

Is a teledentistry an opportunity in a COVID-19 pandemic? :

Abstract: The World Health Organization (WHO) officially declared the COVID-19 pandemic as a public health emergency of international concern. Despite global efforts to contain the disease spread, the outbreak is still on a rise because of the community spread pattern of this infection. Dental professionals are at high risk for nosocomial infection and can become potential carriers of the disease. The global lockdown of educational institutions is going to cause major disruption to students' learning and cancellation of their yearly assessments. Shifting to online learning is needed in this era and effective in implementing dental virtual simulation in preclinical and clinical courses during pandemics is needed. Teledentistry has the potential to change the dynamics of the dental care delivery system. Therefore, Teledentistry can save a life by freeing up an emergency room bed and dental industry can play a vital role in flattening the curve in COVID-19 pandemic situation.

Keywords: Coronavirus disease, COVID-19 virus, Dentistry, Pandemic, Teledentistry.

Introduction:

The several cases of pneumonia of unknown aetiology in Wuhan City in Hubei Province in central China was reported by the China health authority on 31 December 2019 to the World Health Organization (WHO).[1] On 7 January 2020, a novel coronavirus, originally abbreviated as 2019-nCoV by WHO, was identified from the throat swab sample of a patient. This pathogen was later renamed a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease was named coronavirus disease 2019 (COVID-19).[2] The WHO declared the rampant spread of SARS-CoV-2 and its associated disease (COVID-19) a public health emergency with a currently known overall mortality rate to be as high as 3.4 on 30 January, 2020.[3] The novel coronavirus belongs to a family of single-stranded RNA viruses known as corona viridae, this family of viruses are known to be zoonotic or transmitted from animals to humans. There is strong evidence that this novel coronavirus has similarity to coronavirus species found in bats and potentially pangolins, confirming the zoonotic nature of this new cross-species viral-mediated disease.[4,5] The incidence of SARS-CoV-2 infection is seen most often in adult male patients with the median age of the patients was between 34 and 59 years. SARS-CoV-2 is also

more likely to infect people with chronic comorbidities such as cardiovascular and cerebrovascular diseases and diabetes. The highest proportion of severe cases occurs in adult ≥ 60 years of age, and those with certain underlying conditions, such as cardiovascular and cerebrovascular diseases and diabetes.[6] Clinical manifestations of 2019-nCoV infection have similarities with SARS-CoV where the most common symptoms include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia whereas, less common

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symptoms include headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting. Therefore, the effort on initial management of COVID-19 must be addressed to the early recognition of the suspect and contain the disease spread by immediate isolation and infection control measures as no vaccination is available.[6-9] Dental professionals are at high risk for nosocomial infection and can become potential carriers of the disease. These risks can be attributed to the unique nature of dental interventions, which include aerosol generation, handling of sharps, and proximity of the provider to the patient's oropharyngeal region. If adequate precautions are not taken, the dental office can potentially expose patients to cross-contamination.[10] As the understanding of this novel disease is evolving, dental practices should be better prepared to identify a possible COVID-19 infection, and refer patients with suspected, confirmed, or a history of COVID-19 infection to appropriate treatment centres.[11]

Teledentistry, new field, has the potential to change the dynamics of the dental care delivery system. It is an upcoming field in dentistry that combines telecommunication technology, digital imaging, and the internet to link health providers in rural or remote communities.[12] The birth of teledentistry as a subspecialist field of telemedicine can be linked to 1994 and a military project of the United States Army (U.S. Army's total dental access project), aiming to improve patient care, dental education, and effectuation of the communication between dentists and dental laboratories. As technology has advanced, new opportunities for teledentistry have been created.[13] Teledentistry can be defined as the practice of using videoconferencing technologies to diagnose and provide advice about treatment over a distance. It is about delivering data from one point (spoke site) to another point (hub site) using telecommunications technology.[14] Therefore, the purpose of present review was to find out the usefulness, limitations and legal aspects of teledentistry in a COVID-19 pandemic.

Teledentistry - A positive hope in a pandemic:

The pandemic of COVID-19 has become a major public health challenge for many countries around the world moreover, the global lockdown of educational institutions is going to cause major disruption to students' learning as well as cancellation of their yearly assessments.[15] Dental students are particularly at risk, due to the possibility of aerosols produced in many dental procedures that were suggested as a way of transmission of the COVID-19 virus.[16] Shifting to online learning is needed in this era and effective in implementing dental virtual simulation in preclinical and clinical courses during pandemics is needed. Patients who suffer from dental issues are in dilemma over available options to address their

unbearable toothache, bleeding disorders, pain, swelling, cracked teeth, chipped teeth, loose teeth, abscesses, cold sores, broken denture, filling fell out and other serious oral health issues during a lockdown situation.[17] With simple tools like smartphones and laptop webcams, dentists can see the most vulnerable dental patients safely in their homes thereby eliminating their risk of infection while hospitals were doing only elective surgeries and treatments. Parents often use teledentistry to ask questions about their children's teeth.[18] Teledentistry will eliminate the need for unnecessary exposure during this coronavirus outbreak and stay in touch with their current patients and allow the dentist to triage dental emergency calls and will improve quality of care.[19] Hence, teledentistry may provide a possible solution to many prevailing problems related to dental treatment provisions, like people living in rural village areas and those who are not able to get regular dental care.

Methods of teleconsultation:

1. Tele-screening and triaging: Initial screening via telephone to identify patients with suspected or possible COVID-19 infection can be performed remotely at the time of scheduling appointments. The most pertinent questions for initial screening should include any exposure to a person with known or suspected COVID-19, any recent travel history to an area with a high incidence of COVID-19, presence of any symptoms of febrile respiratory illness such as fever or cough, identify residence to high-risk areas, live tracking of reported cases using the dashboard and these patients should be encouraged to engage in self-quarantine.[19,20]

2. Patient evaluation and cohorts: Patients should complete a detailed medical history form, COVID-19 screening questionnaire and assessment of a true emergency questionnaire. Dental professionals should measure the patient's body temperature using a non-contact forehead thermometer or with cameras having infrared thermal sensors. Patients who present with fever (100.4 F or 38 C) and/or respiratory disease symptoms should have elective dental care deferred for at least two weeks. Dentists should instruct the patients to contact their physician to rule out the possibility of COVID-19.[20] Tele-consultation through teledentistry can take place by Real-Time Consultation, Store-and-Forward and Remote Monitoring method.

Real-Time Consultation method involves a videoconference in which dental professionals and their patients, at different locations, may see, hear, and communicate with one another.

Store-and-Forward method involves the exchange of clinical information and static images collected and stored by the dental practitioner, who forwards them for consultation and treatment

planning. The patient is not present during the consultation. Dentists can share patient information, radiographs, graphical representations of periodontal and hard tissues, therapies applied, lab results, tests, remarks, photographs, and other information transportable through multiple providers.

Remote Monitoring method, in which patients are monitored at a distance and can either be hospital-based or home-based.[21] The Tele-Dentists' receptionist will provide the patient with the contact information. The virtual consultations can take place from the dentists' home or off and this will eliminate the need for unnecessary exposure during this coronavirus outbreak and the opportunity to triage dental emergency calls.

3. Mobile health (mHealth): Health care and public health practice and education supported by mobile communication devices, such as cell phones, tablets, computers, laptops, and personal digital assistants (PDA).[22, 2]

Limitations of Teledentistry:

The major constraints in setting up of telehealth projects in India include technical infrastructure, training and cost of equipment, time management, lack of high-speed connection, low bandwidth, etc.[19] Thus, there is a need for enhanced public awareness of the advantages of telehealth for consultations, education and post-operative follow-ups. Currently, another challenges such as to identify or get travel history of the COVID-19 patients as they might hide information, the ability to perform root canals or extractions over the virtual consult, and pay issues to the professionals who provide teleconsultation, etc.[19]

Setting course for present and/or future COVID-19 situation:

In developing country like India, a large number of population and school-going children are lacking basic oral health education as well as services and subsequently affecting their health in various forms of the disease. Implementation of a telehealth system can improve primary healthcare services hence, widen the reach of speciality care and can expand the chances for utilization of medical education and training by health care professionals and community members. Utilization of these services and teledentistry can set up a pivotal role in expanding and improving oral health and overcoming other related ill-habits such as smoking and tobacco chewing especially during the pandemic. The future of teledentistry will depend on the efforts of the health authorities as on the collective efforts of the dental professionals.²⁴ Thus, a dentist must help to slow the spread of COVID-19.

Initially, antibiotics and pain killer can be prescribed and refer to the dental hospital for dental emergencies only and also prioritize and defer some patients for later treatment, based on their medical history and symptoms. Dental practices can utilize teledentistry to reassure older adults that they can defer a cosmetic procedure or other elective treatment a few months in the future, and thus limit their risk of contracting COVID-19.[24,25] Teledentistry can help in infection control and reduction of the burden of aerosols in office by preventing. The patients with COVID-19 symptoms from entering in office and pre-screening the patients for symptoms (e.g., fever, dry cough, etc.) or a recent COVID-19 test result to defer treatment to protect other patients. Teledentistry can be helpful by prioritizing the patients based on health history, dental needs, and age e.g. younger adults and children should be scheduled first as children are less likely to show symptoms, but they can still spread the virus. Confirm the appointments of older patients according to the status of the local outbreak of COVID-19. Assess their medical risks, underlying conditions, oral needs, and whether or not are immune-compromised.[25] Thus, teledentistry can be used to assess the patient need for oral care, including medical management of caries or periodontal disease, etc.

Present and/or future role of teledentistry in different specialities of Dentistry:

Oral medicine and diagnosis: Distant diagnosis is an effective alternative in the diagnosis of oral cancer, temporomandibular joint disorder, oral mucosal diseases, salivary gland disorders, orofacial pain disorders, and infective orofacial lesions which require immediate attention, using transmission of digital images and teleradiology. Oral lesions can be electronically photographed using a 50 mm macro lens and circular illumination system, and clinical data can be stored in a textual file. Specialists of oral medicine can then analyse independently the obtained images and clinical information. They make the diagnosis and electronically return the results. This approach will prove boon to patient. Oral CDx is a method for screening oral lesions that involve a brush biopsy and computerized analysis of the histologic slide, allowing for screening of patients for premalignant or malignant lesions.[26,27] Thus, teledentistry works best in the field of oral medicine and radiology, as teleconsultation and teleradiology.

Oral and maxillofacial surgery: The clinical diagnosis of impacted or semi-impacted third molars, computerized radiographic support in dental implants placement assisted by the telemedicine approach can be effective in future smartphones provide fast and clear access and electronically mailed digital images can improved efficiency of the speciality consultation, triaging, ultimately providing improved care to the maxillofacial patient.[28]

Endodontics: Remote dentists can identify root canal orifices based on images of endodontically accessed teeth. Diagnosis of periapical lesions of the front teeth, reducing the costs associated with distant visits and making urgent help available.[29]

Orthodontics: The interceptive orthodontic treatments provided by sufficiently prepared general dentists and supervised remotely by orthodontic specialists through teledentistry will be a viable approach to reduce the severity of malocclusions in disadvantaged children when referral to an orthodontist is not feasible. Minor emergencies such as rubber ligature displacement, irritation due to the orthodontic appliance can be solved by telecommunication in the field of orthodontics, thus limiting visits to the dental office.[30]

Prosthodontics: Teledentistry can be used for diagnosis and treatment planning for patients requiring prosthetic or oral rehabilitation treatment through videoconferencing.[31]

Ethical and legal aspects of Teledentistry:

The practitioners of teledentistry should take utmost care to ensure that patient privacy is not affected. Informed consent procedure in teledentistry should be as per guidelines. The patient should be informed of the inherent risk of improper diagnosis and/or treatment due to failure of the technology involved in teledentistry practice, medico-legal and copyright issues also have to be considered. Currently, there is no method to ensure quality, safety, efficiency, or effectiveness of information or its exchange.³²

Discussion and recommendations:

There should be proper guideline at central level for teledentistry, like telemedicine in India so that it can provide patients' as well as health workers' safety. The teledentistry practice guidelines can be amended from time to time in larger public interest with the prior approval of Ministry of Health and Family Welfare, Government of India. Patients' record must have access to their dentist for guidance, support, and referral, where needed. Patient access to oral healthcare must be balanced with the risks of spreading COVID-19. Identify the resources (e.g. information and communication technology, equipment, support staff, etc.) that are required to provide teledentistry, and only proceed if those resources are available and can be used effectively in each case. Consider each patient's existing health status, specific health-care needs, and specific circumstances, confirm the identity of the patient and provide the patient with proof of their identity and licensure status (if assessing a new patient). The

Obtain an appropriate medical history, verbal history of the patient's condition and confirm the nature of the emergency before ensure that the reliability, quality, and timeliness of the patient information obtained via teledentistry is sufficient to justify providing or assisting in the provision of dental care. Therefore, dental professionals must adopt this same mindset and do the same, adopting teledentistry, into their practices.

Conclusion:Teledentistry can save a life by freeing up an emergency room bed and dental industry can play a vital role in flattening the curve in COVID-19 pandemic situation.

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