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Chapter

Perspective Chapter: Teledentistry and Distance Learning – Access to Oral Health State during COVID-19
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Abstract

Background: COVID-19 virus is the most interesting pandemic in the last two years because of its life-threatening conditions. The American Dental Association defines dental emergencies as potentially life-threatening that require immediate treatment to stop ongoing tissue bleeding or alleviate severe pain or infection. Children and adolescents frequently have traumatic dental injuries (TDIs) damaging permanent teeth. Crown fractures and luxations of these teeth are the most common forms of dental trauma. A Favorable outcome requires accurate diagnosis, treatment planning, and follow-up care. Telemedicine/Teledentistry refers to the remote delivery of clinical care through electronic communications. Dental’s virtual consultation is a convenient way to connect with patients from the comfort of their homes to show support and interest in teeth.

Keywords: COVID19, traumatic dental injuries, telemedicine, teledentistry, dental’s virtual consultation

1. Introduction

COVID-19 is a member of the coronavirus family. In Wuhan, China, the first instances were reported between December 2019 and January 2020. All viruses include DNA or RNA nucleic acids encased in a protein coat. Additionally, some viruses have lipid and protein complexes around them. Coronaviruses have a 30 kb, nonsegmental, positive-sense RNA genome with a high rate of mutation and recombination. Coronaviruses cause upper and lower respiratory infections. Rapid COVID-19 transmission by droplets, coughing and sneezing from symptomatic and asymptomatic individuals prior to the start of symptoms. These infectious droplets are capable of traveling up to 2 meters before settling on surfaces. Typically, droplets do not exceed 2 meters in height and do not adhere to the air. In favorable environmental conditions, the virus can remain active on surfaces for days, but conventional disinfectants such as sodium hypochlorite and hydrogen peroxide can eliminate it in less than one minute [1].

The SARS-CoV-2 virus can be spread by inhalation or by contacting contaminated surfaces prior to touching the nose, mouth, and eyes. Some persons may exhibit
super spreading behavior despite the fact that they may stay infectious as long as symptoms persist and even after achieving clinical recovery. The incubation time for SARS-CoV-2 infection is estimated to be 14 days following exposure, with the majority of patients developing symptoms within four to five days. A SARS-CoV-2 infection can affect anyone of any age, but the majority of those infected are middle-aged and elderly. Important clinical symptoms include fever, dry cough, tiredness, sore throat, rhinorrhea, conjunctivitis headache, myalgia, dyspnea, nausea, vomiting, and diarrhea. On the basis of this symptom, there are no clinical criteria that distinguish COVID-19 from other upper/lower airway viral infections. Under some situations, COVID-19 can cause pneumonia, lung failure, and death within the first week [2].

Among the many mechanisms of COVID-19 transmission include coughing and sneezing, direct contact with virus-infected surfaces, and inhalation of aerosols. Due to the disease’s rapid contagiousness, folks avoided public settings, particularly hospitals. On persons with probable COVID-19 infection, infection control and public health authorities must be applied. Minor illnesses that can be successfully isolated can be properly treated at home. In order to prevent the transmission of illness, individuals should be encouraged to wash their hands after having contact with unwell persons. Although asymptomatic individuals seldom use facemasks, social isolation is recommended in all places where the illness is common [3, 4].

Dentistry is the profession mostly affected by the global COVID-19 pandemic. Future workplaces will be forced to follow a clinical protocol to avoid the emergence of new illnesses and the spread of viruses. The patient’s oral secretions, contaminated materials, and dental unit surfaces may serve as possible sources of infection for the dentist, the assistant, and the patient during routine clinical practice. Saliva and blood droplets generated on surfaces, as well as aerosol inhalation from spinning machinery and ultrasound handpieces, offer considerable danger to current and future occupants. To prevent infections, dental practitioners must use disinfectants and personal protective equipment (PPE). The rapid spread of SARS-CoV-2 has forced adjustments to preventative and restorative dental practices. In dentistry, COVID-19 preventive measures include telephone and clinical triage supported by a questionnaire on recent symptoms and movements, body temperature measurement, oral rinses with 1 percent hydrogen peroxide, and the use of appropriate PPEs [5].

The maximum number of COVID-19 cases and fatality rate will be registered globally in January 2021. During the first phase of the lockdown, which covered March and April of 2020, all dental services save for emergency care were suspended. During the disastrous pandemic, a telephone triage system was implemented to keep in contact with patients in need of immediate dental care and to invite them to an in-person appointment. The goal is to reduce the possibility of viral transmission by eliminating unnecessary hospital foot traffic and imposing social distance constraints. The American Dental Association (ADA) guidelines for patients with a cured COVID-19 infection, plan to reschedule dental treatment at least 72 h after the resolution of symptoms, or 7 days after the onset of initial symptoms, such as fever controlled without antipyretics and spontaneous improvement of breathing, set the required recovery period for infected patients to 30 days prior to non-deferrable dental care [6].

During COVID-19, emergency dental treatment was expected to adhere to newly established criteria. On June 19, 2020, the program will no longer provide Urgent Dental Care and will begin promoting the reintroduction of elective services. With the second wave of COVID-19 infections and another lockdown, the service is now
well-organized, and a treatment strategy has been created to ensure patient safety and efficacy. During a pandemic, a dental hospital has adequate dental chairs and personnel to meet the dental needs of a significant number of patients, even if not all patients are required to attend. To lower the risk of COVID-19 transmission, dentistry must undergo significant modifications. According to these standards, there are adequate UDC hubs, allowing patients’ emergency circumstances to be addressed near their homes, hence decreasing the virus’s spread [7].

Throughout the length of the pandemic, telephone triage has been an integral part of dentistry, ensuring that those in greatest need receive emergency care first. It was urged that frightened patients and those with swollen faces send photographs to an NHS email address, as well as call in ambiguous cases. The sharing of photographs aided in assessing whether a patient should be referred or asked to have a clinical evaluation. Practitioners may provide information on analgesics and how to use them in non-emergency situations, in addition to prescribing antibiotics as necessary [8].

The American Dental Association (ADA) and the Centers for Disease Control and Prevention (CDC) recommend eliminating waiting room reading and reducing appointment overlap. Except as otherwise specified, the minimum distance between patients must be 2 meters (6 feet) in each direction. It is advised, for the health and safety of patients, that they wait in their car, if feasible, or nearby the dental clinic, and that they are notified through phone call or text message when it is their turn. Despite the fact that pediatric dentistry is involved, those accompanying young patients are urged to limit their presence in the clinic and wear a protective mask in the waiting area. Based on our most thorough understanding of the situation, healthcare personnel, especially dentists, hygienists, and dental assistants, must comply with stringent clothing and safety equipment regulations. Caps, protective glasses, surgical masks or N95, and disposable gowns are recognised as crucial guidelines for the prevention of disease transmission [9].

2. Dental Treatment Recommendations for the COVID-19 Era

Hand hygiene is considered the first step in preventing the spread of the virus; WHO guidelines require meticulous handwashing before and after any contact with the patient, as well as the use of a rubber dam for containment and protection from oral fluids; it decreases the number of particles in the aerosol by 70% and significantly reduces the risk of cross-infection. If installation is impractical, Carisolv and an excavator should be provided as alternatives. During clinical procedures, high-speed spinning equipment, such as the turbine and the contra-angle, must be equipped with an anti-retraction device to prevent unintended inhalation of dirt and fluids by medical personnel. Meng et al. suggest minimizing the use of high-speed rotating devices; if this is not possible, patients requiring dental procedures including the use of such equipment should be booked for the day’s final session. Moreover, they advise eschewing intraoral radiography in favor of orthopantomography or computed tomography (CT) if absolutely necessary [10].

Due to the risk of exposure to the COVID-19 virus, emergency dental care was difficult to give during the pandemic, making the operation high risk. Therefore, patient consent is necessary prior to make therapy decisions. Extractions must take precedence over restorative operations when infections endanger the airway. For the sake of patient and physician safety, digital follow-up should be prioritized above frequent
patient appointments (such as video conferences). The vast majority of outpatient consultations are currently conducted by telephone [11].

The American Dental Association as part of its emergency recommendations, has incorporated urgent dental care, which focuses on the management of conditions needing immediate attention to alleviate severe pain and/or infection risk. Urgent dental care focuses on disorders requiring minimally invasive treatment, including severe tooth pain due to pulpal inflammation, pericoronitis or third-molar discomfort, surgical post-operative osteitis, and dry socket dressing changes. Abscess or localized bacterial infection resulting in localized pain and edema. Tooth fracture produces localized pain or soft tissue damage. Trauma to the teeth with avulsion/luxation (Figure 1) [13].

Permanent tooth traumatic dental injuries (TDIs) are a frequent reason why children and adolescents require immediate dental care. The most frequent types of dental injuries are crown fractures and tooth luxations. If just tooth structural abnormalities are seen, emergency physicians should evaluate the TDI, manage the patient’s pain, and send them to a dentist; however, if bone involvement is present, they should refer the patient to an OMFS department. In instances of luxation or avulsion, they must move or replant the permanent teeth quickly and refer the patient to a dentist. In the event of an avulsed tooth, they must be familiar with the required abilities or storage media. Due to immature teeth and facial development throughout adolescence, therapies for these younger age groups may differ from those for adults. These Guidelines aim to improve the care of fractured teeth and decrease trauma-related complications. Frequent trauma to the dentoalveolar region causes tooth

Figure 1. Bar chart shows the distribution of patient-side reasons for presentation in dental and maxillofacial emergency services in comparison to the years 2019 (grey) and 2020 (red) [12].
breakage and displacement, bone-crushing and/or fracture, and soft tissue injuries including contusions, abrasions, and lacerations. When concussion or subluxation injuries and mature root development occur simultaneously in teeth, the risk of pulp necrosis and infection is significantly enhanced (Figure 2) [14, 15].

Crown fractures that do not expose the pulp in teeth with lateral luxation significantly increase the risk of necrosis and infection of the pulp, which can be fatal. Dental injury diagnosis relies heavily on radiographs. Tooth root and bone fractures are frequently overlooked when a single radiograph is used. When the clinical symptoms of more serious harm have subsided weeks after a traumatic occurrence, a person may also seek counseling. Therefore, dentists must employ clinical discretion while weighing the advantages and disadvantages of each form of radiography. CBCT improves the visualisation of TDIs, namely root fractures, crown/root fractures, and lateral luxations [16].

This recommendation might be revised based on the progression of the COVID-19 pandemic. Dentists must utilise their professional discretion when determining whether a patient requires urgent or emergency care. The tooth's prognosis is dependent on how quickly dental trauma treatment is delivered. Clinicians must thus understand the appropriate diagnosis and initial therapy for TDI. Avulsion is the most severe kind of documented dental trauma. The loss of an avulsed tooth has both physiological and psychological repercussions (e.g., on phonetics, chewing, and the integrity of supporting structures) (e.g., phonetics, mastication, integrity of supporting tissues). Appropriate first aid care can minimize negative psychological impacts, discomfort, tooth loss, protracted rehabilitation, and expensive costs. The International Association of Dental Traumatology suggests treating avulsed teeth with cautious storage and preservation until replantation is practicable, quick replantation if possible, splinting, and endodontic therapy as a follow-up. The success of reimplantation is dependent on the right storage of the tooth, the extra-alveolar period, the necessary drugs, the patient’s dental cleanliness and overall health, as well as the kind of retention used and the time between endodontic operations [17].

When a permanent tooth was knocked out, expert treatment was “very necessary.” In order to minimize unnecessary suffering, it is essential that parents get detailed advice on how to successfully handle acute symptoms. Root fractures and luxation injuries including avulsion and lateral intrusion can produce excruciating pain. In this circumstance, analgesics are recommended. Occasionally, it may be necessary to apply pressure (e.g., with a cloth) to stop bleeding or to replant or preserve avulsed teeth in cold milk until a dentist can be seen [18].
Managing oral complications and decreasing the risk of COVID-19 spread to employees and patients. Remote consultation (e.g., telephone, pictures, or video conferencing) can assist medical professionals in developing a definitive diagnosis and treatment plan following an acute injury. Throughout the length of the pandemic, telephone triage has been a vital component of dentistry, ensuring that those in greatest need receive emergency treatment first. In addition to documenting the medical history of a patient, this strategy encourages talks with the patient's parents or caregivers to prepare them for what to anticipate and mask-free encounters. An efficient remote consultation may also reduce face-to-face time in the clinic, maximizing the potential use of the facility and reducing the need for Personal Protective Equipment. When feasible, problematic events should be reported to senior coworkers (Figure 3) [19, 20].

Telemedicine is the creative delivery of remote health care using electronic communications and the use of communication and information technologies to offer therapeutic services from a distance. In the 1970s, the World Health Organization (WHO) developed the term to describe the authorized exchange of medical information for the diagnosis, treatment, and prevention of disease and injury through information and communication technologies, with the goal of enhancing patients' health status. Telemedicine cannot be regarded as a unique medical specialty; rather, it is viewed as a tool for healthcare practitioners to disperse conventional medical practice outside the boundaries of traditional medical practice [21].

Applications and services for telemedicine include email, two-way video, wireless tools, smartphones, and further communication technologies. Telemedicine involves group treatment, nurse contacts, teaching and training, tele visits with community health experts, and medical image transfer. Telehealth, in contrast to telemedicine, provides a larger range of remote healthcare services that are not often limited to the clinical context. These services, known as remote nonclinical services, consist of training, medical education, and administrative meetings. The two primary types of telemedicine are store-and-forward telemedicine and real-time telemedicine. Store-and-forward telemedicine does not need communication partners to concurrently transfer data. It is possible to gather, organise, and store data. Data are sent as often as possible to the desired destination for diagnosis or analysis. In addition to the patient's information and medical history, images of skin lesions or electrocardiograms are sent to a physician in the linked area. Real-time telemedicine, like
videoconferencing, needs simultaneous communication between the healthcare provider and the patient [22].

Lienert et al. [23] discovered that telemedical services were beneficial in circumstances requiring dental trauma at a Swiss telemedical center, and they provided crucial support when a specialized dentist was unavailable. MD et al. discovered that teledentistry provides distant, cost-effective professional dental consultations for rural Australians [24]. Utilizing teledentistry for expert consultations, diagnosis, treatment planning, referral and coordination, and continuity of care will provide decision support and allow dentists to transmit patient-specific context information. In place of dental charts and written explanations, actual images of dental problems will be utilised to fulfill second opinions, preauthorization, and other online insurance needs extremely quickly. Teledentistry will also provide the opportunity to improve current dental education teaching methodologies and provide new chances to dental students and practitioners [25].

Teledentistry is not a new field of study. The definition of teledentistry is “the remote diagnosis and suggestion of treatment using videoconferencing technology.” It is an alternative to the standard delivery of dental treatment. The utility of teledentistry in rural and isolated places cannot be overstated. In rural and urban areas with access to specialized navigation, its use is of the highest relevance and value. Teledentistry is a revolutionary aspect of patient treatment that is gaining popularity and importance fast. Incalculable benefits would accrue to patients of a primary care physician who utilizes the tremendous knowledge accessible via teleconsultation. The exchange of information will result in enhanced patient care, and the capacity to engage more effectively with colleagues will increase comprehension of treatment goals [25].

In rare instances, telemedicine for the first visit was permitted with limits. After an initial telemedicine consultation, face-to-face contact was often necessary. With the development and extensive deployment of COVID-19 in 2020, the Japanese Ministry of Health, Labour, and Welfare (MHLW) has relaxed prohibitions on the use of telemedicine and dental telemedicine during the first consultation in restricted and exceptional circumstances. The MHLW has suggested discontinuing dental telemedicine for first consultations once the COVID-19 epidemic in Japan is under control. Due to the COVID-19 pandemic, we analysed the interim authorization of dental telemedicine in Japan in 2020 [26].

Teledentistry’s limitations and constraints must be understood. The most prevalent technical concerns were Internet access and sound quality. All telemedicine mistakes may be categorised as technical, organizational, or severe. Universities and colleges must include telemedicine in their curricula and offer training for doctors. Telemedicine allows physicians to participate in continuing education programs without leaving their existing roles. Teledentistry may thus be used to optimise and lower the cost of dental treatment. Additionally, teledentistry is often used during the anamnesis phase of patient evaluation [27].

Internet is the basis of modern teledentistry systems since it is current, rapid, and capable of delivering vast amounts of data. Recent teledentistry technology and remote consultation methods exist only on the Internet. Today, almost every dentist clinic is outfitted with intra-oral cameras, digital cameras, and Internet-connected computers, allowing for the rapid examination of teledental possibilities. Teledentistry is a novel part of patient care that is rapidly rising in popularity and significance. Practitioners who want to include teledentistry in their practices must educate themselves on the legal, technological, and ethical obstacles posed by this burgeoning field. Dentists are required to take initiative and adapt to the digital
world. They must understand not only how the digital transformation of healthcare will affect their practices, but also how they and their patients may benefit from the expansion of teledentistry. Implementing teledentistry in professional dental education is a realistic and effective strategy for fostering teledental skills [28].

Virtual consultations are a simple method to communicate with your dentist from the comfort of your home in COVID-19 situations. We would want to assist you with any oral issues you may have during the Circuit Breaker. Clinical diagnosis is NOT the aim of the virtual consultation with the dentist. Therefore, a virtual consultation cannot substitute a physical examination for clinical diagnosis. It enables dental office teams to deliver individualized care and diagnostics when on-site visits are impractical or forbidden. During this appointment, a dentist may decide whether you are having a dental emergency and recommend treatment. Due to the benefits of virtual consultation, it is not necessary to take time off from work to see the dentist. Eliminate disease transmission risks and decrease wait times. Evaluate the need for an urgent/emergency visit. Explore several treatment options [29].

Telemedicine is a fascinating new development that improves the quality of medical and health care services as a whole. Practitioners who want to include teledentistry into their practices must educate themselves on the legal, technological, and ethical concerns this emerging subject presents. Dentists are required to familiarize themselves with the electronic environment. They must first understand not only how their practices will be affected by the digital transformation of healthcare, but also how they and their patients may benefit from the expansion of teledentistry [30].

Before you may treat a patient referred to you through teledentistry, you must establish a doctor–patient relationship and get an adequate medical history. If you are considering incorporating teledentistry into your practice, you must assess the criteria below. Before beginning teledentistry therapy, authorization must be acquired from the patient. Before giving treatment through teledentistry, a suitable medical history is required. Thirdly, any dental records generated through teledentistry must comply with the same retention rules as those generated during in-person dental visits. You must adhere to your state’s e-prescribing requirements if you prescribe medications through teledentistry. Dentists who practice teledentistry are required to take every care to ensure the security of their systems, data collecting, and processing of all types of collected data. For example, data encryption, password protection, and user access logs may contribute to avoiding the misuse of the information of the majority of persons and, ultimately, protecting patient privacy [31].

The significance of teledentistry is investigated. Numerous subspecialties of teledentistry, such as teleconsultation, telediagnosis, telemonitoring, and teletriage, perform essential dental practice-related tasks. Teleconsultation reduces the number of non-urgent patient referrals, hence alleviating the strain on already overburdened healthcare systems. Telediagnosis permits the remote diagnosis of oral problems via the transmission of patient data, intraoral imaging, and radiographic pictures. Due to the pandemic, teletriage prioritizes patients in urgent need of dental treatment based on a remote evaluation of their oral health, hence eliminating the need for non-essential travel [32].

Teledentistry is advantageous for both dentists and patients. Teledentistry is helpful for internet-based dental education and training for dentists since it minimizes patient expenditures and remote self-education. Dentists feel that teledentistry may provide novel means of maintaining regular dental practice under non-pandemic settings. Future teledentistry will provide appointment schedule simplification so that new patients may be assessed in two ways. The first stage will consist of obtaining the patient’s medical history and consent, while the second will comprise an in-person
examination, diagnosis, and treatment. The frequency of hospital/clinic admissions would decrease, hence decreasing the spread of COVID-19 [33].

Similarly, to telemedicine, teledentistry has developed as a viable alternative for a number of dental specialties, including endodontics, orthodontics, oral surgery, and pediatric dentistry. Acceptable for identifying children with a reduced risk of developing dental caries. The accurate diagnosis of oral disorders, such as oral cancer, may be difficult in diagnostic dentistry, particularly in low-income regions with limited access to specialized dental treatment. Teledentistry may thus satisfy this requirement and enhance treatment quality [34].

Covid-19 has advocated the use of teledentistry and telemedicine during the current epidemic, a move that has been favorably accepted by both patients and medical professionals. Dentists may integrate teledentistry into conventional dental practice by educating themselves and their staff in this technology field. Teledentistry is a fantastic way to supplement the current insufficient dental system and aid those in need. This project's clinical mailbox for teledentistry was developed to be as user-friendly, time-efficient, and easy as possible in order to overcome these obstacles. Using email templates with links to each digital information booklet allows clinicians to easily personalize each patient's contact by excluding unnecessary details [35].

Teledental care provides obvious benefits for limiting the spread of COVID-19 among younger patients. Some dentists at private dental clinics exploit dental telemedicine to recruit patients. It is seen as a unique strategy that might help improve access to medical and dental treatment. Utilizing 'Attend Anywhere' virtual video conferencing software might enable video consultations to minimize patient foot traffic and aid physicians in managing patient backlogs caused by the cessation of elective services. This necessitates the availability of enough rooms to provide privacy. The current COVID-19 epidemic has prompted dentists to explore alternatives to direct clinical examination for the delivery of healthcare. Virtual dental consultation is distinct from teledentistry, one of the few remote patient treatments and monitoring approaches that do not involve the transmission of the COVID-19 virus [32].

The Internet plays a key role in facilitating good communication between dentists and patients, a need in contemporary society. Despite the limits that prevent individuals from physically meeting, invest in active contact through email, social media, the telephone, and video chat. A new aim is to feel comfortable and protected when obtaining medical advice or services. Thus, we are better able to interact with and connect with the global community [36].

Teledentistry's clinical uses include patient record keeping, diagnostics, and clinical decision-making. Teledentistry helps impoverished individuals to get dental treatment. In addition to its therapeutic benefits, teledentistry may be useful in eradicating inequities and fostering equitable access to oral health care. The technology used in teledentistry permits the rapid transmission of photos, data, and papers and gives practitioners access to this information [25, 37].

Despite the vast number of specialties that may benefit from teledentistry and the variety of applications, there are still restrictions on the transmission and use of information technology. Digital photographs may be useful for recognizing obvious issues, but they have their limitations. Photos provide a two-dimensional depiction of three-dimensional objects, which may diminish diagnostic accuracy. Teledentistry requires the use of high-quality pictures, which are unavailable at all remote clinics and facilities. The expensive expense of teledentistry for both governments and people is a serious barrier. Teledentistry is a fast-expanding subject with enormous promise, but it is still in its infancy, and greater focus must be made on the
distribution of money and grants for more clinical research to offer more data and establish the position of teledentistry in the delivery of oral healthcare [33].

3. Conclusion

Dentistry forms an important part of our healthcare system, which has become severely compromised during the current pandemic of COVID-19. Teledentistry can be used to successfully record a patient’s chief complaint and medical history and to assign the number of missing and filled teeth at acceptable levels. However, teledentistry tends to overestimate the number of decayed teeth. The need of the hour is to incorporate teledentistry into routine dental practice. If not fully replaced, at least teledentistry can complement the existing compromised dental system during the current pandemic.

Recommendations

For oral screening, teledentistry may be similar to face-to-face technology, especially for school-based programmes, caries assessment, referrals, and teleconsultations. Several studies comparing teledentistry to traditional clinical evaluation revealed that teledentistry is less sensitive. Therefore, the validity of teledentistry and telemedicine in dental specialties requires further research.

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Conflicts of interest

The authors declare no conflict of any interest.

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Emergency, Nonemergency Care


