefore pay attention to potential multiorgan injuries and the protection and prevention thereof in the treatment of COVID-19. Differentiating features between Cold, Flu and Coronavirus should be understood (table).^[5]

FEATURES	COLD	FLU	CORONAVIRUS
Time between catching the virus and beginning to show symptoms	1-3 days	1-4 days	2-14 days
Symptom onset	Gradual	Abrupt	Gradual
How long does symptom last?	7-12 days	3-7 days	Mild cases -2 weeks. Severe or critical disease-3-6 weeks.
Fever	Sometimes	Common	Common
Running nose	Common	Sometimes	Less common
Sore throat	Common	Sometimes	Less common
Cough	Common	Sometimes	Common
Bodyache	Rare: if occurs mild	Common	Less common
Difficulty breathing	Rare	Rare	Common

Table 1: showing differentiating features between Cold, Flu and Coronavirus (Acc.to Coronavirus No-Panic help guide by 1mg.)^[5].

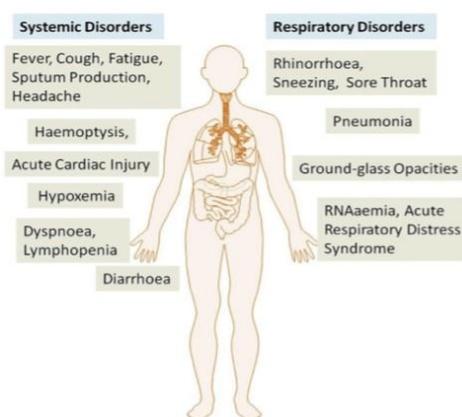


Figure 2: The systemic and respiratory disorders caused by COVID-19 infection.

The incubation period of COVID- 19 infection is approximately 5.2 days. There are general similarities in the symptoms between COVID-19 and previous betacoronavirus. However, COVID-19 showed some unique clinical features that include the targeting of the lower airway as evident by upper respiratory tract symptoms like rhinorrhoea, sneezing, and sore throat.

Additionally, patients infected with COVID-19 developed intestinal symptoms like diarrhoea only a low percentage of SARS-CoV patients exhibited diarrhoea.^[4]

Potential Ways Of Transmission

Reproduction number (R0) is an epidemiologic metric used to describe the contagiousness or transmissibility of infectious agents.^[7] R0 of COVID-19 infection was earlier estimated to be in the range of 1.4 to 2.5; recently, it was estimated to be 2.24 to 3.58. Compared to its coronavirus predecessors, COVID-19 has an R0 value that is greater than that of MERS (R0 < 1) but less than that of SARS (R0 value of 2 to 5).^[2]

The common transmission routes of novel coronavirus include direct transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes). Although common clinical manifestations of novel coronavirus infection do not include eye symptoms, it has been seen that conjunctival samples from confirmed and suspected cases of 2019-nCoV suggests that the transmission of 2019- nCoV is not limited to the respiratory tract⁴, and that eye exposure may provide an effective way for the virus to enter the body. In addition, respiratory viruses can be transmitted from person to person through direct or indirect contact, or through coarse or small droplets, and 2019-nCoV can also be transmitted directly or indirectly through saliva. It has been suggested that 2019-nCoV may be airborne through aerosols formed during medical procedures. It is notable that 2019-nCoV RNA could also be detected by rRT-PCR testing in a stool specimen collected on day 7 of the patient’s illness. However, the aerosol transmission route and the fecal–oral transmission route concerned by the public still need to be further studied and confirmed.^[8]

Symptomatic transmission	Direct transmission from a symptomatic individual, through such a contact that can be readily recalled by the recipient.
Pre-symptomatic transmission	Direct transmission from an individual occurs before the source individual encounters noticeable symptoms.
Asymptomatic transmission	Direct transmission from individuals who never encounter noticeable symptoms that can be established by follow-up, as single time-point observation cannot fully distinguish asymptomatic from pre-symptomatic individuals.
Environmental transmission	It is via contamination, and in a way that would not typically be attributable to contact with the source in a contact survey (i.e., this does not comprise transmission pairs who were in extended close contact, but for whom in reality the infectious dose passed via the environment instead of more directly). These could be identified by an analysis of spatial movements.

Table 2: showing potential ways of transmission of novel corona virus.^[5]

Potential Transmission Routes Of 2019-Ncov In Dental Clinics

Due to the specificity of its procedures, dental care settings invariably hold the risk of 2019-nCoV infection 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 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. Infections can be present through any of these conditions involved in an infected individual in dental clinics

and hospitals, especially during the outbreak of 2019-nCoV (Figure-3).^[8]

AIRBORNE SPREAD: The droplet and aerosol transmission of 2019-nCoV are the most important concerns in dental clinics and hospitals, because it is difficult to avoid the generation of large amounts of aerosol and droplet mixed with patient’s saliva and even blood during dental practice. Besides the infected patient’s cough and breathing, dental devices such as high-speed dental handpiece uses high-speed gas to drive the turbine to rotate at high speed and work with running water. When dental devices work in the patient’s oral cavity, a large amount of aerosol and droplets mixed with the patient’s saliva or even blood will be produced. Particles of droplets and aerosols are small enough to stay airborne for an extended period before they settle on the environmental surfaces or enter the respiratory tract. Thus, the 2019-nCoV has the potential to spread through droplets and aerosols from infected individuals in the dental clinics and hospitals.^[8]

DENTAL DEVICE	PROCEDURE
Ultrasonic and sonic scalers	<ul style="list-style-type: none"> • Considered as the greatest source of aerosol contamination. • Use of high-volume evacuator reduces contamination by 95%.
Air polishing	<ul style="list-style-type: none"> • Air-borne contamination is almost equal to that of ultrasonic scalers. • Use of suction devices reduces airborne contamination by more than 95%.
Air-water syringe	<ul style="list-style-type: none"> • Air-borne contamination is almost equal to that of ultrasonic scalers. • High-volume evacuator reduces airborne contamination by 99%.
Tooth-preparation with air turbine handpiece	<ul style="list-style-type: none"> • Minimal contamination if a rubber-dam is used.

Table 3: Dental devices and procedures known to produce airborne contamination.^[1]

The viral particles can usually travel a distance of 6 feet but when aerosolized (cough, sneeze or dental care), can potentially travel across far greater distance approximated upto 20 feet. The virus detected in aerosols can survive up to 3 hours and this aerosolized virus can remain viable and infectious on various surfaces for extended span. The nature of the surface can alter the viable capacity of the virus. On plastic and stainless steel surfaces, the virus can remain viable up to 72 hours, on cardboard up to 24 hours and on copper surfaces up to 9 hours. This persistence capacity of the virus may infect many people and can cause secondary infections everywhere in the environment. ^[1]

Contact spread:

A dental professional’s frequent direct or indirect contact with human fluids, patient materials, and contaminated dental instruments or environmental surfaces makes a feasible route to the spread of viruses. Additionally, dental professionals and other patients have likely 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. Effective infection control strategies are needed to prevent the spread of 2019-nCoV via these contact routines.^[8]

Contaminated surfaces spread:

Human coronaviruses such as SARS-CoV, Middle East Respiratory Syndrome coronavirus (MERS-CoV), or endemic human coronaviruses (HCoV) could persist on surfaces like metal, glass, or plastic for up to a couple of days. Hence, contaminated surfaces that are frequently contacted in healthcare settings are a potential source of coronavirus transmission. Dental practices derived droplets and aerosols from infected patients likely contaminate the whole surface in the dental offices. In addition, it was shown at room temperature that HCoV remains infectious from 2 hours up to 9 days, and persists better at 50% compared with 30% relative humidity. Therefore, keeping a clean and dry environment in the dental office would help decrease the persistence of 2019nCoV.^[8]

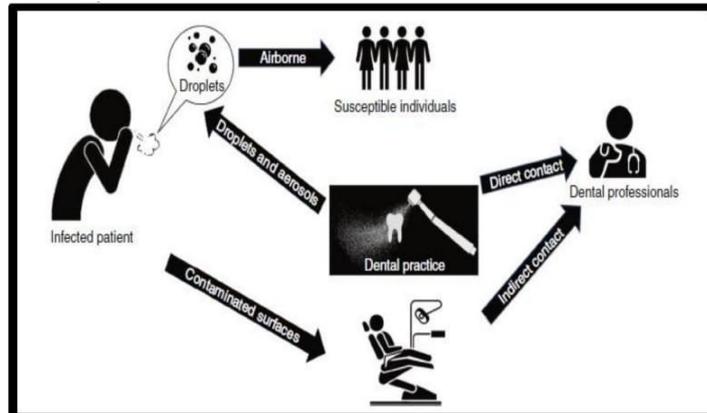


Figure 3: Illustration of transmission routes of 2019nCoV in dental clinics and hospitals^[8].

Epidemiology:

As of 7th December 2020, it has been reported that around 67,250,219 people have tested positive for the virus(confirmed cases); out of which 1,538,533 have passed away(total deaths) all over 191 countries/regions of the world.(Table 4).^[9]

REPORTING COUNTRIES	TOTAL CASES	CONFIRMED	TOTAL DEATHS
US	14,769,353		282,375
India	9,677,203		140,573
Brazil	6,603,540		176,941
Russia	2,466,961		43,122
France	2,345,648		55,247
Italy	1,728,878		60,078
United Kingdom	1,727,755		61,342
Spain	1,684,647		46,252
Argentina	1,463,110		39,770
Colombia	1,371,103		37,808

Table 4: Global cases of COVID-19 by the center of systems science and engineering at John Hopkins University. ^[9]

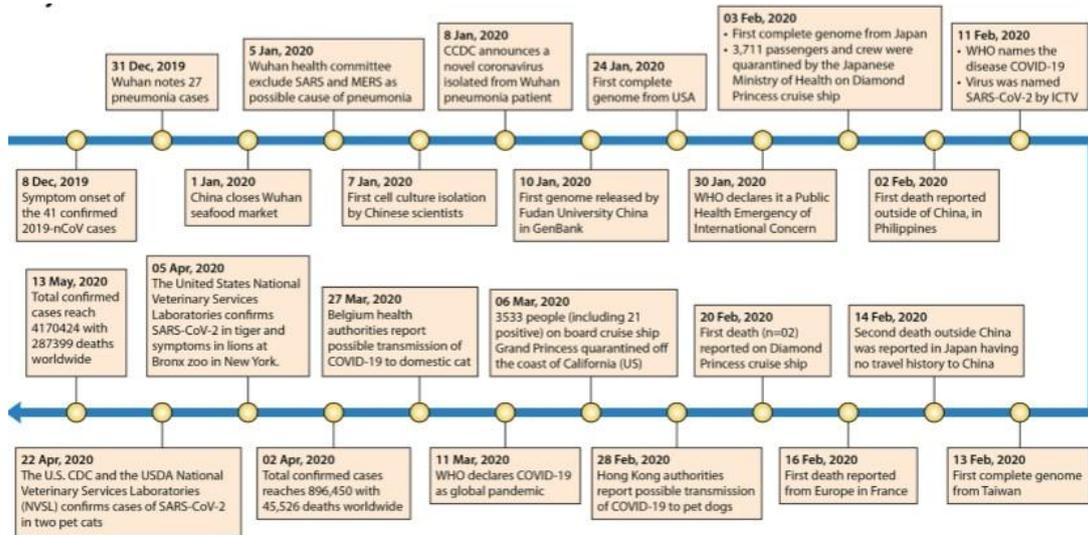


Figure 4: depicting the significant events which occurred during the SARS-CoV-2/COVID-19 virus outbreak. The timeline explains the significant events during the current SARS-CoV-2 outbreak, from 8 December 2019 to 13 May 2020.^[2]

Social Distancing

Social distancing has been encouraged by many nations as a primary factor to reduce the rate of infection spread and to “flatten the curve” (figure 5) of numbers of those infected over a period of time^[5].

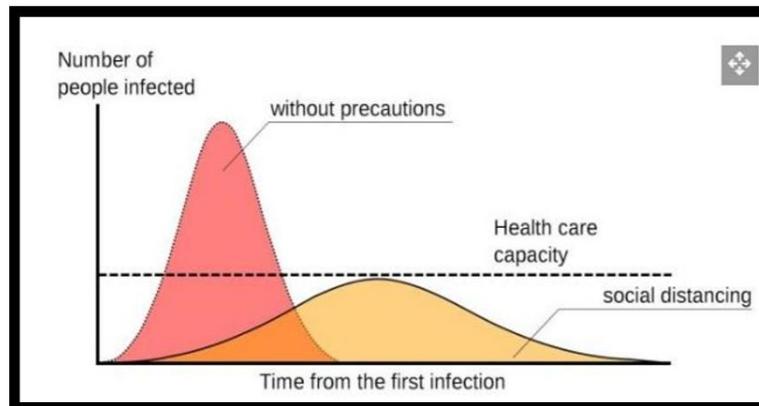


Figure 5: A sample epidemic curve, with and without social distancing. (Image credit: Johannes Kalliauer/ CC BY- SA 4.0)^[5]

Social distancing has been encouraged/expected by many nations as a single primary factor to reduce the rate of infection spread and to “flatten the curve” (figure 6) of numbers of those infected over a period of time. Along with social distancing, other measures taken to limit the doubling time and rate of infection are constantly updated by the Centre for Disease Control, USA. This minimizes the potential for people to contract the disease from a contagious person.^[5]

Impact Of Social Distancing On Dental Practice

With the advent of COVID-19 and subsequently social distancing, the dental practice seems to be on stake. The ability of rapid human to human transmission of COVID-19 infection especially through asymptomatic infected individuals and aerosol, has paralyzed life across the globe. Although the COVID-19 infection primarily affects physical health, however, it can also affect mental health through the fear of transmission both in patients and dental

clinicians and high mortality rate that can further paralyze the life. The fear of being infected due to close contacts with infected symptomatic and asymptomatic patients may decrease the working efficiency in current health care providers including dentists. In addition to the high risk of contracting infection due to direct interaction with infected and suspected individuals, healthcare workers have also been seen to develop severe mental conditions including stress, anxiety, and related mental illnesses.^[10]

According to a survey involving some 20 thousand US dentists, the decrease in earning and patients flow is alarming and could certainly affect the ability of most practices to pay their employees.^[11] In fact, the inability of paying the employees over a longer time can be further sensed from the finding that 28% of dentists remained unable to pay their staff during the 3rd week of March 2020 with another 45% who managed partial payment.^[11] The US situation given here applies to everywhere in the world, where almost all dental practice have been shut either voluntarily or by governmental orders of sheltering at homes. Furthermore, the patients' flow was drastically affected with few patients reporting only for what can be described as urgent dental care. Besides this, existing dental students as well as the many would be dental students and their parents developed a dilemma regarding pursuing dentistry as career. Hence, it is anticipated that even in the coming year or so, this reluctance will continue toward seeking admission in dental institutions. Dental education will soon be seen as very costly unaffordable by students and their parents. Additionally, it is likely that reduced demand for dental products and equipment will also impact on new investment in dental education and dental healthcare industry. Despite the explosion of information available online and through social media, it is still difficult to identify reliable research evidence and guidance. As such most of the decisions made have simply moral ground with no evidence from research. The rising boom for orthodontics / elective restorative and cosmetic dental services will no more continue and perhaps considered absolutely unnecessary by many people. Gone seem to be the "prophy mills" where dentists / hygienists have been working in a 'fast food' dental environment without adequate time for the provision of safe care. Perhaps, more worrying is that in the coming time, our slogans highlighting and emphasizing the link between oral health and systemic health will be ignored by many people as a reason for seeking dental treatment and maintaining oral and dental health. Furthermore, our preaching of the impact of teeth of the vibrant and pleasing look and smile, on the quality of life, better prospect for social engagements and employment will not convince our patients anymore to seek dental consultation and dental care services for achieving these outcomes considered due from dentistry. As such, it is likely that we may see less dentistry on the globe. Hence many existing dental professionals have already started thinking of leaving, with yet many more to be thinking of quitting their beloved dental profession permanently and opting for alternative jobs and career fields. Dental hospital buildings have been considered to undergo reconfiguration to host medical care with only specialists in oral and maxillofacial surgery kept engaged to provide urgent dental and facial trauma and oncology care.^[12]

How To Combat Dental And Patient Crisis In The Current Scenario

A. Motivational strategies :

In a difficult phase, where our routine is suddenly transformed, and where we are "forced" to be separate from our families and friends, and added to that, we also cannot exercise our professional activity in the same way as before, the psychological aspect of the human being can logically be affected. It is interesting to focus on what is possible to be accomplished, to spend our energy on what we have control over. The things, in which we cannot have decision- making command, should not be the focus of our actions, since it would only be

spent of energy without any concrete result as an answer. Focusing on what we have control, we consider essential to take care of our mental state, to work our feelings so that we can overcome this phase in the best possible way. One way to control our psychological aspect, would be to feel active, even though we are not attending patients as often as before. Being in the office, with the team, studying the strengths and weaknesses of the business, is a way to motivate and better prepare for the moment experienced. Allied to this, we need action; there is no sense in having ideas and not putting them into practice. The moment now is to plan, to reinvent, but mainly, to move, so that these changes take place. Due to the high clinical demand of professional dental surgeons, it is common that there is no time for this strategic alignment of business and market, perhaps this is the time, for those who have this gap, to leave their comfort zones and promote concrete actions in this area.^[13] Also, in such an uncertain and truly testing situation, the responsibility of senior dental professionals is to come forward and help and save dentistry as a profession. Dental professionals are required to feel encouraged and to remain innovative and imaginative in this unprecedented period. This, they can do by considering how to help and work and support dental industry in their efforts of quickly coming up with feasible new universal design full fledge airborne infection isolation dental surgery clinic (AIIDSC).^[12]

B. Clinical operating strategies:

Without a doubt, dentistry will change with this pandemic in several aspects. It is important that the dental business have this vision, in order to have a great chance of economic recovery and the issue of reinventing oneself is extremely important in this sense.^[13]

Supportive action towards patients:

The focus of reinventing oneself must always be the patient, he is the most interested in this process, all of our actions must be focused on him. Within the context of focusing on the simple, on what is possible, we can exercise a supportive action to our patients. Contact each one of them, showing concern for the current situation, wanting to know about his health and making yourself available for any eventual need he may have in terms of oral health. This type of action can attract patients at this time, in addition to making your client even more loyal to a future moment of need.^[13]

Implementing biosafety measures:

One aspect to be changed are the issues of biosafety, new service protocols are being suggested, due to the high transmission capacity of the new virus, mainly in a dental environment. The dental office environments, have always been very biosafety, due to the great risk of contagion from other diseases. At the present time, these actions must be complemented with additional care, in order to reduce the risks of transmission from the dental team to patients and vice versa, in addition to less transmission from patient to patient^[13].

Measures to curb aerosol contamination in clinics:

To prevent bio aerosol contamination (figure-aerosol), the clinics should the clinic should be fumigated with formaldehyde done through four technologies. Such as:

- Filtration: Filtration can be done using high-efficiency particulate arrestor (HEPA) filters.
- Ozonization: In this process, the air is subjected to high voltage charges, which results in the separation of oxygen atoms and ozone isotopes. Ozone molecules are highly reactive and when they come in contact with microorganisms, they react and render them harmless. However, the amount of ozone required to destroy pathogens in the air would

present a health risk to dental personnel and patients.

- **Ionization:** This technology uses charged electrodes to project negative ions into the air. The microorganisms are attracted to these ions and as a result become heavier and precipitate onto surfaces. However, the microorganisms are not destroyed through this process. They remain viable and thus require further treatment through some more conventional forms of disinfection.
- **Air sterilization:** In this process, UV radiation is used. Ultraviolet radiation ruptures the DNA of bacteria and viruses. Thus making them sterile and incapable of reproduction.
- **Extraoral Suctions:** Use of high power extraoral suctions can also reduce the cross contamination by aerosols in a clinic, as it is capable of removing up to 80% of total aerosol produced during a procedure.
- **Surface Sanitization:** Surface sanitization of the dental offices can be easily achieved by chemical sanitization or by UV sanitization; as a result, it prevents indirect transmission of microbes.^[1]

Non-chemical approach:

This includes flushing of Dental Unit Water Lines (DUWL) water, improving the quality of water using anti retraction valves and retrograde aspiration. Physical cleaning can be done by using sponges or balls, making them pass through the pipeline in order to remove the biofilm. Use of fumigation techniques and UV light in the workplace are also an option.

Chemical approach:

This includes the use of chemical disinfectants which have broad spectrum anti-microbial activity like chlorhexidine gluconate, povidine iodine, glutaraldehyde, ethanol, hypochlorite and peroxide.

Apart from these, the hand piece should be externally sterilized by autoclaving and internally by using chemiclave. The suction pipes should be cleaned with ammonia. Surfaces such as dental unit light handles, electrical and mechanical controls, head and arm rest of the chair, dental unit controls can be wrapped using aluminum foils or thin plastic sheets [1].

(I) **SPECIFIC DENTAL PRECAUTIONS FOR THE REDUCTION OF AEROSOLS:**

DENTAL SPECIALITY	SPECIFIC PRECAUTIONS
ENDODONTICS	<ul style="list-style-type: none"> • Rubber dam must be applied at all times during endodontic treatment. • Use of hand instruments is recommended instead of rotary instruments. Vital pulp therapy (VPT) is much preferred to conventional root canal treatment.
RESTORATIVE AND PEDIATRIC DENTISTRY	<ul style="list-style-type: none"> • In selective cases, consider chemomechanical caries removal and atraumatic restorative techniques. • For cavity preparations, prefer hand instruments over rotatory instruments. • Endorse manual scaling and polishing.
PERIODONTICS	<ul style="list-style-type: none"> • Hand and ultrasonic approaches have similar clinical effects on the reduction of dental plaque and calculi. Therefore, using instruments manually is preferable.
PROSTHODONTICS	<ul style="list-style-type: none"> • Salivary suction should be used to avoid

	<p>gagging in patients.</p> <ul style="list-style-type: none"> • Impression and prosthodontics materials should be properly disinfected prior its delivery to the prosthodontics laboratories. • The disinfection procedure is as follows: <ul style="list-style-type: none"> a) Initial irrigation using tap water. b) Placement of the material in a disinfectant such as sodium hypochlorite for 10minutes. c) Re-irrigation using tap water. • Use of rubber dam is necessary for crown and bridge and other prosthodontics procedures. • Use of supra-gingival margins can be considered for posterior bridges.
ORAL AND MAXILLOFACIAL RADIOLOGY	<ul style="list-style-type: none"> • Extraoral imaging such as computed tomographic imaging and panoramic radiography are recommended.
ORAL AND MAXILLOFACIAL SURGERY	<ul style="list-style-type: none"> • For the case of a simple extraction, treat the patient in a supine position. • Using salivary suction during procedures is necessary. • In case of wounds, rinse it slowly. • Use absorbable material for suturing.
ORTHODONTICS	<ul style="list-style-type: none"> • In case of a bracket breakage the spot can be covered with orthodontic wax instead of rebonding.

Table 5: Strategies to reduce droplet and aerosol generation in different dental specialties. ^[1]

Following proper hand hygiene:

Following proper hand hygiene should be followed as guided by WHO. Any health-care worker, caregiver or person involved in direct or indirect patient care needs to be concerned about hand hygiene and should be able to perform it correctly and at the right time. Clean your hands by rubbing them with an alcohol-based formulation, as the preferred mean for routine hygienic hand antisepsis if hands are not visibly soiled. It is faster, more effective, and better tolerated by your hands than washing with soap and water.

- Wash your hands with soap and water when hands are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.
- If exposure to potential spore-forming pathogens is strongly suspected or proven, hand washing with soap and water is the preferred means.
- Take care of your hands by regularly using a protective hand cream or lotion, at least daily.
- Do not routinely wash hands with soap and water immediately before or after using an alcohol-based handrub.
- Do not use hot water to rinse your hands.
- After hand rubbing or handwashing, let your hands dry completely before putting on gloves.^[14]

Use of masks:

Table 6 shows the type of mask for use by health workers depending on transmission scenario, setting and activity as recommended by WHO. This table (table 6) refers only to the use of medical masks and respirators. The use of medical masks and respirators may need to

be combined with other personal protective equipment and other measures as appropriate, and always with hand hygiene.[15]

COVID-19 Transmission scenario	Who	Setting	Activity	Type of mask to be used
Known or suspected community transmission	Health worker or caregiver	Health facility (including primary, secondary, tertiary care levels, outpatient care, and LTCF)	In patient care area irrespective if patients are COVID-19 suspect/confirmed	Medical mask (continuous medical masking)
	Personnel (working in health care facilities but not providing care for patients, e.g. administrative staff)	Health care facility (including primary, secondary, tertiary care levels, outpatient care, and LTCF)	No routine activities in patient areas	Medical mask not needed. Medical mask should be considered only if in contact or within 1m of patients, or according to local risk assessment
	Health worker	Home visit (for example, for antenatal or postnatal care, or for a chronic condition)	When in direct contact or when a distance of at least 1m cannot be maintained.	Consider using a medical mask
	Health worker	Community	Community outreach programs	Consider using a medical mask
Sporadic transmission or clusters of COVID19 cases	Health worker or caregiver	Health care facility (including primary, secondary, tertiary care levels, outpatient care, and LTCF)	Providing any patient care	Medical mask use according to standard and transmission-based precautions (risk assessment)
	Health worker	Community	Community outreach programs	No mask needed

Any transmission scenario	Health worker or caregiver	Health care facility (including primary, secondary, tertiary care levels, outpatient care, and LTCF) Health care facility (including LTCF), in settings where aerosol generating procedures are performed	When in contact with suspected/confirmed COVID-19 patient Performing an AGP on a suspected or confirmed COVID-19 patient or providing care in a setting where AGPs are in place for COVID-19 patients.	Medical mask Respirator (N95 or N99 or FFP2 or FFP3)
	Health worker			
	Health worker or Caregiver	Home care	When in close contact or when a distance of at least 1 m cannot be maintained from a suspect or confirmed COVID-19 patient	Medical mask

Table 6: Type of mask for use by health worker depending on transmission scenario, setting and activity^[16]

Use of personal protective equipment (ppe):

Figure-6 illustrates recommendations for putting on and removing personal protective equipment for treating COVID-19 patients. ^[16]



Figure 6: Centers for Disease Control and Prevention recommendations for putting on and removing personal protective equipment for treating COVID-19 patients. From: <https://www.cdc.gov/hai/pdfs/ppe/ppe-sequence.pdf>. Site accessed March 17, 2020. [16]

Mouth rinse before dental procedure:

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. Patient is requested to brush his/her teeth before appointments. According to Dr. Davidson, "This very real possibility can be easily diminished by reducing biofilm viral load in the mouth and pharynx region with 1.5% peroxide for 60 seconds, thereby reducing viral load and basically disinfecting the throat. Peroxide drops coronavirus replication by >4 logs. These types of debridement controls are often overlooked." [1]

Use of disposable (single-use) devices:

Use of disposable devices such as mouth mirror, syringes to prevent cross contamination is encouraged.

12 o'clock operator's sitting position:

12 o'clock operator's sitting position is mostly recommended during COVID-19 outbreak as it is considered to be a more safe position and prevents direct aerosols exposure.

Radiographs:

Extraoral imaging such as computed tomographic imaging should be used to avoid gag or cough reflex that may occur with intraoral imaging.

Minimize use of aerosol producing dental devices:

Dentists should minimize the use of ultrasonic instruments, high-speed hand pieces, and 3way syringes to reduce the risk of generating contaminated aerosols.

Use of rubber dams:

Use of rubber dam could significantly reduce airborne particles in ~3-foot diameter of the operational field by 70%.

Use of anti-reflux devices:

Hand pieces should be equipped with anti-reflux devices to avoid contamination.

Use of high vacuum evacuator:

When correctly positioned near the hand piece and close to the mouth can reduce 90% of aerosol production.

Discard used masks:

Discard used N-95 masks following aerosols generating procedures, procedures contaminated with blood, nasal secretions etc.

Management of medical waste:

Should be transported to the temporary storage area in a double layered yellow color medical waste package bags with gooseneck ligation and should be marked and disposed in accordance with the Biomedical Waste Management and Handling Rules 2016, 2018.^[1]

Promoting The New Equipments

In addition to this main objective, we can use this new care to our advantage, in terms of business. We can value this aspect, in communication with patients. Any action in this sense, whether by the acquisition of new equipment that promotes a more sanitized environment, or by the simple change of routine on the arrival of patients, care with the staff's individual protection, must be evidenced with the patient, so that he realizes this concern of the company with the client, making him feel important and confident in undergoing dental treatment even in times of pandemic. Logically, this approach must be careful and in an appropriate way, we cannot generate fear in the patient, but rather create a way to acquire his confidence that there is an environment prepared to take care of him without causing risks to his health. A clinical aspect, that we must adapt in this phase of changes, is the optimization of dental procedures.

Less Circulation Of Patients

The routine of caring a large number of patients per period should be modified, the trend will be few visits on the day with longer duration, so that there is less circulation of people in the office environment. For this, an adaptation in the clinical routine of many offices will need to be adjusted, logically each one within the reality of the public it serves, but we see possibilities, in this sense, for any demand.

Optimization of procedures:

The important thing will be, to establish a concrete treatment plan, with beginning, middle and end. In the initial phase of the treatment, establishing an adequate case planning, the clinical phases can be carried out in an orderly and objective way. In this way, the optimization of procedures will be facilitated and the patient's discharge will be accomplished in a shorter treatment time.

Understanding The Differing Patients' Demands

Another important aspect in the resumption of dental practice, within the clinical practice, is to understand that the patients' demand will be different. The focus should be on prevention and rapid problem resolution, since patients, even after the pandemic, will be restricted to leaving home, at least in a first moment.

Elective treatments, such as aesthetics, for example, should not be a priority for clients, therefore, we suggest a change of focus, to a more preventive and resolving approach,

promoting the health and comfort of patients.

Offering Less Costly Treatments

Offering less costly treatments, with greater payment possibilities since the economic lag will reach everyone. Therefore, within a clinical perspective, these are scenarios that professionals must begin to understand and put into practice for a readjustment to a new reality.^[13]

2. CONCLUSION

We must work hard to find and implement ways to keep our much needed profession stay on thriving and to remain on the frontline of healthcare services besides the fact that today we are facing a sorry and confused situation for the dentistry which might continue till the availability of a point-of-care quick serological Covid-19 testing suitable for dental practice setting and a proven vaccine for Covid-19 having long-lasting efficacy. It is the high time to keep supporting each other in our professional family, support and help patients with reduced contact, restrict the generation of aerosols and use the best masks and personal protective equipment (PPE) along with looking for our own mental health and wellbeing. We all know that there should be a strong belief to distance fear well away from the hope we currently have. In this regard, the good news of the coming back to normal of the routine dental care in Wuhan, China, since its suspension last January 2020, is certainly encouraging but the effects arising from this, if any, need to be strictly followed over a period. We hope that this article may shed some light on the gaps in preparedness of many dental professionals for such pandemics in the future, thus minimizing disruptions to their practices.

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