

## Teledentistry and its application in pediatric dentistry: A literature review



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### ABSTRACT

During the unfortunate scenario of the COVID-19 pandemic, restrictive measures were implemented in face-to-face dentistry interactions, aiming to promote social distancing and contain the spread of the virus. Given this context, teledentistry has

emerged as a solution to offer dental services. The purpose of this article is to review the literature and available information on the provision and use of teledentistry as a method to meet the oral health needs of pediatric patients. Teledentistry has been applied in the pediatric population for oral health education and promotion, remote diagnosis and monitoring, and behavior guidance. This strategy has been shown to be beneficial in enabling dental treatment in remote locations with limited access to pediatric dental specialists. In addition, teledentistry has been shown to be useful in monitoring between appointments, conducting remote diagnosis and screening programs, promoting oral health through dental education, and providing pre-consultation behavioral guidance. This method has proven especially effective during the COVID-19 pandemic, allowing dentists to conduct consultations via their mobile devices and webcams, maintaining a safe distance and avoiding exposure to the virus, both for themselves and patients. Additionally, teledentistry can function as a complement to in-person pediatric dental care methods, resulting in more effective patient management.

**Keywords:** Dentistry, pediatric dentistry, technology, teledentistry.

## 1 INTRODUCTION

"Telemedicine" refers to the provision of health services at a distance through the electronic generation of information, using telecommunications technology and infrastructure. This approach encompasses diagnosis, consultation, disease treatment, and patient education (Waller & Stotler, 2018). The increasing use of mobile phones and wireless technologies globally has impacted the dental practice. "Teledentistry" is a dental branch that uses the internet and information technology, applying the concept of telemedicine to oral health (JAMPANI *et al.*, 2011; MARINO & GHANIM, 2013).

The expression "Teledentistry" is the practice of using videoconferencing technologies for remote counseling and diagnosis in Dentistry. Originating from the concept of dental informatics, Teledentistry has its roots in the "Total Dental Access" project of the United States Army, implemented in 1994 (FRICTON & CHEN, 2009; JAMPANI *et al.*, 2011; GILL *et al.* 2022).



Teleconsultation occurs in real time, involving videoconferencing between dental professionals and patients, or through the storage and referral method, with the exchange of information and images for consultation and treatment planning by specialists (CHEN *et al.*, 2003). This approach provides a comprehensive interdisciplinary platform for communication between practitioners, with the introduction of mobile-supported mobile health (mHealth) applications (MARINO & GHANIM, 2013; WALLACE *et al.*, 2021).

The aim of this study is to review the literature and analyze the available information on Teledentistry as a method aimed at meeting the oral health needs of pediatric patients.

## 2 MATERIALS AND METHODS

This study consists of a literature review, using articles from the following databases: Scientific Electronic Library Online (SCIELO), Latin American and Caribbean Health Sciences Literature (LILACS), Brazilian Bibliography of Dentistry (BBO), Google Scholar and National Library of Medicine (PUBMED/Medline). The descriptors used were "Teledentistry", "Odontopediatria" (Pediatric Dentistry) and "Odontologia" (Dentistry).

## 3 LITERATURE REVIEW

Teledentistry has been shown to be beneficial for oral health education and promotion in children, in the diagnosis and monitoring of pediatric dental patients in distant locations with limited access to dental care, and in the behavioral guidance of pediatric patients (MACAPAGAL, 2020). This approach proves to be particularly valuable in pandemic situations, as it contributes to the reduction of contact between patients while ensuring a safe distance. At the same time, it avoids the exposure of dental staff and dentists, who use devices such as cell phones, webcams, intraoral cameras, and dental applications connected via the internet (ACHMAD *et al.*, 2020; GHAI, 2020).

### 3.1 ORAL HEALTH EDUCATION AND PROMOTION

Children's oral health is vital to overall well-being, encompassing physical, social, and mental aspects. Advancement in the technology industry enables pediatric dentists to improve access to dental services and promote healthy behaviors

(KOPYCKA-KEDZIERAWSKI *et al.*, 2007). Oral education programs through mobile technology have been successful in attracting the attention of the public, especially the child population, taking advantage of the growing number of mobile and internet users (WALLACE *et al.*, 2021; DI SPIRITO *et al.*, 2022).

Children, adept at technology, are more engaged in its use than adults (KOPYCKA-KEDZIERAWSKI *et al.*, 2007; BRECHER *et al.*, 2021). Social media applications, including during



the COVID-19 pandemic, have been popular among dental professionals for interacting with patients. In short, the use of mobile apps and the internet raises awareness about oral health, provides effective communication for remote communities, and addresses the shortage of oral health professionals (MARIÑO *et al.*, 2014). These applications, while offering benefits, require simplicity, respect for privacy, and an attractive design to ensure effectiveness and continuous engagement (BRECHER *et al.*, 2021).

### 3.2 REMOTE DIAGNOSIS AND FOLLOW-UP

Children and adolescents are the main group for the early diagnosis and prevention of oral diseases. Despite efforts to improve children's oral health, disparities persist due to geographic and socioeconomic barriers. This lack of access to dental services demands efficient methods, and Teledentistry, through electronic records, information technology, the internet, and digital devices, has accelerated the provision of these services, providing access to children in distant locations (ALABDULLAH & DANIEL, 2018; BHAMBAL & BALSARAF, 2010).

Teledentistry encompasses several applications, such as teletriage, teleconsultation, telediagnosis, and telemonitoring. Telediagnosis uses imaging to diagnose pathologies remotely, while teletriage prioritizes patients who require urgent care by remote assessment (BRECHER *et al.*, 2021). This provides safe access to dental care, reducing the need for unnecessary travel, especially for patients in remote areas. Despite the advantages, there are challenges, such as the quality of photos and the learning curve when using cameras, highlighting the need for adequate remuneration and training for dental professionals who adopt teledentistry (KHAN & OMAR, 2013; ISLAM *et al.*, 2022).

### 3.3 CHILD BEHAVIOR

During the pandemic, there was the conventional application of behavioral guidance techniques in pediatric dental patients due to the use of Personal Protective Equipment (PPE), such as the N-95 mask, face shield and disposable aprons. These devices, while essential for safety, hide the facial expressions of pediatric dental professionals and limit verbal communications, contributing to increased fear and anxiety in children during dental procedures (ALSALEH *et al.*, 2020; SALES *et al.*, 2021). In this context, mobile applications accessible in the home environment emerge as a viable solution to guide children's behavior in the dental clinic, providing an effective alternative in the face of the limitations imposed by the extensive use of PPE (BRECHER *et al.*, 2021).

Mobile gaming apps stand out as interactive tools that offer children an engaging approach to guiding their behavior, making them particularly useful in reducing face-to-face contact during the pandemic by minimizing the number of dental visits. Incorporating proven behavioral guidance



techniques such as "show and tell," positive pre-visit imagery, distraction, and modeling, these apps contribute to the promotion of a less intimidating dental environment. However, it is worth noting that the creation of these applications requires time and effort from dental professionals, although it contributes to optimizing the direct interaction between dentist and patient (ALSALEH *et al.*, 2020; SALES *et al.*, 2021; PREDA *et al.*, 2022).

In addition, mobile dental apps, which are provided to pediatric patients before their first visit, play a crucial role in building an anticipated positive image. The expression "previous positive image" refers to the presentation of photographs related to dentistry and dental treatment, allowing the child to enter the waiting area already comfortable, relaxed and familiar with the office environment (FARHAT-MCHAYLEH *et al.*, 2009; ISLAM *et al.*, 2022). Considering the current scenario of the pandemic, these strategies can be leveraged through social media applications, such as YouTube, which allow children to watch informative videos before their appointments, if necessary (FARHAT-MCHAYLEH *et al.*, 2009). By adopting principles of the "show and tell" technique, these apps provide an effective educational approach, reducing dental anxiety during the first visit and contributing to building a more positive relationship between pediatric patients and the dental environment (PREDA *et al.*, 2022).

### 3.4 CHALLENGES AND BENEFITS

Teledentistry offers the possibility to expand the provision of children's dental care at affordable costs, especially in remote areas with a shortage of pediatric dental specialists, eliminating the need to travel through virtual consultations. Not only does this approach provide convenience for children and parents by avoiding disruption to school or professional activities, but it also assists dentists in triaging patients requiring urgent care, reducing the workload in busy offices (SALES *et al.*, 2021; PREDA *et al.*, 2022).

Despite the benefits, the applicability of Teledentistry in everyday dental practice faces challenges such as lack of consumer awareness, infrastructure-related issues, and resistance to new technologies, requiring efforts to overcome these barriers and establish clear guidelines for reimbursement and regulation. However, current limitations, similar to those found in telemedicine, include obstacles such as lack of consumer awareness, financial issues, inadequate infrastructure, and resistance to adoption of new technologies by dentists (FARHAT-MCHAYLEH *et al.*, 2009; ISLAM *et al.*, 2022). Overcoming these challenges will require training of practitioners, provision of informed consent to patients, and additional research on the financial effectiveness of teledentistry, as well as the need for clear reimbursement policies and government regulation to drive its global acceptance and consistent incorporation into dental practice (FRICTON & CHEN, 2009; DI SPIRITO *et al.*, 2022; ISLAM *et al.*, 2022).



#### 4 CONCLUSION

Teledentistry, based on the internet and technological advancements, can complement face-to-face pediatric dental care methods, resulting in more effective patient management. Dentists can use this technology for patient education, post-treatment monitoring, dental disease diagnosis, and pre-visit guidance to reduce anxiety in child patients. This advancement can help close the gap between supply and demand for pediatric dental specialists where services are limited. Despite some challenges, Teledentistry can be a tool for long-term dental care, requiring efforts from health authorities and pediatric dentists.



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