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Review Article

Managing Prosthodontic (Geriatric) Patients during the SARS-CoV-2 Pandemic

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Abstract

Since the beginning of this millennium, we are witnessing a surge in outbreaks across the globe. COVID-19 has been termed as the disease responsible for the current pandemic. The disease is caused by a beta coronavirus (SARS-CoV-2 (2019)) and within a span of 6 months has affected more than 200 countries. The death toll of more than half a million people has particularly been severe on the geriatric population (65 years and older), especially those whose systemic status is compromised (existing comorbidities). Presently, only predictions are being made regarding the duration of this pandemic. Most gerodontic treatments are performed by prosthodontists. This review besides presenting an overview of the COVID-19 is also aimed to guide clinicians to develop a robust long-term approach to this crisis by overcoming the anxiety associated with COVID-19, identifying general and COVID-19-related limitations of gerodontic care, reorganizing clinical and academic practices with a new approach (important and urgent), and minimizing aerosol production during prosthodontic procedures. Novel psychosocial and ethical issues associated with the COVID-19 pandemic have also been addressed in brief. Academic and private clinical geriatric practice commencement has been discussed based on scientific facts. Limitations of this study being the highest level of unpredictability about the pandemic, which could end abruptly or may be a vaccine will be produced in which case everything may become null and void.

Keywords: Comorbidity, Coronavirus, Gerodontic, Pandemic, Prosthodontist

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Introduction

The ongoing coronavirus (CoV) disease 2019 (COVID-19) is caused by the virus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has been declared as a pandemic by the World Health Organization (WHO).[1] The causative virus belongs to the largest known RNA Coronoviridae family (subfamily Coronavirinae and Torovirinae), with subfamily Coronavirinae having four genera (α, β, γ, and δ) out of which the alpha and beta coronavirus are transmissible to humans.[2] The beginning of this millennium (2001–3000) has already witnessed three major zoonotic beta CoV outbreaks (SARS-CoV [civet cats], MERS-CoV [Middle East respiratory syndrome coronavirus; dromedary camels], and SARS-CoV-2 [Chinese horseshoe bats]).[3,4] COVID-19 was reported from China on December 31, 2019 and to date has affected 215 countries (≥30 million infected cases) with almost a million deaths.[5] CoV was first reported in domesticated chickens in the year 1931 (infectious bronchitis virus)[6] while the first human discovery was reported in the year 1961.[7] COVID-19 disease has till now perplexed scientists with its reproduction rate (R_0 2.5–3),[4] rapid progression (median days from the first symptom to dyspnea is 5 days, to hospital admission is 7 days, and to acute respiratory distress syndrome [ARDS] is 8 days), and its difficulty in screening among the population.[8] The present evidence suggests that the virus can be transmitted directly through viral laden droplets (respiratory) and can remain viable within droplets on surfaces between few hours to several days,[9] depending upon the type of surface[10] and temperature and humidity variations (lower temperature and lower relative

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humidity increase air suspension).[11] While clinically apparent infections are most contagious, human transmission can even occur during a silent infection, during the incubation period, and/or during the convalescent stage. Despite the majority of cases being mild, clinically apparent symptoms reported in order of their severity are fever, fatigue, dry cough, nausea, vomiting, anorexia, lethargy, arthralgias, myalgias, headache dyspnea, diarrhea, anosmia (hyposmia), and loss of taste.[4,8,12,13] Developing an ARDS and acute kidney injury (AKI) has been associated with reporting of dry cough as the first symptom.[8] While a quick reliable method for diagnosis of COVID-19 is still pending, currently confirmatory diagnosis is done by real-time reverse transcription-polymerase chain reaction assay on respiratory (deep phlegm) or blood serum samples.[14] The test amplifies nucleic acids of the virus but has the problem of high false-negative rates due to factors such as the location of sample collection (superficial vs deep phlegm) and sample taken at which stage of incubation which alters the degree of viral load in the sample.[15] Other independent diagnostic tests include virus isolation, viral antigens (immunofluorescent test), and antibody detection.[14] Routine diagnostic aids such as peripheral blood picture (lymphocyte count decreased), serum chemistry (increased levels of creatine kinase, myoglobin, aspartate transferase, creatinine, and C reactive protein), and computed tomography (CT; bilateral multilobular ground glass opacity) are specifically dependent upon the severity (shock, acute cardiac injury, arrhythmia, ARDS, and AKI) of an intensive care unit case.[16] Global strategy to combat the COVID-19 pandemic has been directed to decrease the spread of the infection although the cases are increasing alarmingly. For infected cases, early diagnosis, isolation, supportive medication (antiviral, glucocorticoid, and chloroquine phosphate),[16,17] and supportive care in the form of oxygen inhalation, ventilation (noninvasive and invasive mechanical ventilation), and extracorporeal membrane oxygenation have been main lines of management.[8,12-15,17] Total estimate for the overall case-fatality rate for the COVID-19 pandemic has been predicted to be between 0.25% and 3%,[18] although current data have shown it to be between 0.39% and 4.05%,[19] which tends to be less than previous coronavirus outbreaks (SARS, ≈10%; MERS, ≈34%).[19] However, a significant impact of the COVID-19 pandemic till now has been its fatality rate in geriatric (65 years and older) patients, especially with existing comorbidities such as obesity, diabetes, cardiovascular, and cerebrovascular diseases.[4,8,12,18] While early data showed a case fatality rate of 8% (70–79 years) and 14.8% (≥80 years),[20] data from New York reports to be as high as 24.9% (65–74 years) and 48.7% (≥75 years).[21] According to WHO estimates at present, the fatality rate for those older than 80 years of age is five times the global average,[22] while in Europe, 95% of fatalities due to COVID-19 have been 60 years and older.[23]

Globally, the geriatric population has increased (increased life expectancy and improved health care) and is expected to reach almost 850 million (12% of the overall human population) by 2025.[24] Elderly people are also one of the largest consumers of availing health care facilities globally. Besides various medical specialties, gerodontics is largely managed by a prosthodontist within dentistry. Their role in geriatric care has even claimed them to be in a position to identify the existence of elder maltreatment because their patients have been found to develop trust in them while undergoing prosthodontic treatment.[25] COVID-19 pandemic has been predicted to last more than what has been thought (18–24 months),[26] and despite large community transmission in China, the demand for dental treatment has been reported to decrease only by 38%.[27] Globally the early response of various dental associations/organizations toward pandemic was to advise practitioners to either close their practices (CDA, 2020) or limit dental practice to only urgent treatments. However, a recent study in China has shown that there has been a decrease in the reporting of urgent dental treatments (trauma) and an increase in the proportion of regular dental and oral infections.[27] At the same time closure of dental practices in a country like India, where only 2.7% of the registered dentists are employed by the government (*Times of India*, April 21, 2019) has socioeconomic implications besides increasing suffering of dental patients especially elderly people. Meanwhile, careless dental procedures could exaggerate the intensity and duration of the pandemic. Since most countries have stopped lockdowns and with the above-mentioned factors, the aim and objectives of this review are to present an overview of the COVID-19 disease to every practicing dentist with a special focus on geriatric care for the prosthodontic practice. The review also aims to enhance prosthodontists in both private and academic practice to develop a consistent, effective, and competent long occupancy approach toward providing safe gerodontic care by identifying the challenges that the pandemic presents until rapid COVID-19 testing or vaccine is available. A search of literature (2002–2004, 2013–2014, 2019–2020) was conducted on different medical databases (MEDLINE, PubMed, Scopus, PsycINFO, Google Scholar, ResearchGate, and ProQuest) using individual and/or a combination of general and medical terms (coronavirus, covid 19, pandemic, WHO, CDC, CMS, SARS, flu, pneumonia, viral, worldometer, dentistry, prosthodontist, economy, lockdown, vaccine, prevention, infection control, and many more) during the second quarter of the year 2020. Relevant articles were selected by reviewing titles, abstracts, keywords, and full texts by two independent reviewers using a prepared template for the review. Besides scientific literature, media, and health reports/briefings, government reports and guidelines that are outside the traditional academic publishing were also deemed necessary and included as gray literature in preparation of this review.

COVID-19 Challenges in Gerodontic (Prosthodontic) Practice

The curious case of an anxious prosthodontist and an anxious geriatric patient

A profession that may endanger one's own life is bound to create stress (response to a threat) and anxiety (specific

reaction to stress). Mild anxiety is normal, natural, and promotes preventive and safeguarding behavior.[28] A prosthodontist, however, is bound to develop severe anxiety about COVID-19, because his profession has been declared as a high-risk profession.[29] Fear associated with chances of dying,[30] getting infected or infecting his family member,[31] fear of getting isolated or quarantined (if infected), stigmatization by family and society, and the possibility of losing practice can be psychologically traumatic and contribute to existing stress. On the other side, we have an elderly person who knows that he has a higher risk of severe illness and/or even mortality if infected with COVID-19,[8,12] who feels he may face discrimination in decisions on medical and life support care (*New York Times*, March 31, 2020), who is vulnerable to be neglected or abused during lockdown/quarantine by his caregivers (including children),[32] who may even not be able to maintain social distance or perform hand hygiene, whose social and economic (access to health care, jobs, and pensions) well-being is under threat, and who may have not even a caretaker (old age home). In countries like India, the present elderly population is more apprehensive due to the risk of losing jobs (post-retirement) and their inability to use various COVID-19-related mobile applications. During this pandemic, when such an anxious elderly patient enters a dental clinic and is attended by a fully masked (look like an alien) doctor, who hesitates to touch him and talk to him from a distance, he is bound to feel more anxious. Nonverbal communication is absent and the entire status of individuals gets exaggerated with daily news about COVID-19 spread and related death. Control of such anxiety is necessary before starting any clinical procedure. Most of the anxiety related to being infected can be minimized by following a strict infection control protocol, including hand hygiene and respiratory etiquettes as studies have found that they are essential in controlling the spread of respiratory illness including SARS.[33]

Managing COVID-19-related stress in oneself and in older patients

Elderly prosthodontists and general dentists, especially with compromised immunity and systemic health, need to be more careful in case they plan to provide geriatric care. About more than 1000 health care workers have already been reported (till May 1, 2020) to lose their lives due to COVID-19 (youngest being 20 years and oldest being 99 years old).[34] But millions of health care workers are continuing their fight with the virus day and night. Stress and the feelings associated with it are by no means a reflection that one cannot do his prescribed job or that one is weak. Besides physical health, the COVID-19 challenge for all is to be able to manage mental and associated psychosocial well-being, especially those who are not used to lockdowns, quarantines, etc. Stress related to COVID-19 can be reduced/minimized by seeking information only from trusted sources (minimize watching, reading, or listening to news of COVID-19), ensure sufficient rest (sleep) at night, during work, or in among shifts, engage in physical activity, maintain a familiar routine, and stay socially active by contacting friends and relatives. Improve your immune defense by eating sufficient and healthy food, fruits, and vegetables. Have a thorough knowledge of the steps to be taken if a patient having COVID-19 enters, read the guidelines (CDC, CMS, local, national, and international as they build confidence), and stay updated with COVID-19 spread, including monitoring of trends by being informed regularly through consultation with state/local health department.[22,26] It is important that a prosthodontist must attend his geriatric patients with great attention, calm behavior, and communicate in a way that is specific and clear, especially when a prosthodontist knows that nonverbal communication with his patients is absent (masking decreases nonverbal communication).[35]

Vulnerable elderly (limitations of geriatric care)

Early studies indicate that elderly with existing comorbidity results in a faster progression of COVID-19-related complications such as ARDS and AKI.[20,36] This has been attributed to a weaker immunity that results due to frailty (weakness), existing metabolic disorders such as obesity, diabetes, cardiovascular, and liver disease (immune cell activation), pharmacokinetics (immune checkpoint inhibitors), and slower body response to SARS-CoV-2.[17,20] Clinically, elderly patients have been reported to present atypical symptoms (respiratory) masking of chronic obstructive pulmonary disease (COPD) and atypical blood work during the COVID-19 pandemic.[4,8] Generally, elders may find it difficult to wear a mask/wash hands/maintain social distance (sensory problems) thus increasing their vulnerability. Their limitations of communication (instructions to be communicated in a clear, concise, and respectful way), noncooperative nature, do not recognize their higher risk, dementia, depression, and stress are some essential hiccups that every practitioner needs to overcome.

Clinical/academic reorganization

Before one starts his practice in either a private or an academic (department) setup, one needs to reorganize the entire clinical setup to accommodate easy recognition (critical and noncritical areas) and rapid action. These may include color-coding areas (social distance, waiting, hand hygiene, sterilized, and disposal areas),[37] setting up teledentistry (for online consultations before, during, and after treatment) to minimize self and patient exposure, installing physical barrier (plexiglass dividers) in administrative, waiting, reception, and near toilets depending on the size of the clinic, increasing the number of facilities for cleaning and sanitization, providing disposable touch items (for door handles, taps, and elevator buttons), training staff for appropriate human

behavior (respiratory and hand hygiene, cough etiquette), and placing preventive COVID-19-related posters, instructions, and signboards at all strategic places. Fever monitoring should be done for everyone at the entry. For staff and students, one needs to develop a long-term occupancy capacity rather than repeated short-term crisis management and thereby protect them from chronic stress that will result due to working in high-stress areas. Simple administrative steps include frequent staff rotation (higher to a lower stress area), partnering (inexperienced with experienced), enhancing open communication (between students, teachers, and administrative staff), and develop mutual trust to facilitate cooperation.[38] Many academic institutes should also have an alternative plan if and when they have to work around the shortage of personal protective equipment (PPE).[39] Psychological counseling for students and staff needs to be provided and self-learning programs need to be initiated at all academic levels. Evaluation criteria for such programs need to be redefined and clearly communicated to all students.

Aerosol control and protection

Aerosol in clinics is generated by procedures like suctioning, intubation (implant and pre-prosthetic surgeries), and most of the standard dental procedures that involve the use of a high/low-speed handpiece, ultrasonic scaler, and air-water syringes. While aerosol is considered as mode of transmission both aerosol and vertical transmission of c COVID-19 is not yet scientifically confirmed,[40] although the related virus has been isolated from the saliva.[41] Individual protection using either an N-95 or N-99 mask during all dental procedures has been considered appropriate,[42] while a commonly used surgical mask is compulsory when the distance is less than 1 m (patient interviews and patient education). Aerosol exposure during a clinical procedure can be greatly reduced by using a rubber dam, high vacuum suction, anti-retraction handpieces, efficient ventilation system (placing a floor/table fan behind the clinician takes aerosol away from the clinician), installing air filtration units (reduces droplet count and turnover time), negative pressure rooms (for small clinics), and avoiding the use of demand and/or temperature-controlled ventilation systems.

Psychosocial and ethical considerations

COVID-19 pandemic has raised certain important issues that are mainly related to human behavior in general. Reports of discrimination by doctors regarding medical care decisions (especially where ventilators were short in supply), stigmatization of people who were suffering from COVID-19, discord at the political level among leaders, and data manipulation in a quest to publish research and the quality of peer-review process used in reviewing scientific research have surfaced during the pandemic. A prosthodontist should ensure that his treatment decisions affecting older people are guided by a commitment to dignity and the right to health, while maintaining the basic elements of doctor–patient relationship, especially consent, confidentiality, decision making, and refusal of treatment. People who have contracted COVID-19 need empathy, support, compassion, and kindness from everyone. The clinician should refrain himself from labeling such patients (COVID-19 cases, families, or diseased) and should educate other administrative and health care officials to do the same. Stigmatization is dangerous in the present stage of an epidemic and could lead to a situation where patients conceal their symptoms.

Gerodontic clinical practice during the pandemic

For the next few years, one needs to comprehend the possibility of interacting or treating an asymptomatic COVID-19 patient during his professional practice unless the present pandemic is controlled to a few spots. At present, the only thing we seem to know for sure about this pandemic is that we are still in the first half of the pandemic therefore, at this time a good initiative will be to get oneself and clinical staff tested for COVID-19; and while one is waiting for his test results, everyone involved must read and understand all necessary guidelines (both medical and dental) as laid down by local authorities (state dental councils), national (DCI, IDA), and international (CDC, CMS) organizations regarding infection control. It is important to stay aware of the latest information on the COVID-19 spread and transmission, progression of hot spots in and around the area where one practices to identify potential caution in dealing with patients from those areas. Compulsory administrative steps during the pandemic include patient registration (valid identification proof), telescreening for COVID-19 triage questions (screening also to be done every time and for everyone including patients attendees), no overlapping appointments between patients, follow and focus on one appointment only, scheduling long clinical procedures toward the end of the day (minimize aerosol exposure to others), scheduling most frail patient as the only patient for the day and first day of the working week (contaminant exposure is minimum), and possibility of special days/time for very elderly patients (older than 75 years). Clinical efficiency can be improved by prioritizing of patients depending upon urgency and importance [Table 1] as decided by the prosthodontist rather than the patient, minimizing distractions (mobile phones in particular) during any clinical procedure, practicing four hand dentistry for all steps with a principle that minimizes fomite contamination, period of rest between appointments, and proper use of isolating techniques in fixed partial denture procedures.

One is going to encounter four types of patients during the pandemic under the categories of confirmed COVID-19 case (active disease or recovered case) and unconfirmed case (asymptomatic and symptomatic). Recovered patients should be at present treated like infectious patients because

Table 1: Managing long-term competency by differentiating treatment procedures based on importance and urgency

Important and urgent	Important but not urgent	Not important but urgent	Not important and not urgent
• Uncontrolled bleeding	• Dry socket dressing changes	• Reversible pulpitis, pericoronitis, peri-implantitis responsive to drugs	• New cases seeking implant-supported restorations, removable complete/partial denture service, and fixed partial denture service
• Symptomatic infections not responding to medication (abscess, cellulitis)	• Localized pain/swelling responsive to drugs	• Localized pain/swelling responsive to drugs	• Patients not taken prior appointment for nonemergency care
• Maxillofacial trauma requiring prosthetic opinions	• Prosthesis causing irritation, pain, or ulceration	• Crown bridge cementation if temporary restoration is lost	• Patients referred by other colleagues/departments and do not have any emergency
• Tooth avulsion/luxation	• Dental caries (extensive) causing mild to moderate pain	• Replacing the temporary filling	• All elective procedures for different types of prosthesis
• Biopsy of any suddenly appeared growth	• Suture removal for implant surgery	• Ill-fitting or a loose denture	• Maxillofacial prosthodontic cases
• Denture adjustment of radiation/oncology patient	• Denture adjustment or repairs	• Trauma from a wire of a prosthesis	• Special denture cases where preliminary treatment is done by other specialists
• Fractured/broken/decemented anterior bridge	• Adjusting of a cast partial denture framework	• Temperomandibular joint pain as a result of occlusal discrepancies	
• Temperomandibular joint-related pain/dysfunction	• Fractured/broken/decemented posterior crown or a bridge	• Occlusal splints, night guard fabrications	
• Previously prepared teeth/implant abutments	• Mucosal lesions under or adjacent to a prosthesis that do not show any changes	• Fabrication of surgical splints/stents	
• Symptoms that cannot be managed by the patient	• Dentine hypersensitivity under a crown or a bridge		
• Dental treatment required prior to a medical procedure	• Occlusal equilibration procedures in FPD/implant prosthesis		
	• Patients with underlying uncontrolled systemic disease		
	• Pre-prosthetic surgeries and other mouth preparations prior to impression making		
	• Anterior fixed partial denture cases/post-core cases		

Factors that should also be taken into consideration: age of the patient, systemic health of the patient (uncontrolled/controlled medical condition), ability to manage social distance and hand hygiene independently, and patient undergoing other medical treatments. All procedures must be done under strict infection control procedures irrespective of the procedure having a potential of transfer or not

not only recusancy during the convalescence period has been observed,[43] but no evidence exists that recovered patients are not a potential source of transmission.[44] It has been recommended that dental treatment for convalescing patients with SARS should be postponed by at least 1 month.[45] As urged, treat every patient as potentially infectious and take all preventive measures to stay safe and keep other patients also safe. For all clinical procedures done within the oral cavity, use a rubber dam (except in completely edentulous patients), initiate a mouthwash for at least 15 s (0.23 povidone-iodine) to reduce salivary viral load,[46] use high vacuum suction while performing clinical procedures and minimize excess salivation, and gag reflex initiation (extra-oral views to be preferred) for all clinical procedures. For all pre-prosthetic and implant-related surgeries, use absorbable sutures rather than nylon sutures. Avoid drugs (Ibuprofen) that have been restricted for use in COVID-19 patients.[47] For all treatment options, weigh the risk and benefits and select those options that are designed for the long term. Initiate early treatments with long-term favorable prognosis (e.g., prefer overdenture rather than a conventional complete denture, or initiate root canal treatment [expose pulp] if a deep secondary carious lesion [symptomatic irreversible pulpitis] has been diagnosed around an existing fixed partial denture or a crown). For most of the clinical procedures in prosthodontic practice (occlusion, complete denture, removable partial denture, fixed partial denture, implants, temporomandibular joint disorders, and esthetic dentistry), it is important to identify the importance and urgency of each treatment step, procedure, technique, and even follow-up as presented in Table 1. The decision

should be based on the clinical judgment that is made for each individual patient according to his condition. There is no substitute for strict infection control, neither at the present time nor at any time. Teledentistry can be used for all neither important nor urgent cases as well as screening and follow-up. Minimally invasive treatments that are stable, reliable, and valid should be chosen, especially in older patients with comorbidities.

Risks

It depends on where you are (hotspot, indoors vs outdoors, nonventilated vs well ventilated), with whom you are (high people density vs low people density), and one's dedication in following social distance rules, hand hygiene, and wearing effective PPE. COVID-19 may last for more than 2 years and further lockdowns may come. In such cases, developing depression, anxiety, and stress is a high risk that needs to be taken care of by every individual.

Conclusion

An overview of COVID-19 has been presented in this review, to highlight what one might have to go through if infected (symptoms, tests, and medications) and indirectly highlight the importance of prevention in this case. Within the medical field, COVID-19 has highlighted many issues that need to be addressed such as more than 22,000 people entering the USA from China without health screening, helpless physicians to diagnose COVID-19 if an elderly has underlying COPD, and our existing health care system. Remember this is not a Formula One car race, which lasts for a few hours, but it is a rally, therefore we all be better prepared for it. Improve your and your family members' immunity against COVID-19 because we all are susceptible and sooner or later we might contract it. All gerodontic patients should be educated about their risks and if desired treatment should be deferred unless deemed important and urgent.

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Declaration of patient consent

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References

1. WHO. 2020. WHO Virtual press conference on COVID-19. Available from: https://www.who.int/docs/default- source/coronaviruse/transcripts/who-audio-ergenciescoronavirus-press-conference-full-and-final-11mar2020.pdf. [Last accessed on 2020, July 6].
2. Payne S. Family coronaviridae. Viruses 2017:149-58. doi:10.1016/B978-0-12-803109-4.00017-9
3. List of epidemics. In Wikipedia, the Free encyclopedia. Available from: https://en.wikipedia.org/w/index.php?title=List_of_epidemics&oldid=964601768. [Last accessed on 2020, July 6].
4. Li JY, You Z, Wang Q, Zhou ZJ, Qiu Y, Luo R, *et al*. The epidemic of 2019-novel-coronavirus (2019-nCoV) pneumonia and insights for emerging infectious diseases in the future. Microbes Infect 2020;22:80-5.
5. Worldometer – COVID-19 coronavirus pandemic. Available from: https://www.worldometers.info/coronavirus/#countries. [Last accessed on 2020, July 6].
6. Estola T. Coronaviruses, a new group of animal RNA viruses. Avian Dis 1970;14:330-6.
7. Kahn J, McIntosh K. History and recent advances in coronavirus discovery. Pediatr Infect Dis J 2005;24:S223-7.
8. Wang D, Hu B, Hu C, Zu F, Liu X, Zhang J, *et al*. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. J Am Med Assoc 2020;323:1061-9.
9. World Health Organization. 2020. Questions and answers on coronaviruses. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public. [Last accessed on 2020, July 3].
10. Doremalen NV, Morris DH, Holbrook MG, Gamble A, Williamson BN. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med 2020;382:1564-7.
11. Masters P. The molecular biology of coronaviruses. Adv Virus Res 2006;66:193-292.
12. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, *et al*. Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin. Nature 2020;579:270-3.
13. Lovato A, De Filippis C. Clinical presentation of COVID-19: A systematic review focusing on upper airway symptoms. Ear, Nose Throat J 2020. doi:10.1177/0145561320920762.
14. Ai T, Yang Z, Hou H, Zhan C, Chen C, Lv W, *et al*. Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: A report of 1014 cases. Radiology 2020;296:2, E32-E40.
15. Tahamtan A, Ardebili A. Real-time RT-PCR in COVID-19 detection: Issues affecting the results. Expert Rev Mol Diagn 2020;20:453-4.
16. Wang M, Cao R, Zhang L,Yang X, Liu J, Xu M, *et al*. Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. Cell Res 2020;30:269-71.
17. Gao J, Tian Z, Yang X. Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. Biosci Trends 2020;14:72-3.
18. Wilson N, Kvalsvig A, Barnard LT, Baker MG. Case-fatality risk estimates for COVID-19 calculated by using a lag time for fatality. Emerg Infect Dis 2020;26:1339-441.
19. Malik YS, Sircar S, Bhat S, Sharun K, Dhama K, Dadar M, *et al*. Emerging novel coronavirus (2019-nCoV)—current scenario, evolutionary perspective based on genome analysis and recent developments. Vet Q 2020;40:68-76.
20. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China:

Summary of a report of 72 314 cases from the Chinese center for disease control and prevention. JAMA 2020;323:1239-42.
21. Age, sex, existing conditions of COVID-19 cases and deaths. Worldometers.info. Available from: https://www.worldometers.info/coronavirus/coronavirus-age-sex-demographics/. [Last accessed on 2020, July 6].
22. COVID-19 strategy update. World Health Organization. Available from: https://www.who.int/publications-detail/covid-19-strategy-update---14-april-2020. [Last accessed on 2020, July 6].
23. Statement – Older people are at highest risk from COVID-19, but all must act to prevent community spread. Available from: https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-older-people-are-at-highest-risk-from-covid-19,-but-all-must-act-to-prevent-community-spread. [Last accessed on 2020, July 6].
24. Randal J, German T. The Ageing and Development Report: Poverty, Independence, and the World's People. 1st ed. London, UK: HelpAge International, Routledge; 1999. p. 23-4.
25. Mattoo KA, Shalabh K, Khan A. Geriatric forensics: A dentist's perspective and contribution to identify existence of elder abuse among his patients. J Forensic Dent Sci 2010;2:81-5.
26. HHS, 2020. U.S. Government COVID-19 response plan. Available from: https:// int.nyt.com/data/documenthelper/6819-covid-19-response-plan/d367f758bec47cad361f/optimized/full.pdf. [Last accessed on 2020, July 6].
27. Guo H, Zhou Y, Liu X, Tan J. The impact of the COVID-19 epidemic on the utilization of emergency dental services. J Dent Sci 2020. doi:10.1016/j.jds.2020.02.002.
28. Fazel M, Hoagwood K, Stephan S, Ford T. Mental health interventions in schools 1: Mental health interventions in schools in high-income countries. Lancet Psychiatry 2014;1:377-87.
29. Ng K, Poon BH, Kiat Puar TH, Shan Quah JL, Loh WJ, Wong YJ, *et al*. COVID-19 and the risk to health care workers: A case report. Ann Intern Med 2020;172:766-7.
30. Zhan M, Qin Y, Xue X, Zhu S. Death from COVID-19 of 23 health care workers in China. N Engl J Med 2020;382:2267-8.
31. McAlonan GM, Lee AM, Cheung V, Cheung C, Tsang KW, Sham PC, *et al*. Immediate and sustained psychological impact of an emerging infectious disease outbreak on health care workers. Can J Psychiatry 2007;52:241-7.
32. Makaroun LK, Bachrach RL, Rosland AM. Elder abuse in the time of COVID-19-increased risks for older adults and their caregivers. Am J Geriatr Psychiatry 2020;28:876-80.
33. Jefferson T, Foxlee R, Del Mar C, Dooley L, Ferroni E, Hewak B, *et al*. Interventions for the interruption or reduction of the spread of respiratory viruses. Cochrane Database Syst Rev 2007;4:CD006207.
34. In Memoriam: Healthcare workers who have died of COVID-19. Medscape - Apr 01, 2020. https://www.medscape.com/viewarticle/927976. [Last accessed on 2020, September 17].
35. Zulman DM, Haverfield MC, Shaw JG, Brown-Johnson CG, Schwartz R, Tierney AA, *et al*. Practices to foster physician presence and connection with patients in the clinical encounter. JAMA 2020;323:70-81.
36. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China. J Med Virol 2020;92:441-7.
37. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine. J Dent Res 2020;99:481-7.
38. Park SW, Jang HW, Choe YH, Lee KS, Ahn YC, Chung MJ, *et al*. Avoiding student infection during a Middle East respiratory syndrome (MERS) outbreak: A single medical school experience. Korean J Med Educ 2016;28:209-17.
39. Livingston E, Desai A, Berkwits M. Sourcing personal protective equipment during the COVID-19 pandemic. JAMA 2020;323:1912-4.
40. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
41. To KK, Tsang OT, Chik-Yan Yip C, Chan KH, Wu TC, Chan JMC, *et al*. Consistent detection of 2019 novel coronavirus in saliva. Clin Infect Dis 2020;71:841-3.
42. Ge ZY, Yang LM, Xia JJ, Fu XH, Zhang YZ. Possible aerosol transmission of COVID-19 and special precautions in dentistry. J Zhejiang Univ Sci B 2020;21:361-8.
43. Chen D, Xu W, Lei Z, Huang Z, Liu J, Gao Z, *et al*. Recurrence of positive SARS-cov-2 RNA in COVID-19: A case report. Int J Infect Dis 2020;93:297-9.
44. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, *et al*. Transmission of 2019-ncov infection from an asymptomatic contact in Germany. N Engl J Med 2020;382:970-1.
45. Samaranayake LP, Peiris M. Severe acute respiratory syndrome and dentistry: A retrospective view. J Am Dent Assoc 2004;135:1292-302.
46. Eggers M, Koburger-Janssen T, Eickmann M, Zorn J. In vitro bactericidal and virucidal efficacy of povidone-iodine gargle/mouthwash against respiratory and oral tract pathogens. Infect Dis Ther 2018;7:249-59.
47. Day M. Covid-19: Ibuprofen should not be used for managing symptoms, say doctors and scientists. BMJ 2020;368:m1086.