

TELEDENTISTRY IN PAEDIATRIC DENTISTRY: REVIEW

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ABSTRACT

The coronavirus disease-2019 (COVID-19) pandemic has forced the suspension of all healthcare operations other than emergency services. These circumstances made it necessary to put in place a digitally accessible healthcare delivery system that will help most children as well as healthcare professionals. This review seeks to offer a solid model of less technique-sensitive, safe, and practical solutions for orthodontic emergencies, endodontic and restorative issues, and oral traumatic injuries while waiting for complete clinical assistance. From 2011 to 2021, 533 publications were retrieved from the PubMed, Google Scholar, Embase, Lilacs, and Cochrane databases. There were 19 papers that discussed teledentistry during the COVID-19 era. Teledentistry can be a crucial patient management approach that can help in prioritizing urgent and elective patient treatment needs. This will ultimately lessen the pressure on clinics and offer a safer form of consultation.

Keywords: teledentistry, telehealth, teleconsultation, pediatric dentistry, COVID-19

INTRODUCTION

Dentistry is thought to be the field most likely to be affected by the COVID-19 pandemic since it deals with the naso-oro-pharyngeal area and requires close observation, evaluation, diagnosis, and therapeutic measures (1). The World Health Organization (WHO) declared this extremely dangerous new coronavirus SARS CoV-2, whose epicenter was Hubei province in China, as a health emergency of global concern on January 30, 2020. (2). Even after a year, people continue to experience suspensions of ongoing dental procedures outside of addressing urgent requirements all across the world (3–5). The second wave of the pandemic has witnessed an increase in the number of pediatric cases of COVID-19 infection, with cases being more severe and carrying a higher risk of transmission (6, 7). Due to this, it is critical for pediatric dentists to prioritize, evaluate, and manage patients carefully. The most sensible strategy used by all nations to manage patients presenting with health issues both during lockdown and otherwise has been the adaptation of a telemedicine model during these trying times. Advisories emphasize using telehealth to manage the majority of COVID-19 patients in their homes under the direction of a treating physician (8). This strategy has been shown to be effective in dentistry because it complies with social distance rules and stops the spread of the virus. Cook stated in 1997 that "teledentistry" is "the practice of employing video-conferencing technologies to diagnose and provide treatment suggestions over a distance" (9, 10). In teledentistry, clinically derived information and pertinent photos are exchanged for consultation and treatment planning. This type of telehealth combines telecommunications and dentistry. The idea has proven to be helpful for the ongoing provision of essential healthcare services under challenging pandemic scenarios (11). The learning and referral strategy required to reduce direct contact between patients and doctors has been made easier by innovations in the form of mobile applications and other digital advancements.

Types of Teledentistry

1. Real-Time Consultation or Two-Way Interactive/Synchronized

In order to arrive at a diagnosis within the same appointment, real-time consultation involves video conferencing between a dentist and a patient with simultaneous exchange of information, medical history, and reports. It also facilitates rapid information sharing and reporting with a specialist or dentist who is a peer. A user in a remote or distant site can obtain real-time visuals or sound from an originating site using two-way

interactive technology (26–31).

2. Store and Forward Asynchronous

Teledentistry The treating consultant receives the information from one site, stores it, and then transfers it to another location. After being reviewed or saved in the system, pertinent data in the form of x-rays, pictures, and scanned images is uploaded and sent to the consultant.

Before referring or monitoring the patient, this system is helpful for consulting a specialist or team from a separate location, city, or country. After getting previous authorization, the data may be used to inform colleagues. Many websites also offer a pattern of asynchronous consultation for retrieving a potential diagnosis by entering serology or pathology results (30, 31).

3. Patient Remote Monitoring

For the sake of healthcare and supporting management, health information and other medical data are exchanged electronically from one site to another.

4. **Mobile health (mHealth)** is the use of mobile communication devices, such as smartphones, tablets, laptops, and personal digital assistants, to promote public health practice and education (PDAs).

Model for telehealthcare

Teletriaging

Teletriage can be used to manage patient classification according to the urgency of the therapy. Whether a patient's condition is elective or emergent can be determined by the dental team or front office. Emergency cases can be given priority, elective cases can be booked for teleconsultation at a convenient time, and appointments can be moved to a more suitable time (12). "Forward triage" manages non-emergent patients before they reach a hospital, which lessens the strain of a caregiver (32, 33). It anticipates potential crises and stops superfluous movements during pandemics.

Teleconsultation

The core of the telehealth approach is interactive consultation with a clinician via telephone or video conference. If the software supports numerous participants at once, expert consultation may also be added. A teleconsultation is a virtual visit that includes the exchange of the principal complaint, medical history, most current and prior laboratory reports, extraoral photographs, intraoral images, dental cast photographs, radiographs, and inspection.

Telediagnosis

A diagnosis is developed once the information gathered during the teleconsultation is analyzed. The patient is given a projected diagnosis and a developed treatment plan. In the past, Haron et al. tried to create "Mobile Mouth Screening Anywhere (MeMoSAXR)" to find oral cancer (34). As a solution to oral cancer screening, the creation of a tablet-based mobile microscope (Cellscope Device) was also influenced by limited access to specialists (35).

Telemonitoring

Patients have never given follow-ups and regular checks in dentistry a high importance. Telecommunications can be used to monitor postoperative situations in an efficient manner. By filling out online forms, participating in planned phone conversations, or participating in video conferences, you may assist ensure good oral health and foresee treatment failure (36).

Pediatric Dentistry Relevance

The American Academy of Pediatric Dentistry (AAPD) has added a resource page for COVID-19, titled "Re-emergence," to the most recent edition of their reference manual, AAPD 2020-2021. They do this because they recognize COVID-19 as an ongoing problem on a local and international scale with an increasing number of cases among children. A Report on the Re-Entry of Pediatric Dental Practice During the COVID-19 Pandemic" (13), which also contains the parent-FAQ statement (37). The execution of public health measures and their effects on the provision of oral healthcare when dental practice was suspended are also highlighted.

Teledentistry adoption in routine practice:

1. Hosting monthly webinars and virtual continuing dental education programs to help practitioners evaluate the different new software and technological platforms available for teledentistry. 2. Hospital-based software with stepwise patient triaging can be used to disseminate methods for dentists to manage patients effectively. The hospital-based software can also be transformed into a self-help tool that allows patients to find themselves in accordance with their primary complaint and contact an expert for assistance by making a call or starting a chat. Private dental offices, where patients can directly ask their treating dentists for assistance, can use a different

strategy of offering management alternatives. A dental clinic or hospital may need to perform a definitive operational, endodontic, orthodontic, or surgical procedure on a child as part of their treatment plan. To reduce the need for dental clinic visits, we suggest a model of teledentistry-assisted management of pediatric dental issues during the COVID-19 pandemic that can be enhanced with video-based and live teleconsultation demonstrations. It provides at-home suggestions for non-emergency issues that can be distributed to parents and caregivers via teleconsultation mode. This strategy's primary goal is to assist during pandemics when people are unable to seek professional, conclusive care because of the risk of infection, overcrowded hospitals, and a lack of operating dental offices during lockdowns. Tables 1, 2 provide descriptions of the suggested specialized problem-oriented management paradigm. These tables outline suggested guidance and potential adjusted management depending on predetermined standards. It must not take the place of the decisive care needed for a patient in a dentist office, which entails a careful clinical examination and other testing for an appropriate diagnosis and course of treatment (14, 38–47).

Recent Teledentistry Evidence

Before creating any viable models of action, it is crucial to gain updated knowledge of the usage, practical applications, and difficulties of teledentistry because the dynamics of the pandemic are changing over time. In a study by Dusseja et al., it was shown that 80.5% of participants preferred teledentistry over traditional dentistry, and that nearly 70.7% of respondents were unwilling to visit dental offices during the COVID-19 pandemic. 58% of those who responded to the survey received prescriptions via WhatsApp, 35% by phone, 5% via video chat, and 2% via e-mail and other channels (17). Similar results were found in a study by Davies et al., who found that more than 50% of photographic referrals led to the prescription of either guidance or antibiotics without the requirement for face-to-face interaction. The bulk of the photographs obtained during the study period were of edema, pain, and oral injuries in children 10 years of age and younger (18). Additionally, according to a Statista survey, 97% of people between the ages of 16 and 54 currently own a smartphone that can take pictures and send emails (48). In a study by Rahman et al., dependability of the teledentistry system, effectiveness in accessing clinical services, and patient satisfaction were all assessed. The results showed that 94% of respondents were happy with telephonic consultation and would use it again in the future. The majority of responders were able to communicate effectively and adequately (19). According to SenTunc et al., a recent study from Google on interest trends on self-medication during the COVID-19 epidemic showed an increase in the amount of searches on the topic. This shows the need to reach out to the community in various methods, one of which can be through teledentistry (20). A few more acceptance-focused studies using teledentistry consultation for pain as well as for monitoring and follow-ups have seen positive results. Numerous dental specialties, including orthodontics, maxillofacial surgery, and pediatric dentistry, have benefited from teledentistry (21–23).

Obstacles to Teledentistry Use

1. **Technology:** Clinicians may find it challenging to accept teledentistry due to the complexity of technology because they may be reluctant to pick up and use a new skill.
2. **Implications for daily life:** An obstacle to making an appropriate diagnosis may include the inability to do a tactile examination of the lesion/oral cavity and two-dimensional images, as well as improper evaluation of interproximal contact and the posterior-most teeth (24). Clinicians may become anxious about providing the erroneous diagnosis and the improper course of treatment.
3. **Communication:** Although numerous surveys show that teledentistry is becoming more and more popular, patient acceptance due to a lack of in-person communication may hinder the adoption of a devised treatment plan.
4. **Lack of infrastructure in rural areas,** including a lack of internet access, computers, smartphones, x-ray machines, and other advanced tools for diagnosing dental lesions, giving them to patients, or transferring patients to specialists in other areas (25).
5. **Privacy:** Despite stringent legal penalties for patient privacy breaches without agreement, the absence of privacy in transferred information may be a barrier to winning patients' trust. All healthcare professionals and telehealth portals are recommended to adhere to the Health Insurance Portability and Accountability Act (HIPAA) (1).

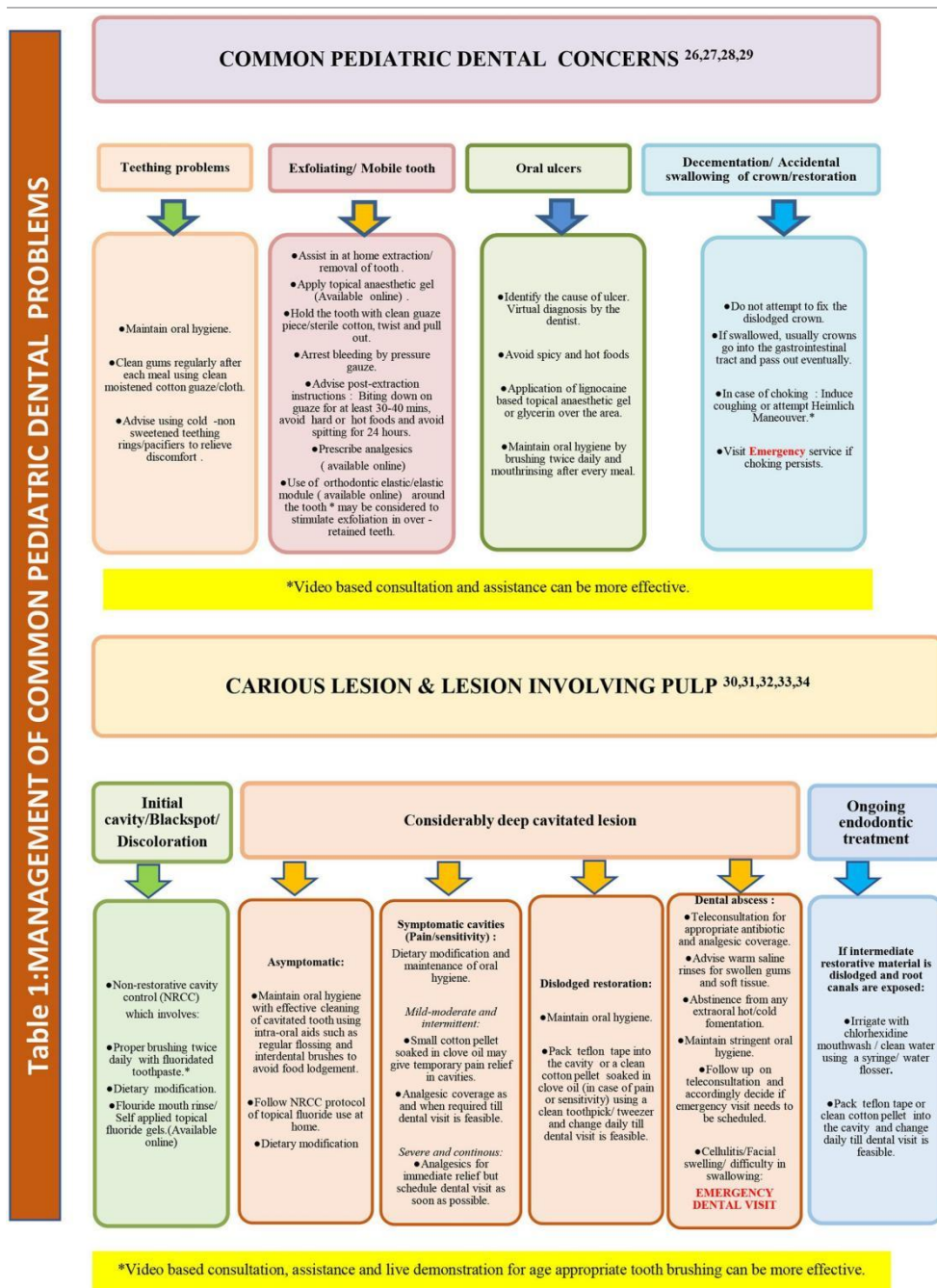


TABLE 1 | Management of common pediatric dental problems.(adapted from: Goswami M, Nangia T, Saxena A, Chawla S, Mushtaq A, Singh SR and Jain P (2021) Practical Applicability of Teledentistry in Pediatric Patients Amidst Pandemic : A Narrative Review. *Front. Dent. Med.* 2:748089. doi: 10.3389/fdmed.2021.748089)

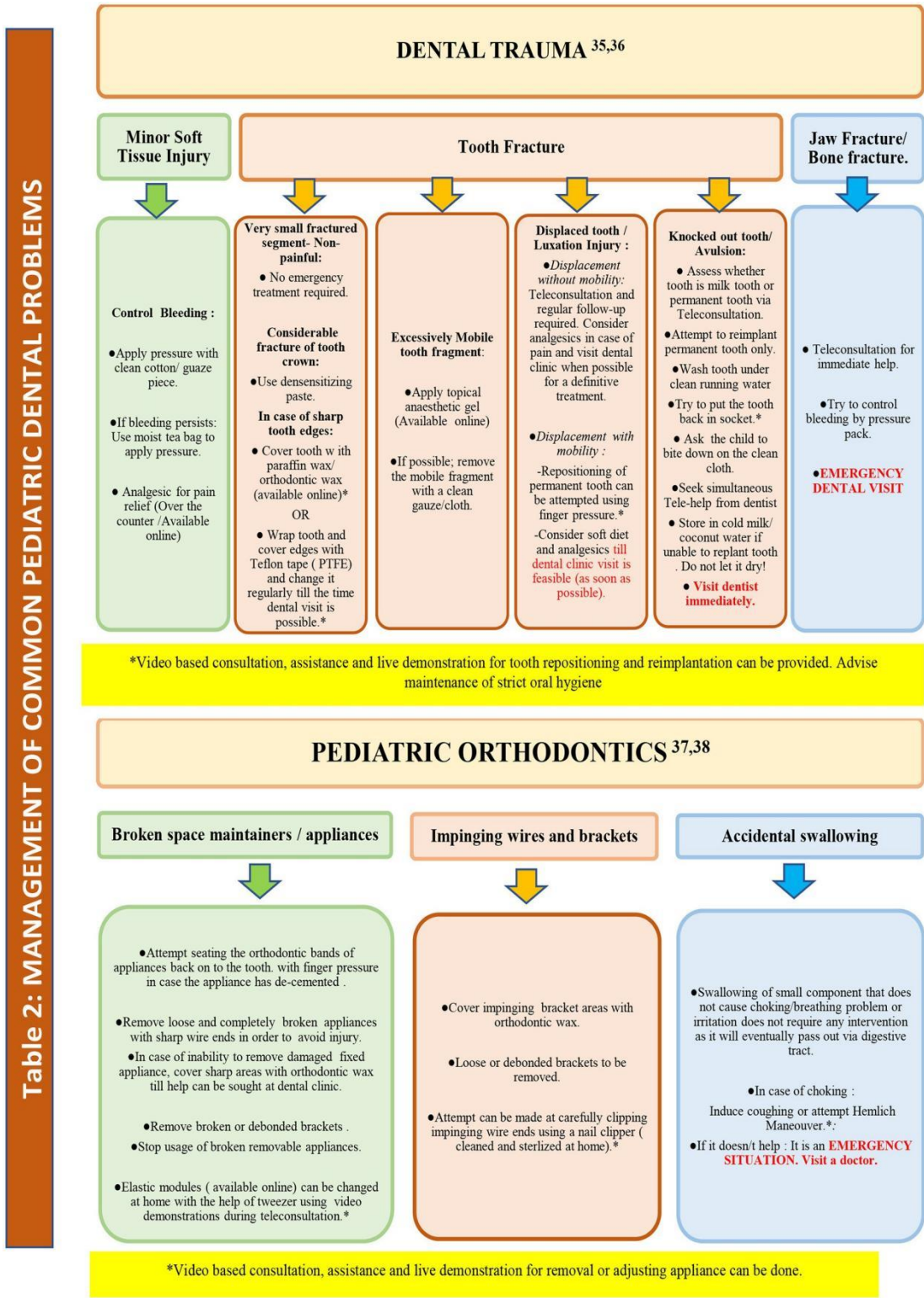


TABLE 2 | Management of common pediatric dental problems. (adapted from: Goswami M, Nangia T, Saxena A, Chawla S, Mushtaq A, Singh SR and Jain P (2021) Practical Applicability of Teledentistry in Pediatric Patients Amidst Pandemic : A Narrative Review. *Front. Dent. Med.* 2:748089. doi: 10.3389/fdmed.2021.748089)

SUMMARY

Telemedicine has been widely used in the COVID-19 pandemic. Dentistry in the newer times does not only rely on technological advancements in terms of armamentarium and instruments but also ways to reach out to patients using convenient and advanced modes of communication media that include teleconsultation support

anytime and anywhere as well as internet-based social media platforms for creating health awareness and disseminating valuable information to patients during times of crisis. Teledentistry can, therefore, serve as a vital patient management strategy that aids in triaging urgent and elective patient treatment needs, ultimately easing the burden of clinics and at the same time providing a safer means of consultation.

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